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# WILDLIFE USE OF MANAGED FORESTS - A LANDSCAPE PERSPECTIVE

## West Side Summary Report

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TIMBER FISH
&WILDLIFE

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# WEST SIDE STUDY PLAN

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## INTRODUCTION

The managed forests of Washington State encompass approximately 17,305,000 acres (7,003,333 ha) of which about 63% are on State and private lands (Card et al. 1985). The Timber Fish and Wildlife (TFW) Agreement (1987) introduced both a framework for management practices on State and private forests, and a mechanism to evaluate and modify management practices to achieve stated resource goals. A critical question facing TFW resource managers is how to balance the TFW wildlife goal to "provide the greatest diversity of habitats (particularly riparian, wetlands and old growth), and to assure the greatest diversity of species within those habitats for the survival and reproduction of enough individuals to maintain the native wildlife of Washington forest lands" with the timber resource goal of "...continued growth and development of the State's forest products industry..." (Timber Fish and Wildlife 1987).

Franklin and Forman (1987) have proposed that the number, size, and arrangement of stands in a managed forest landscape could be modified to achieve different wildlife objectives. However, we must first be able to analyze and predict wildlife responses to varying landscape conditions. The response of wildlife species to local stand conditions has been hypothesized for certain species (see Thomas 1979, Brown 1985, Irwin et al. 1989), but these responses have so far only been evaluated in the field in unmanaged forests (Ruggiero et al. 1991); no comprehensive research on wildlife communities in managed forests has been conducted in the Pacific Northwest. Even less is known of the response of wildlife populations and communities at the landscape scale. We propose to develop a database of knowledge and methods to evaluate wildlife responses to changes in forest habitat conditions as a result of timber harvest at the landscape scale. These are the tools that resource managers must have to accomplish the wildlife habitat objectives of the Timber Fish and Wildlife Agreement (1987).

Analysis of wildlife habitat relationships can be approached from a hierarchical perspective (e.g., Urban et al. 1987, Irwin et al. 1989). Irwin et al. (1989) identified 3 spatial scales in managed forests - landscape, stand, and gap - with 3 corresponding wildlife habitat analysis levels. At the stand scale, we are concerned with habitat features such as stand size, shape, and seral stage. When we view managed forests from a landscape perspective, however, we are concerned with the spatial and temporal patterns occurring among stands. At the landscape scale we consider, for example, distances between stands, connectivity of stands, and conditions surrounding stands. The response of wildlife populations at stand and landscape scales will depend upon the particular life history characteristics of a species, the environment (habitat and other species present), and the species' population structure, which reflects the interaction of life history and the environment (Gilpin and Soule 1986).

Primary concerns in this study of wildlife in managed forest landscapes are the responses of wildlife species to harvest regimes that affect the composition, size, and juxtaposition of habitat stands. The interaction of stand size and type, characteristics of adjacent stands, isolation of stands, and mobility of species will influence species composition in a stand despite potentially high habitat suitability (e.g., Lehmkuhl and Ruggiero 1991). For example, individuals of species with small home range requirements and limited dispersal capabilities might be restricted to a single forest stand. If a stand is too small it might be unable to support a viable population (i.e., births < deaths) over time and the limited mobility of the species might preclude recolonization. Individuals of more dispersive species might intermittently inhabit the stand by immigrating from nearby "source" habitats, but be incapable of reproducing there (i.e., a "sink" habitat). This is the "source-sink" effect (Van Horne 1983, Pulliam 1988). Wide-ranging species can move between stands to exploit preferred resources, but the spatial distribution of stands can affect their use of habitat as well (e.g., Milne et al. 1989). In such a case, isolated stands of preferred habitat might not be used by these animals, whereas stands of less preferred habitat might be used if they are in close proximity to more suitable stands. Given the potentially varied and complex responses of wildlife to the distribution of stands in a managed forest landscape, we believe that it is necessary to examine wildlife habitat relationships at the stand scale in addition to anlyzing effects resulting from the landscape context of the stand.

The May 1991 workshop with the Project research team, WSC members and outside consultants, and a later meeting of the WSC and the research team resulted in a number of recommendations to modify the objectives stated in the Request for Proposals (RFP). The objective of determining habitat relationships that significantly affect the long-term population viability of wildlife species was dropped due to a realization that such analyses were beyond the scope of this broad, exploratory research project. Rather, data collection would focus on defining as yet unknown habitat relationships in managed forests at the stand and landscape scales. A second objective, to produce a highly-structured, predictive computer model of landscape-scale habitat relationships having widespread application to forest wildlife management, was also dropped as being unrealistic within the scope of this project. We agreed, however, that the research team would develop methods for assessing landscape-scale influences on wildlife in managed forests. Some of those methods will certainly include modelling efforts and the use of Geographic Information Systems (GIS), but will not be a highly structured and rigorously validated simulation model. The revised objectives of the project are to:

- describe the species composition and abundance levels of wildlife and plant communities occurring in forest stands of varying structural stages and landscape configurations in watersheds managed primarily for timber production;

- develop methods for analyzing wildlife responses to landscape-scale habitat conditions in managed watersheds.

# TECHNICAL APPROACH

## Development of the Study Design

Milne et al. (1989) review some of the difficulties in predicting the occupation or use of habitat at the landscape scale. These problems include: (1) At some times the landscape may be "unsaturated" with organisms and thus many suitable areas may be vacant. This possibility reduces our ability to accurately describe the habitat requirements of wildlife species; (2) Humans may recognize different landscape variables to which other species may perceive no difference; (3) Models based on the analysis of correlations between animal abundance and landscape variables which lack explicit spatial information, make it difficult to translate correlational relationships to maps; and (4) If populations are monitored infrequently, our ability to describe spatial variation in habitat use will be reduced. Thus the success of habitat modelling will be contingent on animal density, human perceptions, spatial information, and temporal variation in wildlife populations and habitat needs (Milne et al. 1989).

The study design must meet these challenges and still be logistically feasible. In evaluating the types of approaches that one might develop for studying wildlife habitat relationships at the watershed scale, we considered the following 2 approaches:

**(1) Wildlife-habitat relationships based on sampling conducted at the landscape scale.** The variables in this analysis would describe the spatial composition of many (20-30) watersheds as the main sample units. Variables might include habitat diversity, diversity at any point in the landscape (i.e., contagion), and the shape of habitat patches (i.e., fractal dimension). These types of variables could be calculated easily from map data entered into a GIS. Wildlife sampling would be conducted throughout each watershed on a very broad scale (e.g., by running transects). Vertebrate sampling conducted at the scale of entire watersheds would, by necessity, result in data with relatively low predictive power, such as presence-absence data. The landscape variables could then be used, for example, as independent variables in a regression model to predict such wildlife community characteristics as species richness or patterns of abundance among species.

Although this approach seems appealing, it has several critical problems. First, obtaining an adequate number of samples (i.e., watersheds) for statistical analysis is difficult due to the necessity of sampling terrestrial vertebrates throughout entire watersheds. Second, by sampling different sets of watersheds in each year to increase sample size, one loses the ability to examine or account for temporal variation in species abundance. Third, the extensive sampling across landscapes that is needed for this approach precludes collection of precise stand-scale data that are largely unknown for managed forest stands. Finally, we might find that many wildlife species do not respond to the landscape variables that we perceive or measure making model development unachievable. Initial work in the Pacific Northwest thus far indicates that the predictive power of landscape variables is weak (Lehmkuhl et al. 1991).

**(2) Wildlife-habitat relationships based on sampling at the stand scale.** In this approach, terrestrial vertebrate groups would be sampled in stands occurring along a gradient of landscape conditions. Selected stands would vary both in structural stage and landscape context (i.e., spatial relationship of a stand to others in the watershed). This approach would allow statistical analyses of wildlife habitat relationships at both the stand and landscape scales. For example, one could attempt to predict components of wildlife community composition within stands according to variables of type and context and then integrate these stand-scale results into a landscape-scale model.

We selected this approach because it provides a sufficient sample of stands for analysis, a high resolution of important stand-scale habitat relationships, and incorporates most of the spatial variation of the watersheds. Temporal variation in habitat use will also be examined by sampling each of the stands and watersheds each year of the 3-year study.

### Development of a Landscape-Scale GIS Database

The first step in implementing our sampling design was to develop a means of discriminating between managed landscapes according to the age, size, and pattern of forest stands, and the intensity and manner in which these landscapes have been logged. We began by stratifying landscapes according to management history. Target landscapes were those consisting primarily of second-growth Douglas-fir dominated forest in southwestern Washington. We used Landsat Thematic Mapper (TM) imagery to create a surrogate structural-stage classification based on species, canopy structure, and stand age. With these data, we developed a GIS methodology that enabled us to classify landscapes by age class, subdivide the landscape by watershed, calculate the pattern or character of the landscape, and examine areas for their management intensity and potential as study areas (see Young et al. 1993 for a detailed description of our analytical approach).

We classified each 25-m TM pixel into one of 5 habitat classes (4 forest age classes and 1 "other" category) using both unsupervised and supervised classification procedures. Age classes identified were 3-8 yr, 10-20 yr, 50-80 yr, and >80 yr; forests in the 20-50 yr age range could not be confidently separated from other forest types with the data available to us. To facilitate the processing of this very large and spatially extensive dataset, we resampled the original classification to 100 x 100 m (1 ha) pixels using a nearest-neighbor resampling algorithm. We quantified the range of landscape patterns present in our dataset by subdividing the age-class map into major watersheds (60,000-81,000 ha) using boundaries provided by the Washington State Water Resource Inventory Area (WRIA) classification. This divided the area encompassed by the satellite imagery into 68 whole or partial watersheds (basins). To ensure that basins considered for sampling in this study were similar in ecological and physiographic characteristics, so that major differences among landscapes would result primarily from management history, we selected the subset of 19 basins located west of the Cascade crest and east of the Puget Trough Physiographic Province (Franklin and Dyrness 1973) for further analysis.

We assessed variation in landscape conditions in each of these 19 basins by calculating standard landscape indices (diversity, dominance, and fragmentation) and found that the range of index values among watersheds was narrow, i.e., most of the variation in landscape pattern was occurring within basins. To provide a more useful unit of landscape analysis, we subdivided each basin into sub-basins (3rd-order watersheds) ranging in size from 4,000-12,000 ha according to guidelines provided by the Washington State Department of Natural Resources (DNR) for delineating a Watershed Administrative Unit (WAU). This procedure resulted in 119 sub-basins mapped by age class. To further refine this dataset for our study objectives, we screened out those sub-basins that were over 5000 ft in elevation; located in Wilderness Areas, National Parks, National Monuments, or Wildlife Refuges; or that had been strongly influenced by the 1980 eruption of Mount St. Helens. We also eliminated sub-basins that had >20% old-growth forest or less than 20% in the 3-8 yr age class, as these landscapes would not be representative of intensively managed landscapes. This resulted in a total of 79 sub-basins to use in describing the range of landscape conditions occurring in intensively managed forest landscapes in the southwestern Washington Cascade Range.

Areal amount of each forest age class, the distribution of stand sizes, and 3 indices of landscape pattern (dominance, contagion, and fractal dimension) were calculated and evaluated to describe the range of available stand conditions in these 79 sub-basins. To establish a landscape pattern gradient, we used principal components analysis (PCA) to reduce information in the original variables to 4 independent components, and then grouped the sub-basins using cluster analysis on the principal components loadings. We then used discriminant function analysis to test the strength of our classification.

PCA explained about 82% of the total variance in the data set. Loadings on Component 1 (35.4% of variation explained) showed that sub-basins differed primarily along an urban/patch complexity gradient characterized by the amount of "other" land-type, a lack of old growth, and patch shape complexity (fractal dimension). Component 2 (20.5 %) further differentiated sub-basins along a clearcut gradient based on the dominance of stands 3-8 yr of age. Component 3 (13.5 %) represented a patch-clumpiness gradient based on the contagion of forest types, or the spatial complexity of the juxtaposition of types. The fourth component (12.2 %) of landscape pattern differentiated sub-basins according to the absence of stands in the 10-20 yr age class.

We used a k-means cluster analysis algorithm to assign landscapes to groups based on loadings for the 4 principal components described above. Discriminant analysis showed that the resulting 5 groups were significantly separable; all observations but 1 were classified correctly. The 5 groups represent different landscape configurations and establish a gradient of landscape pattern resulting from differing intensities of fragmentation and varying natural and cultural influences. In other words, these groups represent the range of landscape structure types occurring in intensively managed forest landscapes at low to mid-elevations in the Douglas-fir/western hemlock forest zone of western Washington. We visited 2-3 sub-basins in each group to field check the structure types as determined from satellite imagery and multivariate analysis; these visits confirmed the existence of the described landscape structure types.

Group 4 was composed of landscapes dominated by younger seral stages and high contagion or clumpiness. This landscape type was typical of managed forests in varying stages of regrowth, having approximately equal proportions of patches in the clearcut, young, and mature seral stages with little, if any, old growth. This suggests a managed landscape harvested in rotations. We focused our study-site selection efforts at landscapes within this group to ensure that the stands we selected for wildlife sampling would be located in intensively managed forest landscapes. These landscapes provided similar seral stages, an intensive management history, and a variety of patch sizes and configurations to choose from. With this stratification process, we were able to select study areas for sampling wildlife populations that were located in landscapes having similar management histories, thereby reducing the amount of landscape-scale variation on wildlife populations that is unrelated to forest management.

## Selection of Study Areas

We then used our reclassified satellite imagery, topographic maps, orthophotos, and ground reconnaissance to locate our primary study areas within sub-basins classified in Group 4 in the area encompassed by the 19 WRIAs. We initially focused our efforts on Weyerhaeuser and DNR lands in the southern Cascades near the Columbia River. We excluded this area from further consideration, however, because we typically encountered only extensive areas containing very large patches dominated by only 1 or sometimes 2 of our target age classes. In addition, we found that many areas to the south were not suitable due to confounding environmental influences from the Yacolt burn, the 1980 eruption of Mount St. Helens, or high amounts of residual old growth.

After several months of reconnaisance, we decided to locate 20/24 study sites on the Kapowsin and Buckley tree farms on land owned and managed by Champion International in southern Pierce County. Among these 20 study sites, 5 are in Township 17N Range 5E, 1 is in T17N R6E, 7 are in T18N R5E, 4 are in T18N R6E, and 3 are in T19N R7E. The remaining 4 stands are located in T16N R5E of the Vail Tree Farm on land owned and managed by Weyerhaeuser. We chose these study areas for a number of reasons: the landowners were extremely cooperative and helpful, and were clearly interested in participating in the study; the area had been entirely cutover in the last 70 yrs or so, and is virtually devoid of residual old growth; there is a great deal of heterogeneity in stand composition and juxtaposition on these tree farms; all of the target age-classes are represented; much of the area is fragmented into many relatively small patches; and, lastly, it is only about 1 hour's drive from both Seattle and Olympia, which kept logistical constraints and travel costs to a minimum (Fig. 1).

Originally, we proposed to study 3 stand size-classes: 2-5 acres, 20-40 acres, and 90-100+ acres. The smallest size-class was intended to represent the range of sizes of existing TFW Upland Management Areas (UMA's). The medium size-class represents the typical size of harvest units and regenerated stands in intensively managed landscapes. The largest size-class was included to ensure that the full range of size-classes in managed landscapes is evaluated. In addition, we originally proposed to also study 3 forest age-classes (seral stages): harvest-regeneration unit (no canopy; herbaceous layer only), immature forest (pre-canopy; herb and shrub layers only), and mature forest (closed-canopy). Each of these seral stages provides optimal habitat for a unique (but generally overlapping) array of wildlife species (Thomas 1979, Brown 1985). Consequently, the extent and distribution of each seral stage within each landscape will represent varying degrees of habitat fragmentation for those species associated with each seral stage. Because UMAs are designed to provide residual habitat for wildlife following timber harvest activity, we expected all stands in the small-size-class to be in the mature forest seral stage. Thus, we originally planned to sample 7 different stand conditions UMAs (only in harvest age), 20-40 ac patches (in each of the 3 age-classes), and 90-100+ ac patches (in the 3 age-classes). We planned to select 8 replicates of each stand condition, resulting in a total of 56 stands sampled (see Study Plan dated 1 August 1991 for a complete description of our original study design).

During our site-selection process, however, we learned that several major assumptions of our original design required modification. The first concerned our target patch sizes. While it was true that harvest units fell within the range of our medium patch size (20-40 ac), the fact that adjacent harvest units were cut within a few years of each other resulted in a situation where discrete patches in this size range were relatively rare in the areas we examined. In other words, while the harvest units were relatively small,

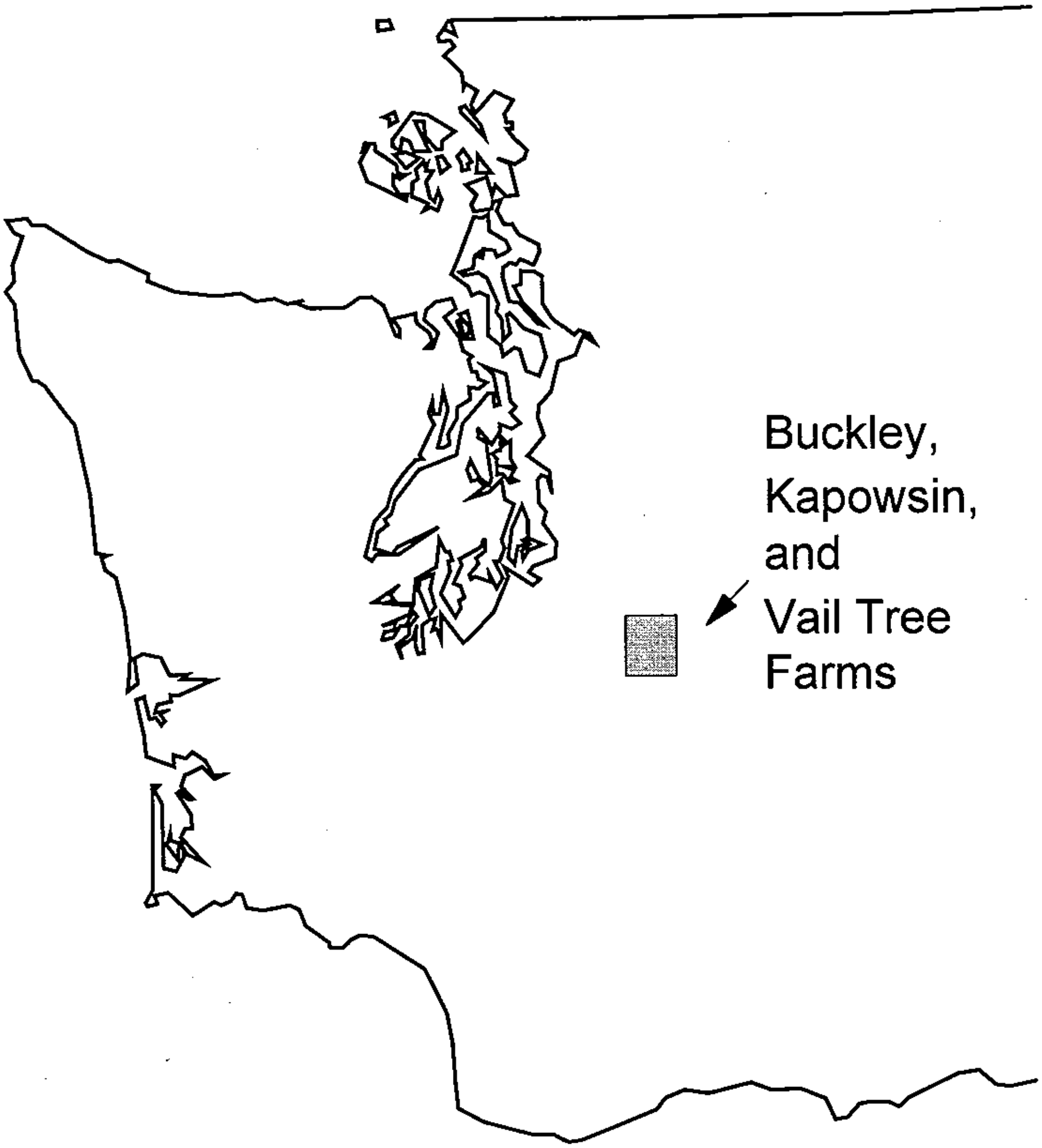

Figure 1. Map of western Washington showing location of TFW Landscape study areas.

the ecologically similar patches resulting from timber harvesting were quite large. Consequently, we found that the smallest patch sizes occurring in this area were generally 80-200 ac in size. We therefore eliminated the 20-40 ac patch size from our design.

During field reconnaisance in our target landscapes, it also became evident that we would also not be able to include UMAs in our sampling. UMAs are much more widely distributed than other size-classes, are much rarer, and vary dramatically in ecological characteristics. Many are located in boggy areas, riparian areas (in association with RMZs), rocky outcrops, or other such anomolous sites. Although they exist, most UMAs do not consist of intact patches of late-successional upland forest (i.e., forests similar to our mature age-class). Furthermore, because of the relaxation time that is required for wildlife communities to reach equilibrium in habitats that are fragmented and isolated, the time lag since isolation will be an additional source of variation in wildlife communities occurring in UMAs. To the extent possible, we needed to sample a set of UMAs that had been isolated from the original matrix for a similar period of time. This further reduced the availability of UMAs for study. Furthermore, since UMAs were not well distributed in our general study area, it would have been necessary to conduct the research in a much larger area than we anticipated. Because of the difficulties involved in finding suitable UMAs for study and associated increases in travel costs and workforce requirements it became infeasible to include UMAs in our sampling design. Consquently, we eliminated the size-class gradient from our design and selected only stands 80-200+ ac. in size for wildlife sampling.

Field reconnaisance also revealed that our 3 target age-classes did not adequately represent the stand-development gradient occurring in intensively managed forest landscapes. Furthermore, it became increasingly evident that in order to be most useful and applicable, our study should include an evaluation of ecological effects resulting from major silvicultural treatments, such as pre-commercial and commercial thinning. Consequently, we decided to expand our original 3 age-classes to 4 structure-classes, in which stand structure as a function of management activities would serve as our target conditions, rather than age. Because of budgetary cutbacks, however, we decreased the number of replicates from 8 to 6. The Forest Service's Old-Growth Wildlife Habitat Research Program (Ruggiero, et al. 1991) included only 3 replicates of each stand age-class for areas considerably larger than our study area. We are confident that 6 replicates will adequately encompass the range of variation in wildlife habitat conditions that we will be studying. We will therefore sample a total of 24 stands: 6 replicates in each of 4 structure-classes in stands ranging in size from 80-200 ac.

## Description of the 4 Structure-Classes

### General Selection Criteria

No entry for 3 years (thru December 1995)

Within 1/2 mile of road; year-round access to sites

Avoid stands with riparian zones larger than headwater creeks (i.e., no large riparian zones with distinctive vegetation)

Must have a 75 x 75 m area where target structure is present for pitfall grid

Stands should contain Douglas-fir as the dominant species

Bogs/marshes OK if minor component of stand

Steep slopes OK as long as site is not excessively drained or too steep for effective pitfall trapping

Roads OK as long as contiguous area is present for pitfall grid

Elevation < 3000 ft

### Structure-Class 1 - Clearcut Stage

Site characteristics at the initiation of sampling include the following:

Age: 2-3 yr since cutting

Tree Height: Herb stratum; seedlings generally < 3 ft tall

Reproduction: Planted, or natural regeneration in progress

Other Species Present: Weedy invaders, red alder

Landscape Context: Adjacent stands at least 5 yr older

**Structure-Class 2 - Pre-Commercial Thin Stage**

Age: 12-20 yr

Tree Height: Mid-canopy approx. 20-30 ft tall

Silvicultural Treatment: Pre-commercial thinning has occurred in stand within the last 5 yr

Other Species Present: Red alder, big-leaf maple, shade tolerant conifers; herbs and shrubs present in lower strata

Landscape Context: Adjacent stands recently clearcut or with fully developed tree canopy

Target Stand Structure: Canopy closure is mid-way between clearcut and a fully closed canopy. Lower branches on conifers dead or dying. Light interception at ground level is high; light reaches ground between trees. Low to moderate amounts of slash resulting from thinning operation may be present

**Structure-Class 3 - Closed-Canopy Stage**

Age: 30-40 yr

Tree Height: Full canopy height

Silvicultural Treatment: Not yet commercially thinned, history of pre-commercial thinning preferable, but not required

Other Species Present: Few, maybe some residual alders or maples in patches. Little or no herbs or shrubs present

Landscape Context: Adjacent stands in any other stand structure

Target Stand Structure: Stand is densely stocked with a wide range of stem diameters. Light interception within stand is low. Small snags and forest floor woody debris common in stand

**Structure-Class 4 - Harvest Stage**

Age: 50-70 yr

Tree Height: Full canopy height

Silvicultural Treatment: Stand has been commercially thinned, history of precommercial thinning preferable, but not required

Other Species Present: Herb and shrub layers re-established, salal, Oregon grape, and Vaccinium typically present; vine maples occur in openings, sword fern in moist sites

Landscape Context: Adjacent stands in any other stand structure

Target Stand Structure: Uniform stem diameters; trees widely spaced with a stocking level of approx. 100-150 trees per acre. Canopy closed, but moderate amounts of light are filtering into stand

## Sampling Methodologies

**Selection of Wildlife Species**--The general design will be to survey vertebrate communities using techniques that provide estimates of species abundances at the stand scale. All taxa will be sampled for 3 consecutive years (fall 1992 through spring 1995) to provide an adequate index of temporal variation in wildlife communities occurring within intensively managed landscapes. We will sample a variety of taxa for which we have reliable methodologies, and have designed more intensive studies for 2 species groups--northwestern salamanders and bats--that may be sensitive to the effects of fragmentation and that can be studied with available resources. Details of these directed studies follow the descriptions of methods for the wildlife community surveys described below. For the community surveys, species-abundance values associated with each stand condition will be expressed as means with associated standard errors. We will attempt to keep the sampling effort as comparable as possible to that of the Old-Growth Wildlife Habitat Program (OGWHP) because the sampling protocols were effective, allowing statistical tests to be made for many species. It is also desirable to maintain as much commonality as possible with the TFW RMZ studies to make comparisons possible between managed upland forests, old-growth forests, riparian zone forests, and Riparian Management Zones.

**Terrestrial Amphibian and Small Mammal Sampling**--During the OGWHP studies, techniques for sampling vertebrate communities were developed and refined for conditions in Pacific Northwest forests. Based on extensive experience with amphibian and small mammal surveys gained during these studies (Aubry et al. 1988, Aubry et al. 1991, Aubry and Hall 1991, Bury 1988, Bury and Corn 1987, 1988ab, Corn et al. 1988, West 1991) we will sample terrestrial amphibians and small mammals with pitfall traps. Pitfall traps will effectively capture surface-active amphibians and most small mammals, resulting in good estimates of relative abundance in forested habitats for both groups (Aubry and Hall 1991, West 1991). In addition, by capturing large numbers of individuals, this technique will enable us to assess the demographic structure of populations through analyses of body size-classes for amphibians, and age-classes for small mammals.

Pitfall traps effectively sample small mammals that use tactile and olfactory cues for orientation more than visual cues. They therefore capture insectivores and non-jumping rodents well, but are less effective at capturing deer mice, chipmunks, and jumping mice (Briese and Smith 1974, Williams and Braun 1983, Bury and Corn 1987). The latter species, however, are either ubiquitous or have specific habitat requirements unlikely to be met in upland areas.

*Procedures*--Pitfall traps will be constructed in accordance with descriptions provided in Corn and Bury (1990). Thirty-six traps will be placed in a 6 x 6 grid with 15-m intervals between traps in each stand. We will open pitfall traps after the onset of fall rains, which usually occurs in early October, and operate them for 4 consecutive weeks (28 days); traps will be checked weekly (the field data sheet is included in Appendix A). As appropriate, animals will be prepared and deposited in the Burke Museum at the University of Washington. Capture rates (number of individuals captured per 100 trapnights) will be calculated and used to compare relative abundance estimates among structure-classes and to investigate patterns of association with various habitat variables. These variables will include vegetation measurements as well as derived environmental gradients and physiographic characteristics.

**Breeding Bird Sampling**--We will use a modified point count method for surveying bird populations. Point counts are discussed by Verner (1985) and have been used in several recent studies (e.g., Huff and Raley 1991, Huff et al. 1991, Hutto et al. 1986, Manuwal 1991, Manuwal and Carey 1991, Manuwal and Huff 1987, Verner and Ritter 1985). The point count method is superior to other methods for sampling forest birds due to relatively poor visibility in forested habitats, and the rugged topography typical of Washington mountains. Other methods, particularly strip transects, are inefficient at determining either the species richness of stands, or at estimating the relative abundance of each species (Manuwal and Huff 1984, Verner 1985).

The modified point count method we propose to use involves estimating the distance to birds detected within 50 m, and then simply recording birds seen or heard in 1 of 2 concentric bands beyond 50 m: 51-75 m and >75 m. The increasing effects of observer bias and variation in bird detectability with distance in these habitats, prohibit the accurate estimation of detection distances beyond 50 m. The recording of detection distances within 50 m will enable us to draw detection curves for each species according to observer. With these data we will evaluate the variation in detectability both among and within species in various stand conditions, and the degree of observer bias (e.g., some individuals may be poorer at detecting species that call at very low or high frequencies than others). This will enable us to delete questionable detections from the data set, and thereby improve the power of our statistical analyses by reducing random variation.

*Procedures*--Twelve evenly spaced bird-count points (or stations) will be located within each stand. Points will be spaced 100 m apart and will be at least 50 m to the edge of the stand. Each station will be marked with plastic flagging and numbered. Counts will begin within 15 minutes of dawn and be completed within 3 hours. Upon arriving at a station, the observer will remain stationary and quiet for at least 1 min to allow birds to settle down after initial disturbance by the observer. During the survey period, the observer will record on a field data form the birds heard or seen for a period of 8 minutes (the field data sheet is included in Appendex A). Observers will slowly scan the vegetation at all levels within the sampled zone to locate birds. Birds not previously recorded will be tallied if they are detected between count points to obtain a complete species list for each stand; these data will not be used in calculating abundance indices. Observers will be systematically rotated among the stands being sampled to help correct for between-observer bias in ability to detect birds among the stands. Furthermore, within-stand bias of bird detectability will be reduced by reversing the travel routes during successive visits to each stand. Detections of tree squirrels, which also give territorial calls that can be used as an index of abundance (Buchanan et al. 1990), will be recorded during the bird surveys.

Bird surveys will be conducted between mid-April and mid-June. Each stand will be surveyed 6 times during the spring. The surveys will be spaced throughout the breeding season to account for different breeding phenologies of bird species in this region. Counts will be conducted when wind is less than 15 kph and when no significant rain or snow is falling, as these factors have been shown to significantly bias results. Every attempt will be made to avoid counting individual birds more than once.

Accurate monitoring of small forest birds will be successful only if the field personnel are competent. Competence in bird identification and in conducting sampling should be demonstrated before any data are collected. Periodic testing may be appropriate. Virtually all recognized techniques for counting birds are subject to observer bias, which results from differences in the attitude, field experience, and abilities of observers. In most forest habitats, birds are much more often heard than seen; for example, in our study of birds in the Douglas-fir forests of western Washington (Manuwal 1991), we saw only 3-4 percent of the birds we heard. Field personnel therefore must be able to correctly identify birds by both calls and songs. Emlen and DeJong (1981) found that observers with slight hearing losses in the high-frequency ranges detected some species at only 25-90 percent of the distances at which observers with normal hearing detected them. Ramsey and Scott (1981) found that hearing thresholds of people over 40 years of age usually did not meet the minimum required to hear frequencies typical of the songs of many passerine birds. Other important observer attributes include alertness, field experience, knowledge of ornithology, and good physical condition. All field observers will have a 2-3 day training period in which all the above-mentioned characteristics will be evaluated.

Assumptions of our proposed technique are: (1) Birds are accurately identified, (2) sampling effort is adequate to detect species present, (3) sampling effort is adequate to obtain reliable indices of bird abundance, (4) differences among observers, years, and species' detectabilities (both within and among habitats) can be accounted for.

The following population parameters will be determined: bird species richness and indices of abundance for all species with adequate numbers of detections. All bird species detected within the survey area will be recorded and compared among study areas. The number of species (species richness) among all study areas will be used in the comparisons. A detection rate (mean number of birds detected per visit) will be calculated to facilitate comparison of bird abundance among stands. Detection rates reduce some of the distance estimation biases associated with the similar variable circular plot (VCP) technique described by Reynolds et al. (1980). Detection rates provide an abundance value for uncommon species for which densities can not be calculated using other approaches. Comparisons of species richness and detection rates can be accomplished using similarity indices, e.g, the Sorensen equation (Able and Noon 1976). We will evaluate the abundance pattern of the various species by using the coefficient of population similarity (Sp) (Odum 1950). Foraging guild structure will be evaluated by placing species into guild categories *a priori*. These categories were described by Sabo and Holmes (1983) and recently used by Manuwal and Huff

(1987) and Manuwal (1991). They are: aerial predators, omnivore-scavengers, tree-seed eaters, bark insectivores, tree foliage insectivores, low understory herbivores/insectivores, aerial insectivores and nectar feeders/insectivores.

**Bat Sampling**--Though often overlooked because of their nocturnal habits, bats collectively represent the second-most numerous group of mammals in the Pacific Northwest, surpassed only by the rodents. There are 12 species known to inhabit the forests of Washington, but most aspects of their ecology are unstudied in this region. It has been shown recently that bats inhabiting forests west of the Cascade Crest in Oregon and Washington roost statistically more often in old than young forest (Thomas 1988, Thomas and West 1991). Bats appear to be using areas with old trees for day-roosting, but leaving these sites to forage over water sources elsewhere, where the abundance of appropriately sized insects is higher than in the forest (Thomas 1988). Although the characteristics of natural roost sites have not been identified adequately for any bat species in Pacific Northwest forests, it is likely that as the average age of forests declines, so will their opportunities for roosting in natural habitat.

We propose to sample bats using ANABAT II automated divide-by-N ultrasonic detectors.These devices yield a frequency count of bat passes per unit time by automatically recording bat echolocation calls on cassette tape after they have been electronically transformed into frequencies audible to humans. Because echolocation calls in some cases differ by species, or by groups of closely related species, they can be identified (Thomas and West 1989). . Mist netting or other forms of net capture are strongly biased with respect to species and are not reliable indicators of relative abundance. The detectors do not require capture, do not affect bat behavior, can distinguish feeding calls from travel echolocation calls, and are capable of accumulating large sample sizes for statistical analysis.

*Procedures*--We will sample bats on a site for 2 nights in June, July, and August. We will employ several bat detectors (5 or 6) simultaneously, such that each month's sample is completed over a 2-week period (the field data sheet is included in Appendix A). Field sampling involves placement of the detectors in appropriate locations, changing batteries and cassettes, and keeping them running under generally adverse conditions. Data analysis is highly specialized. It involves the use of a period meter and a calibrated oscilloscope to provide time-frequency displays of the calls (Simmons et al. 1979, Fenton 1988). We will sum calls following the identification groups of Thomas (1988).

**Stand Vegetation Sampling**.--We propose to measure structural and vegetational components of stands to (1) describe wildlife habitats at the stand scale, (2) correlate habitat features at the stand scale with wildlife population parameters, and (3) identify stand components altered by harvest that affect wildlife species. These data are necessary for the proposed study, but are also of critical importance in making comparisons of stand-scale habitat characteristics between managed and unmanaged forests (OGWHP data sets). Such comparisons will give us insight into the cumulative effects of intensive forest management on wildlife. Consequently, we developed our vegetation sampling protocol by modifying the OGWHP protocol and selecting variables to sample that were shown in that study to be both appropriate for habitat relationships analyses based on wildlife survey data and which were most often correlated with wildlife abundances in the Douglas-fir zone.

*Procedures*--We will sample vegetation at 3 scales. On both the pitfall grids and along the bird transects, we will sample herbs, low shrubs, and ground cover in 3 x 3 m square plots (9 $m^2$); tall shrubs, small to medium-sized trees and snags ($\leq$50 cm d.b.h.), and coarse woody debris in 15 x 15 m square plots (225 $m^2$); and large trees, snags, and stumps (>50 cm d.b.h.) in 45 x 45 m square plots (2025 $m^2$) (all field data sheets are included in Appendix B). Sampling at all 3 scales will occur at each bird sampling point and within each pitfall grid (see Fig. 2 for configuration of sample plots). Sampling will include live and dead tree densities by species according to height and diameter classes, percent cover, and presence/absence variables, as well as general site characteristics.

For logs we used 3 decay-classes: **intact** (bark intact, freshly fallen); **moderately decayed** (bark sloughing to absent, sapwood soft); and **well-decayed** (log completely in contact with the ground, bark absent, and all wood soft). For snags,we used the same 3 decay-classes, but with slightly different definitions: **intact** (bark and branches mostly intact, sapwood firm); **moderately decayed** (limbs either stubs or absent, sapwood soft); and **well-decayed** (all wood soft, bark and sapwood usually sloughed). **Fine woody debris** was defined as logs (or leaning snags at < 45° angle) < 10 cm in diameter on average; **coarse woody debris** is ≥ 10 cm on average. Variables to be included in the vegetation sampling are as follows:

Within Each 3 x 3 m Plot (Herb/Low Shrub Plots)

**Percent Cover Variables**

Berry-producing deciduous shrubs (Vaccinium, Rubus) < 1 m tall
Broad-leaved evergreen shrubs < 1 m tall
Other deciduous shrubs < 1 m tall
Tree seedlings < 1 m tall
Ferns
Leaf litter
Moss
Bare soil
Rock
Forbs
Grass
*Lobaria* lichen
Fine woody debris
Coarse woody debris
All stumps
Other (saprophytes, above-ground roots, tree and snag boles, fungi, etc.)

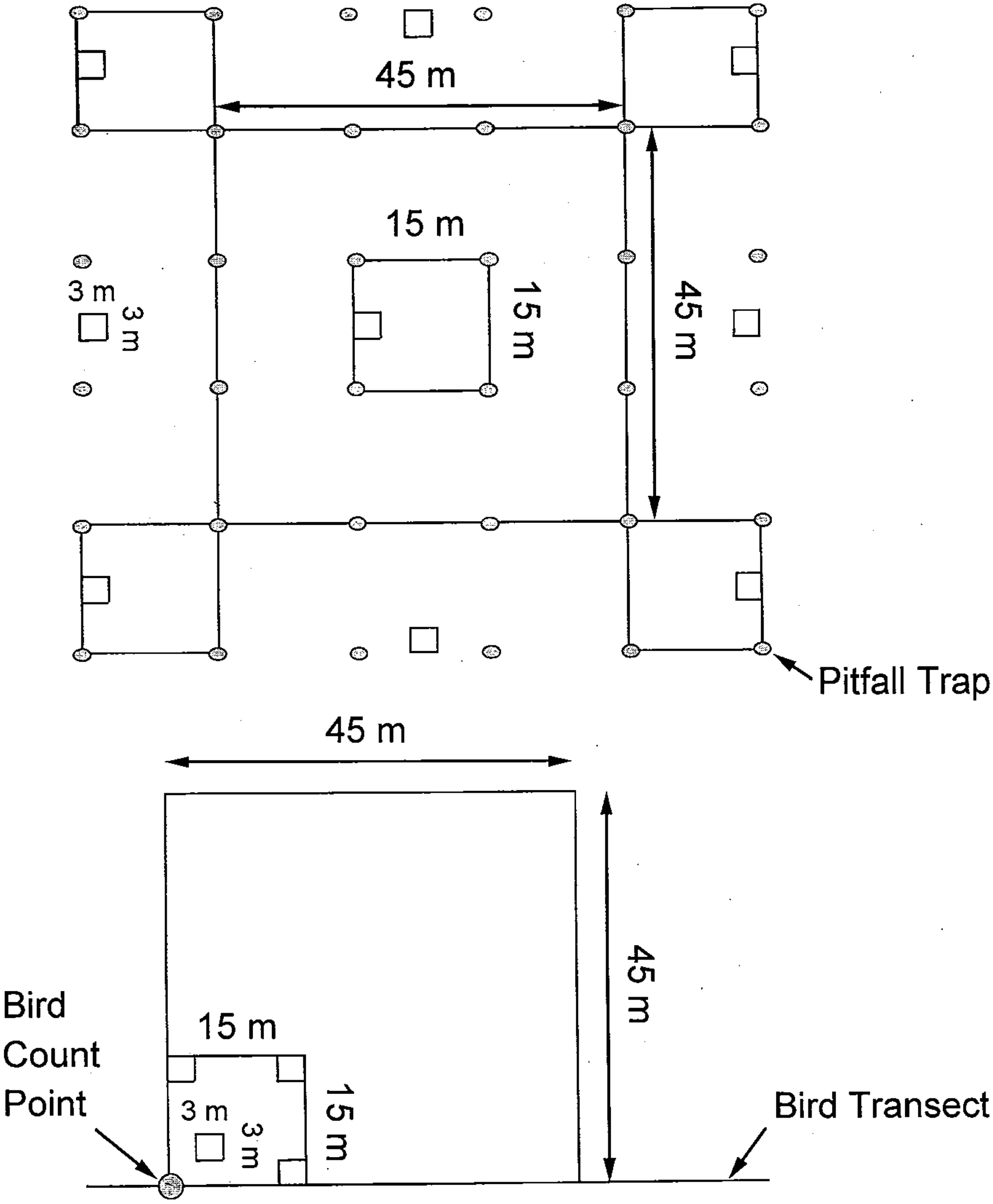

Figure 2. Site maps showing configuration of vegetation sampling plots on pitfall grids and bird count points.

Within Each 15 x 15 m Plot (Small and Medium Tree, Snag, and Log Plots)

**Percent Cover Variables**

Trees 1-3 m tall by species

Berry-producing deciduous shrubs (Vaccinium, Rubus) > 1 m tall

Broad-leaved evergreen shrubs > 1 m tall

Other deciduous shrubs > 1 m tall

Small logs (10-30 cm dia.) by species and decay-class

Large logs (> 30 cm dia.) by species and decay-class

**Density Variables**

Small (< 10 cm dbh) live trees > 3 m tall by species and canopy position

Medium (10-50 cm dbh) live trees > 3 m tall by species and canopy position

Small (< 10 cm dbh) snags by species and decay-class

Medium (10-50 cm dbh) snags < 1.5 m tall by species and decay-class

Medium (10-50 cm dbh) snags 1.5-15 m tall by species and decay-class

Medium (10-50 cm dbh) snags > 15 m tall by species and decay-class

Within Each 45 x 45 m Plot (Large Tree and Snag Plots)

**Presence/absence variables**

Talus

Intermittant stream

Permanent stream

Bog/Marsh

Pond

Tree pit

Riparian zone

**Density Variables**

Large (50-100 cm dbh) live trees by species and canopy position

Very large (>100 cm dbh) live trees by species and canopy position

Large (> 50 cm dbh) snags and stumps < 1.5 m tall by species and decay-class

Large (> 50 cm dbh) snags 1.5-15 m tall by species and decay-class

Large (> 50 cm dbh) snags > 15 m tall by species and decay-class

Deciduous trees in the canopy by species

## Intensive Studies

Prior to a series of budget cuts on the landscape project, we had identified two subprojects for intensive analysis. These focused on important questions which the standard survey protocols could not address. One was to gather basic information on pond-breeding salamanders and the other on the use of day roosts by bats. These were considerable knowledge gaps and were appropriately addressed at the landscape scale.

After the budget reductions we were unable to fully support both projects with TFW funding, but we continued both projects as graduate research with assistance from other monetary sources. We will endeavor to include as much information as possible for these projects in the overall final report (both projects will be reported in the fall symposium), but a full accounting of activities will await completion of degree requirements. They will then be available as a Master of Science thesis on bats roosts (fall 1996) and a Doctoral dissertation on Northwestern Salamanders (summer 1997).

**Northwestern Salamanders**--Salamanders occurring in the Pacific Northwest can be classified into 3 groups according to their reproductive ecology: stream-breeding salamanders, woodland salamanders, and pond-breeding salamanders. The stream-breeding Pacific giant salamander (*Dicamptodon tenebrosus*), Cope's giant salamander (*D. copei*), and torrent salamanders (*Rhyacotriton* spp.) breed in cool, fast-moving headwater creeks. With the exception of metamorphosed Pacific giant salamanders, which occupy terrestrial habitats during the non-breeding season (Nussbaum 1969), individuals of these species remain near the creeks during their entire life cycles. In contrast, woodland salamanders, including the ensatina (*Ensatina eschscholtzii*), clouded salamander (*Aneides ferreus*), Oregon slender salamander (*Batrachoceps wrightii*), and all species in the genus *Plethodon* live in forested environments and lay their eggs in moist, protected terrestrial sites. These species are independent of streams or ponds for breeding and of the larval life stages that accompany such modes of reproduction. Like reptiles, the young of woodland salamanders hatch fully formed from the eggs (Nussbaum et al. 1983).

The third group, including the northwestern salamander (*Ambystoma gracile*), long-toed salamander (*A. macrodactylum*), tiger salamander (*A. tigrinum*), and roughskin newt (*Taricha granulosa*), are all pond-breeding species that migrate in the spring from overwintering habitats to breeding ponds, where they typically congregate in large numbers to mate and lay eggs (Nussbaum et al. 1983). The adults return to terrestrial habitats soon after the breeding season is over. Another migration away from the ponds occurs in the late summer and early fall when metamorphosing larvae leave the ponds to seek overwintering habitats. The mode of reproduction that each species exhibits determines the extent to which it is likely to be directly influenced by landscape-scale environmental variation.

Although mark-recapture studies of salamanders in the Pacific Northwest have never been attempted, both stream-breeding and woodland salamanders probably spend their entire lives within single forest stands. Consequently, landscape-scale environmental influences on these species are more likely to be indirect than direct, e.g., microclimatic changes occurring over long periods of time due to the harvesting of adjacent stands or increased risks of local extinctions due to the insularization of stands through forest fragmentation. We predict, however, that pond-breeding salamanders will be directly affected by landscape fragmentation because their life cycles involve yearly movements among stands, not simply within them.

No research has been conducted on the landscape ecology of amphibians in the Pacific

Northwest. Ponds are relatively scarce in forested habitats in this region (Lehmkuhl unpubl. data), so, pond-breeding salamanders in many areas must travel long distances through a variety of habitats to reach breeding ponds. The skin of all salamanders is permeable to water, restricting their activities to areas in both time and space to areas containing either standing water or moist environmental conditions. Dessication is therefore a constant threat to amphibian survival. Because timber harvesting negatively affects habitat suitability for aquatic amphibians, due in part to the drier conditions that result from removal of the canopy (Bury and Corn 1988b), migratory salamanders may be unable to cross young plantations on their way to breeding ponds. Consequently, both the sizes, arrangements, and environmental conditions of patches (stands), and the availability of suitable breeding ponds within forested landscapes will strongly influence the reproductive ecology of migratory salamanders.

Stand-scale studies of pond-breeding salamanders in terrestrial habitats in Washington during the non-breeding season indicate that overwintering habitat may also be adversely affected by forest management. Pitfall trapping in October and November in the southern Washington Cascade Range revealed that both northwestern salamanders and roughskin newts are closely associated with old-growth forests during the overwintering period (Aubry and Hall 1991). Because forest-floor conditions in old-growth stands are typically moist and buffered from climatic extremes (Spies and Franklin 1988), such conditions may provide critical overwintering habitat for pond-breeding salamanders.

We predict that fragmentation of forested landscapes will significantly affect the habitat relationships and population dynamics of migratory pond-breeding salamanders that occur there. As part of our studies of wildlife responses to landscape-scale environmental patterns in managed forests, we propose to conduct intensive research on the pond-breeding northwestern salamanders.

*Objectives*--Our primary objective is to investigate the movement patterns and reproductive ecology of northwestern salamanders in forested landscapes managed primarily for timber production. We predict that mortality of marked salamanders will increase and numbers of salamanders will decline as landscapes become more fragmented, with ponds becoming more isolated by unsuitable habitat and dispersal routes in forested stands become fewer. Also, we expect overwintering population sizes to decrease as stand sizes decreases and microclimate becomes drier due to edge effects.

*Procedures*--We will use 2 methods to study populations of pond-breeding amphibians: (1) mark all northwestern salamanders captured in pitfall traps during the course of stand-scale vertebrate community studies (2) Establish drift fences, with pitfall traps, around one or more breeding ponds to capture and identify all individuals either entering or leaving the breeding ponds and determine their movement patterns.

Using standard techniques (Ferner 1979), we will individually mark all northwestern salamanders we capture in pitfall traps during the stand-scale vertebrate community studies described elsewhere. In this region, pitfall traps will generally not kill northwestern salamanders. We conducted similar pitfall trapping studies in 45 forested stands in southern Washington as part of the Forest Service's Old-Growth Wildlife Habitat Research Program (Aubry and Hall 1991), and although traps were checked only about once per week, virtually all amphibians were captured alive.

The technique of completely enclosing breeding ponds with drift fences and pitfall traps to capture all individuals either entering or leaving the ponds was developed by Gill (1978) for studies of red-spotted newts (*Notophthalmus viridescens*) in the Shenandoah Mountains of Virginia. He estimates that in any given season, he captured about 90 percent of all salamanders present. However, in multi-year studies the probability of capturing all individuals at least once is nearly 100 percent.

Strips of plastic sheeting will be buried in the ground to completely encircle one or more breeding pond. Pitfall traps will be spaced 15 m apart and constructed and buried in accordance with descriptions of pitfall trapping techniques used in the vertebrate community sampling. Traps will be checked twice per week to ensure that all salamanders are captured alive. Unmarked individuals captured at the breeding ponds during the fall sampling will also be marked. Thus, we will be able to determine migratory movements occurring both into and out of the breeding ponds.

**Bats**--Our information base for bats in Washington is very limited. Little is known about the current ranges and population sizes of bat species in this region. It is also difficult to assess trends in population size because little information exists regarding historic population sizes. The status of only 3% of bats worldwide is well known (Stebbings 1980). Documented declines are primarily due to disturbance of bats in maternity colonies and hibernacula, and loss of habitat (Mohr 1948; Edgerton et al. 1966; Cockrum 1969; Tuttle 1979). As Pacific Northwest bat species are closely associated with old-growth Douglas-fir forests (Thomas and West 1991), the recent, rapid decline in extent of old-growth forests on the west coast has undoubtedly had detrimental effects on bat populations.

To evaluate the effects of forest management upon bat populations of the Pacific Northwest, we need improved estimates of current geographic distributions, population sizes, and habitat-use patterns. Distributional records for many species are incomplete and information on population sizes for most species virtually non-existent. Some progress is now being made in understanding habitat-use patterns, as in the general survey portion of this project, but this work has only begun. Critical habitat elements, especially the characteristics of naturally-occurring roost sites and size and variation of foraging ranges, must be described (Christy and West 1993).

As part of the OGWHP, vegetative parameters were regressed against levels of activity to determine stand-scale habitat characteristics of importance to forest-dwelling bats

(Thomas and West 1991). The density of damaged or diseased trees, snag size and decay-class, elevation, and chronological stand age were all weakly associated with higher activity levels. However, these regression variables did not explain the old-growth associations, leaving 83% of the total among sample variation unexplained. The relationship between the measured vegetation characteristics and activity levels was too weak to draw definite conclusions. Thomas and West (1991) postulate that the weakness of the association stems from our current lack of knowledge concerning natural roost site characteristics and failure to measure the appropriate variables. This information gap severely constrains our ability to provide suitable habitat for the bats of the Pacific Northwest.

Natural roost sites in Pacific Northwest forests are difficult to locate and their characteristics are not well known. In other parts of the country and the world, small bats roost preferentially in the oldest available trees (Lunney et al. 1988, Barclay et al. 1988, Gardner et al. 1991ab). Features of old living trees, such as thick bark with cracks and crevices, offer many potential roosting sites for individual bats. Hollow trees also provide ideal sites for the large maternity colonies which myotis bats commonly form in the spring. Old-growth forest is also important habitat for the large species of bats, especially the hoary and the silver-haired bats. In Oregon, Perkins and Cross (1988) found that these species were captured with much greater frequency in old-growth than in young or mature forests. Although few roost sites have been found in the Pacific Northwest, the silver-haired bat and hoary bat commonly roost in forested areas in other parts of their ranges. It is therefore likely that these bats are roosting in the old-growth forests of the Pacific Northwest. Big brown bats are highly associated with man-made structures. In natural situations, however, the habitat selection of big brown bats appears to be similar to that of silver-haired bats, and capture frequency of big brown bats has been found to increase with snag density in southern Oregon (Cross 1976).

The size of foraging ranges or familiar areas are poorly known for temperate insectivorous bats. The information which is available indicates that bats are capable of traveling relatively long distances between foraging and roosting sites. Pacific Northwest bats generally feed over water and then fly into the forest to roost (Cross 1988), thus forming a link between upland forests and riparian zones. Few groups of animals, other than some birds, have such a movement pattern. Little brown myotis have been observed foraging 2-5 km from day roosts (Thomas and West 1991), big brown myotis are known to travel up to 4.1 km to foraging habitat (Brigham and Fenton, 1986). Using radiotelemetry Gardner et al. (1991a) found that adult female Indiana myotis (*Myotis sodalis*) will travel up to 2.5 km from roosts to foraging areas, and that Indiana myotis have fairly large home ranges (Gardner et al. 1991b). These roughly circular ranges vary from 33 ha for juvenile males to 213 ha for post-lactating females. However, Tuttle (1976) found that growth rates of juvenile gray myotis (*Myotis grisescens*), which feed almost exclusively on aquatic insects, are inversely proportional to the distance of the maternity colony from water. Lunney et al. (1988) also found that most activity in small, insectivorous bats in Australia (*Eptesicus vulturnus*, *Nyctophilus gouldi* and *Nyctophilus geoffreyi*) was confined to within 1 km of the site of original capture, indicating small foraging ranges. This conflicting information indicates that bats may be capable of traveling long distances to forage but this travel may be energetically costly and may lead to reduced fitness.

Until the essential characteristics of movement patterns and roost sites are known, it will be very difficult to manage forests for the persistence of native bat populations. Recent advances in the miniaturization of radiotelemetry components has now made radio tracking of bats feasible, and holds promise for gaining information on movements and roost characteristics. We propose to focus additional effort on these two knowledge gaps.

*Objectives*--The general survey for bats using ultrasonic detectors described above will provide relative use information for stands and watersheds managed primarily for timber production. Additionally we wish to investigate the movement patterns and roost characteristics of bats. Bats use different parts of the landscape for roosting and foraging. It is important, therefore, not only to understand roost characteristics but also the juxtaposition of these habitat elements.

We predict that as a larger percentage of each watershed is harvested, bat abundance (indexed by use) will decline. This should occur because the abundance of acceptable roosts will decline and the distance between roosts and foraging areas will increase. With a knowledge of roost characteristics and distances traveled during foraging, we ultimately expect that suitable roosts can be provided in managed forests within appropriate commuting distances to foraging areas.

*Procedures*--Tuttle traps (Tuttle 1974) will be the primary method for capture. Species identification, weight, reproductive status, forearm length, and sex of each bat will be recorded. Captured bats will either be punch marked or banded and fitted with radio transmitters and released.

Until recently, radiotransmitters have been too heavy to use on myotis bats. It has been shown that increases of greater than 5% of body mass of bats decrease maneuverability and foraging ability (Aldridge and Brigham 1988). However, Gardner et al. (1991a) found that roost selection behavior did not seem to be altered by increases in body weight of up to 15% in the Indiana bat. The transmitters which will be used in this study weigh from .65-.7 g. This will constitute an increase of 16-17% in body weight when attached to a bat of 4 g. As 4 g will be the smallest bat encountered in the study, the transmitters should not severely affect roost selection.

The transmitters will be placed on female myotis (post-parturition) which will be tracked to their day roosts. Male myotis often roost singly or in small groups (Barbour and Davis 1969, Dalquest and Walton 1970). In contrast to male myotis, females form maternity colonies to allow their offspring to roost in clusters, reducing the energetic costs of thermoregulation and thereby increasing the developmental rate of the young

(Barbour and Davis 1969, Tuttle 1975). After feeding, mother bats will return to these colonies to roost during the day. Successful radio tracking of single female bats should, therefore, lead to the discovery of colonial roost sites housing many bats, possibly of several species. It is likely that the availability of suitable maternity roosts is far more limiting to bat abundance than the availability of individual roosting sites. The characterization of maternity sites should, therefore, take precedence over the characterization of individual roost sites.

Holohil model BD2B transmitters using the frequency range of 150-152 kHz will be used for radiotelemetry (Holohil Systems, Ltd.) as well as Telonics TR-2 receivers. Both Yagi and dipole receiving antennas will be used. Transmitters will be placed on the middle of the back of selected bats, between the scapulae, with the antenna trailing down the back. Transmitters will be attached with some form of glue (cyanoacrylate, epoxy, rubber silastic or surgical cement). A layer of glue will be applied, then a mat of hair will be placed over the glue and another layer of glue will be applied. The transmitter will be placed on top of the final layer of glue. This has been deemed the most effective method of attaching transmitters to bats, which often groom transmitters off of one another (Wilkinson and Bradbury 1988).

At each roost site, several general characteristics will be recorded: tree species; tree age; tree size; bark thickness; status (alive or dead); height, aspect and number of roost entrances; general type of roost site (i.e. bark flake, hollow snag, split trunk) and distance of roost tree from water. Tree age will be estimated by coring with an increment borer. Tree size will be estimated through measurements of diameter at breast height (DBH) and height. The DBH will be measured with diameter tape and heights will be measured with a clinometer. Bark thickness will be estimated by coring the tree with an increment borer and measuring the amount of bark in the resulting core. Roost sites will also be photographed and mapped.

Colony sizes will be estimated through visual counts as the bats leave the roosts. Bats generally emerge at twilight and are visible as silhouettes against the sky. A team of observers watching the various roost entrances can get a reasonable estimate of colony size as the bats emerge (Thomas and LaVal 1988).

Distances flown by the bats will be estimated through several measures. The distances from the site of capture to the roost, from the roost to the site of a shed transmitter and from the roost to the site of recapture will be recorded. Attempts will also be made to locate radiotagged bats at night when they are feeding to characterize the general areas in which they commonly forage.

## Wildlife Data Analysis

Species have different habitat relationships and function at different scales within a landscape (Milne et al. 1989). Consequently, this project will use several complementary approaches to data analysis to examine both community- and species-scale responses.

**Community-Scale Responses**--Initial exploratory data analysis will examine relationships between wildlife community composition and habitat by considering abundance data for all species of a taxonomic group across all stands sampled. We will have 2 sets of data: (1) variables characterizing habitat in each of the stands (i.e., area, type, and context) and (2) for each taxonomic group, species abundances in each stand. As a preliminary step, we will first look at correlations among species across all stands by using principal components analysis or related techniques such as detrended correspondence analysis (Gauch 1982, Jongman et al. 1987, Aubry et al. 1991). If 2 or more species are highly correlated in their use of stands they can be treated together in subsequent analyses. Next we will examine the relationship between the species and habitat variables using canonical correlation analysis (Gauch 1982, Jongman et al. 1987). This approach is valuable because it simultaneously considers the interrelationships within a data set (e.g., correlations in abundance among species) and between data sets (i.e., species abundances and stand characteristics). These analyses will indicate the influence of particular stand characteristics on community composition.

We are also interested in predicting the composition of wildlife communities as a function of habitat condition. Regression analysis will be conducted to determine if stand characteristics (independent variables) can be used to predict community attributes (dependent variable) in the stands. We may anticipate, for example, that there will be a pronounced effect of stand size on wildlife species richness and abundance. Moreover, regression analysis allows determination of the importance of other stand variables after a significant component, such as stand size, is incorporated in the model.

One of the difficulties in describing wildlife-habitat relationships is the variability in animal species' abundances over time. Temporal variation can be examined in a similar fashion using analysis of covariance (Timm 1975). Additional variables representing the time of sample can be included in the model (possibly with interaction terms) to determine differences due to fluctuations in density or to density-dependent changes in habitat utilization that may be expected to occur.

**Species-Scale Responses**--For particular species, multiple regression can be used to predict abundance of species or guild as a function of stand characteristics (discussed above). Another approach that we will employ will be to examine differences in the characteristics of stands that are utilized by a species versus those that are not. There are 2 approaches to this analysis. First, multivariate analysis of variance will be used to determine if significant differences exist in the habitat characteristics of stands that are utilized by a species versus those that are not used (Milne et al. 1989). When significant differences are found, discriminant function analysis will be used to determine the habitat characteristics that differ between used and not-used stands (Timm 1975).

## APPLICATION OF RESEARCH RESULTS TO FOREST MANAGEMENT

### Habitat Relationships

We will identify those species that use forest structural stages that characteristically result from intensive timber management, primarily successional stages following even-age timber harvest through rotation-age stands (0-80 years). This information will be compared with results of wildlife studies conducted previously by project personnel in unmanaged forests to better understand how the cumulative effects of timber harvest influences the richness and abundance of forest wildlife communities at a broad scale.

At an operational level, vegetation and microhabitat studies within individual stands will indicate important stand structural characteristics that forest managers should strive to create or retain during timber harvest. The implications of varying the size of harvest units, or leaving corridors within watersheds likewise can be examined.

### Information Transfer

Our research will be applicable to the management of forests at two primary levels. First, we will develop and examine tools for analyzing how stand and landscape components affect wildlife community composition. This work will indicate the types of variables and data analysis required for incorporating landscape characteristics into harvest planning to benefit wildlife. This information will be made available through peer-reviewed professional journals. Additionally, workshops can be developed through the Continuing Education Program at UW or the Cooperative Extension Program at WSU.

Second, we will make recommendations for harvest planning based on our findings. This information will be of interest to a much broader audience and particularly to individuals making on-the-ground decisions. An extension research bulletin that highlights the major results of our research and its implications for management of upland areas could be written for managers. Publication of applied articles based on this research through the Western Journal of Applied Forestry would also be appropriate. Applicable interim results will be presented via WSU Cooperative Extension Newsletters to forest owners. Presentation of both interim and final results at regional meetings such as the Washington State Forestry Conference and annual meetings of Washington and Inland Empire Association of Foresters, Washington Forest Protection Association, and Washington Farm Forestry will provide for the transfer of information.

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# Appendix A. Field data sheets for sampling amphibians and forest-floor small mammals, birds, and bats.

# Landscape Project
# Pitfall Trapping Data Sheet

Wildlife Science Group
University of Washington
Box 352100
Seattle, WA 98195-2100

Page___ of ___

Site: __________
Date: __________ Trapnight: __

Collector: ______________
Weather: ______________
Weather codes: Clear, Partly cloudy, Overcast, Drizzle, Rain, Fog

| I. D. # | Sta. # | Species | Sex | Age (J,SA,A) | Repro. (Y,N) | Wt. | Total Body | Snout-vent | Tail | Hindft | Ear | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
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Entered by: ________________ on ______________. Checked by: ________________ on ______________.

# TFW Landscape Bird Study
# Modified Point Counts

*Behavior Codes*:
- S Song (heard only)
- VS visual & song
- O other sound
- V visual sighting only
- N nesting/ nest building
- ♂ or ♀ if possible.

*Weather Codes:*
- C clear
- P partly cloudy
- O overcast
- D drizzle
- LR light rain
- F fog.

**Site:**________

**Date:**________

**Start Time:**________ **End Time:**________.

**Page:**_____ **of** _____.

**Weather:**_________.

**Observer:**________.

| STATION NUMBER | SPECIES | < 25 M | 25-50 M | 50-75 M | >75 M | FLY OVER | BEHAVIOR | COMMENTS |
|---|---|---|---|---|---|---|---|---|
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**Entered by:**________ **On**__________. **Checked / Edited by**_______ **On**_________.

# DATA FORM FOR ECHOLOCATION CALL DETECTION ANALYSES

| Site | Date | Weather | Time | Int. | MYGR | MYYU | EPFU | LANO | LACI | PLTO | Unknown | Total | Feeding Buzz |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
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# Appendix B. Field data sheets for sampling vegetation.

### Cover Estimates. Use the following categories:

**0, T, 1, 5, 10, 15, 20, 25, 30, 40, 50, 60, 70, 80, 90, 100**

0 = 0, T = >0 and <1; 1 = 1-3; 5 = 4-7; 10 = 8-12; 15 = 13-17; 20 = 18-22; 25 = 23-27; 30 = 28-34; 40 = 35-44; 50 = 45-54; etc.

### Litter Depth:

Estimate mean litter depth within plot. Take enough depth measurements to adequately sample the variation in litter depth within each plot.

**FWD:** Fine Woody Debris - logs or leaning snags < 45° angle that are < 10 cm in diameter on average.

**CWD:** Coarse Woody Debris - logs or leaning snags < 45° angle that are ≥ 10 cm in diameter on average.

**BPSHR:** Berry-Producing Shrubs, including Vaccinium (blueberries, huckleberries), Rubus (blackberries, thimbleberry, salmonberry, raspberries) and Ribes (currants, gooseberries).

**EVSHR:** Evergreen Shrubs, including Gaultheria (salal) and Berberis (Oregon grape).

**ODSHR:** All Other Deciduous and Evergreen Shrubs.

### Tree Species Codes:

**PSME** = Pseudotsuga menziesii (Douglas-fir)
**TSHE** = Tsuga heterophylla (w. hemlock)
**THPL** = Thuja plicata (western redcedar)
**ABAM** = Abies amabilis (Pacific silver fir)
**ABGR** = Abies grandis (grand fir)
**ACCI** = Acer circinatum (vine maple)
**ACMA** = Acer macrophyllum (bigleaf maple)
**ALRU** = Alnus rubra (red alder)
**RHPU** = Rhamnus purshiana (cascara)

### Snag Decay Classes:

**DC 1** = intact. Bark and branches mostly intact, sapwood firm.

**DC 2** = moderately decayed. Limbs either stubs or absent, sapwood soft.

**DC 3** = well decayed. All wood soft, bark and sapwood usually sloughed.

### Log Decay Classes:

**DC 1** = intact. Bark intact, freshly fallen.

**DC 2** = moderately decayed. Bark sloughing to absent, sapwood soft.

**DC 3** = well decayed. Log completely in contact w/ground, bark absent, all wood soft.

Landscape Study - Herb/Low Shrub Plots (3m x 3m) Pitfall Bird

| | | | |
|---|---|---|---|
| Site No.: | Plot No.: | Date (D/M/Y): | Observers: |

| | Low Shrub Layer (< 1 m) | | | | | Herb Layer | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Tree Seedlings | | | | | | | | | | | | | | |
| Plot | BPSHR | EVSHR | ODSHR | Species | Cover | Fern | Mean LittrD (in cm) | Leaf Litter | Moss | Bare Soil | Rock | Forbs | Grass | Lobaria Lichen | FWD | CWD | All Stumps | Other* |
| 1 | | | | | | | | | | | | | | | | | | |
| 2 | | | | | | | | | | | | | | | | | | |
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| 9 | | | | | | | | | | | | | | | | | | |

*Other includes saprophytes, above-ground roots, tree and snag boles, fungi, etc.

Notes:

Landscape Study - Small and Medium Tree, Snag, and Log Plots (15 x 15m)    Pitfall    Bird

| | | | |
|---|---|---|---|
| Site No.: | Plot No.: | Date (D/M/Y): | Observers: |

| Tall Shrub Layer (> 1 m) | |
|---|---|
| Type | % Cov. |
| BPSHR | |
| EVSHR | |
| ODSHR | |

| Trees (1-3 m) | |
|---|---|
| Species | % Cov |
| PSME | |
| TSHE | |
| THPL | |
| ACCI | |
| ACMA | |
| ALRU | |
| RHPU | |
| ABAM | |
| ABGR | |
| UNKN | |

| Small (< 10 cm) and Medium (10-50 cm) Tree and Snag Layers | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Type | Species | Tally | No. | Species | Tally | No. | Species | Tally | No. |
| Small SUBD Tree | | | | | | | | | |
| Small DOM Tree | | | | | | | | | |
| Medium SUBD Tree | | | | | | | | | |
| Medium DOM Tree | | | | | | | | | |
| S1 Snag | | | | | | | | | |
| S2 Snag | | | | | | | | | |
| S3 Snag | | | | | | | | | |
| MS1 Snag | | | | | | | | | |
| MS2 Snag | | | | | | | | | |
| MS3 Snag | | | | | | | | | |
| MM1 Snag | | | | | | | | | |
| MM2 Snag | | | | | | | | | |
| MM3 Snag | | | | | | | | | |
| MT1 Snag | | | | | | | | | |
| MT2 Snag | | | | | | | | | |
| MT3 Snag | | | | | | | | | |

| Coarse Woody Debris Layer (All Logs) | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Type | Species | % Cov. | Species | % Cov. | Species | % Cov. | Species | % Cov. |
| S1 Log | | | | | | | | |
| S2 Log | | | | | | | | |
| S3 Log | | | | | | | | |
| L1 Log | | | | | | | | |
| L2 Log | | | | | | | | |
| L3 Log | | | | | | | | |

<u>S SUBD Tree</u>: Subdominant tree < 10 cm dbh, > 3 m tall
<u>S DOM Tree</u>: Dominant tree < 10 cm dbh, > 3 m tall
<u>M SUBD Tree</u>: Subdominant tree 10-50 cm dbh, > 3 m tall
<u>M DOM Tree</u>: Dominant tree 10-50 cm dbh, > 3 m tall
<u>S Snags</u>: < 10 cm dbh, DC1-DC3
<u>MS Snags</u>: 10-50 cm dbh, < 1.5 m tall, DC1-DC3
<u>MM Snags</u>: 10-50 cm dbh, 1.5-15 m tall, DC1-DC3
<u>MT Snags</u>: 10-50 cm dbh, > 15 m tall, DC1-DC3
<u>S Logs</u>: 10-30 cm dia, DC1-DC3
<u>L Logs</u>: > 30 cm dia, DC1-DC3

Notes:

Landscape Study - Large Tree and Snag Plots (45 x 45 m) Pitfall Bird

| | | | |
|---|---|---|---|
| Site No.: | Plot No.: | Date (D/M/Y): | Observers: |

| Stand-level Characteristics (Presence/Absence) | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Talus | Int. Stream | Perm. Stream | Bog/Marsh | Pond | Tree Pit | Riparian Zone |
| Stand Variables | | | | | | | |

| Large Tree (50-100 cm dbh) and Stump Layer | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Type | Species | Tally | No. | Species | Tally | No. | Species | Tally | No. |
| LSUBD Tree | | | | | | | | | |
| LDOM Tree | | | | | | | | | |
| | | | | | | | | | |
| | | | | | | | | | |
| LS1 Snag | | | | | | | | | |
| | | | | | | | | | |
| LS2 Snag | | | | | | | | | |
| | | | | | | | | | |
| LS3 Snag | | | | | | | | | |
| | | | | | | | | | |

| Very Large Tree (>100 cm dbh), Large Snag (> 50 cm dbh), and Dominant Deciduous Tree (any dbh) Layer | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Type | Species | dbh | Species | dbh | Species | dbh | Species | dbh | Species | dbh |
| VLSUBD Tree | | | | | | | | | | |
| VLDOM Tree | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| DOM Decid. Tree* | | | | | | | | | | |
| | | | | | | | | | | |
| LM1 Snag | | | | | | | | | | |
| LM2 Snag | | | | | | | | | | |
| LM3 Snag | | | | | | | | | | |
| LT1 Snag | | | | | | | | | | |
| LT2 Snag | | | | | | | | | | |
| LT3 Snag | | | | | | | | | | |

* Collect this data in 3rd and 4th age classes only. No minimum dbh.

<u>LS Snags</u>: Stumps and Snags
> 50 cm dbh, < 1.5 m tall, DC1-DC3

<u>LM Snags</u>: > 50 cm dbh,
1.5-15 m tall, DC1-DC3

<u>LT Snags</u>: > 50 cm dbh,
> 15 m tall, DC1-DC3

Notes (e.g., broken tops, supercanopy trees, cavities, description of ponds, streams, etc.):

# DATA SUMMARIES

TOTAL BIRD DETECTIONS BY SPECIES: 1993+1994+1995

| Species | Total Detections |
|---|---|
| | |
| | |
| | |
| American crow | 16 |
| American dipper | 1 |
| American goldfinch | 338 |
| American kestrel | 1 |
| American robin | 373 |
| barred owl | 3 |
| belted kingfisher | 1 |
| black-capped chickadee | 14 |
| Bewick's wren | 146 |
| Black-headed grosbeak | 159 |
| Blue grouse | 12 |
| band-tailed pigeon | 66 |
| brown creeper | 268 |
| brown-headed cowbird | 6 |
| bushtit | 38 |
| black-throated gray warbler | 329 |
| California quail | 1 |
| chestnut-backed chickadee | 1487 |
| cedar waxwing | 103 |
| common nighthawk | 2 |
| common raven | 10 |
| common yellowthroat | 469 |
| dark-eyed junco | 1169 |
| downy woodpecker | 15 |
| evening grosbeak | 131 |
| golden-crowned kinglet | 1883 |
| gray jay | 77 |
| great-horned owl | 1 |
| Hammond's flycatcher | 35 |
| hairy woodpecker | 96 |
| hermit thrush | 11 |
| hermit-Townsend's warbler | 881 |
| house wren | 63 |
| Hutton's vireo | 417 |
| MacGillivray's warbler | 401 |
| mountain chickadee | 1 |
| mourning dove | 5 |
| northern flicker | 35 |
| northern harrier | 1 |
| northern pygmy owl | 0 |
| orange-crowned warbler | 289 |
| olive-sided flycatcher | 28 |
| Pacific-slope flycatcher | 1892 |
| pileated woodpecker | 6 |
| pine siskin | 27 |

TOTAL BIRD DETECTIONS BY SPECIES: 1993+1994+1995

| | |
|---|---:|
| purple finch | 75 |
| red-breasted nuthatch | 141 |
| red-breasted sapsucker | 0 |
| red crossbill | 7 |
| rock dove | 2 |
| ruby-crowned kinglet | 12 |
| rufous-sided towhee | 551 |
| red-tailed hawk | 3 |
| red-winged blackbird | 2 |
| ruffed grouse | 13 |
| rufous hummingbird | 129 |
| sharp-shinned hawk | 0 |
| solitary vireo | 5 |
| song sparrow | 675 |
| Steller's jay | 223 |
| Swainson's thrush | 755 |
| Townsend's solitaire | 5 |
| tree swallow | 40 |
| turkey vulture | 6 |
| varied thrush | 393 |
| Vaux's swift | 1 |
| violet-green swallow | 40 |
| warbling vireo | 80 |
| white-crowned sparrow | 1137 |
| western bluebird | 30 |
| western tanager | 81 |
| western wood pewee | 0 |
| willow flycatcher | 494 |
| Wilson's warbler | 961 |
| winter wren | 3171 |
| unidentified woodpecker | 47 |
| yellow warbler | 8 |
| yellow-rumped warbler | 10 |
| | |
| Total detections | 20404 |

TOTAL BIRD DETECTIONS BY YEAR AND AGE CLASS

| Species | Age Class A | | | | Age Class B | | | | Age Class C | | | | Age Class D | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1993 | 1994 | 1995 | | 1993 | 1994 | 1995 | | 1993 | 1994 | 1995 | | 1993 | 1994 | 1995 |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| American crow | 3 | 0 | 2 | | 1 | 1 | 7 | | 1 | 1 | 0 | | 0 | 0 | 0 |
| American dipper | 0 | 0 | 0 | | 0 | 0 | 0 | | 1 | 0 | 0 | | 0 | 0 | 0 |
| American goldfinch | 84 | 120 | 97 | | 10 | 2 | 6 | | 2 | 13 | 0 | | 3 | 0 | 1 |
| American kestrel | 0 | 1 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| American robin | 54 | 26 | 54 | | 47 | 46 | 48 | | 14 | 20 | 9 | | 10 | 13 | 32 |
| barred owl | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 3 | 0 |
| belted kingfisher | 0 | 1 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| black-capped chickadee | 4 | 1 | 0 | | 4 | 1 | 1 | | 1 | 0 | 0 | | 2 | 0 | 0 |
| Bewick's wren | 35 | 43 | 49 | | 1 | 1 | 17 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| Black-headed grosbeak | 10 | 5 | 24 | | 29 | 22 | 36 | | 3 | 0 | 4 | | 6 | 3 | 17 |
| Blue grouse | 2 | 0 | 1 | | 2 | 1 | 3 | | 0 | 0 | 0 | | 0 | 1 | 2 |
| band-tailed pigeon | 0 | 0 | 3 | | 1 | 19 | 8 | | 4 | 14 | 6 | | 7 | 2 | 2 |
| brown creeper | 0 | 0 | 0 | | 3 | 1 | 8 | | 0 | 7 | 22 | | 69 | 84 | 74 |
| brown-headed cowbird | 0 | 3 | 0 | | 0 | 2 | 0 | | 0 | 0 | 0 | | 1 | 0 | 0 |
| bushtit | 3 | 5 | 3 | | 3 | 3 | 0 | | 0 | 2 | 6 | | 0 | 4 | 9 |
| black-throated gray warbler | 2 | 0 | 6 | | 16 | 47 | 45 | | 47 | 80 | 40 | | 6 | 20 | 20 |
| California quail | 1 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| chestnut-backed chickadee | 0 | 2 | 5 | | 123 | 126 | 166 | | 168 | 117 | 167 | | 214 | 191 | 208 |
| cedar waxwing | 15 | 34 | 34 | | 11 | 1 | 4 | | 0 | 0 | 0 | | 1 | 2 | 1 |
| common nighthawk | 0 | 0 | 2 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| common raven | 0 | 0 | 0 | | 0 | 1 | 1 | | 1 | 1 | 3 | | 0 | 2 | 1 |
| common yellowthroat | 121 | 98 | 138 | | 29 | 33 | 42 | | 0 | 0 | 1 | | 2 | 4 | 1 |
| dark-eyed junco | 223 | 238 | 370 | | 37 | 56 | 56 | | 30 | 37 | 38 | | 20 | 24 | 40 |
| downy woodpecker | 2 | 1 | 2 | | 0 | 1 | 4 | | 1 | 0 | 1 | | 0 | 2 | 1 |
| evening grosbeak | 5 | 0 | 1 | | 11 | 3 | 4 | | 22 | 37 | 8 | | 28 | 2 | 10 |
| golden-crowned kinglet | 0 | 0 | 0 | | 162 | 199 | 171 | | 306 | 303 | 288 | | 165 | 150 | 139 |
| gray jay | 0 | 0 | 0 | | 2 | 2 | 2 | | 20 | 3 | 11 | | 17 | 13 | 7 |
| great-horned owl | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 1 |
| Hammond's flycatcher | 1 | 1 | 1 | | 0 | 2 | 1 | | 1 | 2 | 3 | | 5 | 11 | 7 |
| hairy woodpecker | 4 | 4 | 2 | | 13 | 4 | 2 | | 12 | 1 | 0 | | 24 | 21 | 9 |
| hermit thrush | 0 | 0 | 0 | | 0 | 0 | 0 | | 1 | 8 | 2 | | 0 | 0 | 0 |

TOTAL BIRD DETECTIONS BY YEAR AND AGE CLASS

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| hermit-Townsend's warbler | 0 | 0 | 0 | | 24 | 38 | 70 | | 125 | 160 | 162 | | 101 | 100 | 101 |
| house wren | 43 | 6 | 12 | | 0 | 0 | 0 | | 0 | 0 | 2 | | 0 | 0 | 0 |
| Hutton's vireo | 0 | 0 | 0 | | 34 | 39 | 92 | | 34 | 33 | 82 | | 20 | 16 | 67 |
| MacGillivray's warbler | 86 | 102 | 115 | | 24 | 35 | 20 | | 0 | 3 | 0 | | 6 | 6 | 4 |
| mountain chickadee | 0 | 0 | 0 | | 0 | 0 | 1 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| mourning dove | 0 | 1 | 2 | | 0 | 1 | 1 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| northern flicker | 2 | 13 | 4 | | 7 | 3 | 2 | | 0 | 0 | 1 | | 0 | 0 | 3 |
| northern harrier | 0 | 0 | 1 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| northern pygmy owl | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| orange-crowned warbler | 43 | 15 | 64 | | 40 | 45 | 66 | | 2 | 0 | 7 | | 0 | 1 | 6 |
| olive-sided flycatcher | 3 | 0 | 16 | | 3 | 0 | 2 | | 0 | 0 | 0 | | 1 | 0 | 3 |
| Pacific-slope flycatcher | 3 | 0 | 3 | | 111 | 115 | 148 | | 213 | 159 | 289 | | 238 | 244 | 369 |
| pileated woodpecker | 0 | 0 | 0 | | 1 | 1 | 1 | | 0 | 1 | 0 | | 1 | 0 | 1 |
| pine siskin | 0 | 0 | 1 | | 5 | 5 | 2 | | 8 | 0 | 1 | | 0 | 1 | 4 |
| purple finch | 3 | 3 | 0 | | 45 | 12 | 7 | | 0 | 1 | 0 | | 2 | 1 | 1 |
| red-breasted nuthatch | 0 | 0 | 1 | | 2 | 3 | 5 | | 2 | 7 | 8 | | 11 | 21 | 81 |
| red-breasted sapsucker | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| red crossbill | 0 | 0 | 0 | | 1 | 0 | 0 | | 1 | 0 | 0 | | 5 | 0 | 0 |
| rock dove | 0 | 0 | 2 | | 0 | 0 | 0 | | 0 | 0 | 0 | | | 0 | 0 |
| ruby-crowned kinglet | 0 | 0 | 0 | | 3 | 0 | 1 | | 2 | 0 | 2 | | 2 | 1 | 1 |
| rufous-sided towhee | 120 | 127 | 206 | | 9 | 12 | 13 | | 2 | 5 | 6 | | 7 | 16 | 28 |
| red-tailed hawk | 0 | 0 | 1 | | 0 | 0 | 0 | | 0 | 0 | 1 | | 0 | 1 | 0 |
| red-winged blackbird | 0 | 2 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| ruffed grouse | 1 | 2 | 2 | | 3 | 3 | 1 | | 1 | 0 | 0 | | 0 | 0 | 0 |
| rufous hummingbird | 18 | 17 | 30 | | 15 | 16 | 13 | | 0 | 0 | 0 | | 5 | 8 | 7 |
| sharp-shinned hawk | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| solitary vireo | 0 | 0 | 0 | | 3 | 0 | 2 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| song sparrow | 80 | 114 | 276 | | 45 | 83 | 75 | | 0 | 1 | 0 | | 0 | 0 | 1 |
| Steller's jay | 1 | 7 | 13 | | 26 | 33 | 29 | | 16 | 10 | 13 | | 20 | 13 | 42 |
| Swainson's thrush | 10 | 15 | 47 | | 207 | 140 | 149 | | 23 | 17 | 39 | | 38 | 20 | 50 |
| Townsend's solitaire | 0 | 0 | 0 | | 3 | 0 | 1 | | 1 | 0 | 0 | | 0 | 0 | 0 |
| tree swallow | 8 | 15 | 13 | | 0 | 1 | 0 | | 0 | 0 | 0 | | 0 | 0 | 3 |
| turkey vulture | 0 | 6 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| varied thrush | 1 | 0 | 0 | | 9 | 34 | 54 | | 45 | 26 | 80 | | 43 | 24 | 77 |
| Vaux's swift | 0 | 1 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |

TOTAL BIRD DETECTIONS BY YEAR AND AGE CLASS

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| violet-green swallow | 32 | 0 | 6 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 2 | 0 | 0 |
| warbling vireo | 1 | 1 | 5 | | 19 | 25 | 16 | | 9 | 1 | 3 | | 0 | 0 | 0 |
| white-crowned sparrow | 392 | 403 | 327 | | 2 | 7 | 5 | | 0 | 0 | 0 | | 0 | 1 | 0 |
| western bluebird | 13 | 10 | 5 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 2 | 0 | 0 |
| western tanager | 2 | 2 | 1 | | 8 | 5 | 12 | | 3 | 1 | 3 | | 12 | 17 | 15 |
| western wood pewee | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 | | 0 | 0 | 0 |
| willow flycatcher | 93 | 61 | 253 | | 30 | 30 | 25 | | 0 | 0 | 0 | | 0 | 0 | 2 |
| Wilson's warbler | 2 | 12 | 29 | | 170 | 200 | 171 | | 25 | 22 | 35 | | 86 | 90 | 119 |
| winter wren | 3 | 2 | 4 | | 224 | 340 | 424 | | 153 | 158 | 337 | | 454 | 451 | 621 |
| unidentified woodpecker | 0 | 1 | 3 | | 3 | 3 | 5 | | 6 | 0 | 2 | | 2 | 9 | 13 |
| yellow warbler | 0 | 1 | 2 | | 0 | 1 | 2 | | 0 | 0 | 0 | | 0 | 2 | 0 |
| yellow-rumped warbler | 5 | 0 | 3 | | 0 | 0 | 1 | | 1 | 0 | 0 | | 0 | 0 | 0 |
| . | | | | | | | | | | | | | | | |
| Total detections | 1534 | 1522 | 2241 | | 1581 | 1804 | 2048 | | 1307 | 1251 | 1682 | | 1638 | 1595 | 2201 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
|---|---|---|---|---|---|---|---|
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| A1 | AMCR | 1 | 1 | 0 | 7 | 0 | 0 |
| A1 | AMGO | 17 | 10 | 12 | 48 | 1 | 12 |
| A1 | AMRO | 6 | 4 | 4 | 2 | 9 | 0 |
| A1 | BEWR | 0 | 0 | 3 | 0 | 6 | 0 |
| A1 | BHGR | 0 | 0 | 0 | 0 | 3 | 0 |
| A1 | BTPI | 0 | 0 | 0 | 6 | 3 | 0 |
| A1 | BYWA | 0 | 0 | 0 | 0 | 1 | 0 |
| A1 | CBCH | 0 | 0 | 0 | 0 | 3 | 0 |
| A1 | CEWA | 0 | 0 | 4 | 0 | 2 | 4 |
| A1 | CORA | 0 | 0 | 0 | 0 | 0 | 0 |
| A1 | COYE | 10 | 0 | 3 | 0 | 4 | 0 |
| A1 | DEJU | 51 | 0 | 65 | 1 | 108 | 0 |
| A1 | DOSQ | 0 | 0 | 0 | 0 | 0 | 0 |
| A1 | EVGR | 1 | 5 | 0 | 9 | 0 | 2 |
| A1 | HAFL | 0 | 0 | 1 | 0 | 0 | 0 |
| A1 | HAWO | 1 | 0 | 0 | 0 | 0 | 0 |
| A1 | HOWR | 7 | 0 | 1 | 0 | 0 | 0 |
| A1 | MGWA | 16 | 0 | 11 | 0 | 15 | 0 |
| A1 | MODO | 0 | 0 | 0 | 0 | 2 | 0 |
| A1 | NOFL | 0 | 0 | 4 | 5 | 0 | 0 |
| A1 | OCWA | 12 | 0 | 1 | 0 | 6 | 0 |
| A1 | PISI | 0 | 0 | 0 | 0 | 1 | 0 |
| A1 | PSFL | 0 | 0 | 0 | 0 | 0 | 0 |
| A1 | PUFI | 0 | 0 | 0 | 0 | 0 | 0 |
| A1 | RBNU | 0 | 0 | 0 | 0 | 0 | 0 |
| A1 | RECR | 0 | 0 | 0 | 2 | 0 | 0 |
| A1 | RTHA | 0 | 0 | 0 | 0 | 0 | 0 |
| A1 | RSTO | 33 | 1 | 34 | 0 | 52 | 0 |
| A1 | RUHU | 5 | 1 | 2 | 2 | 3 | 0 |
| A1 | SOSP | 7 | 0 | 1 | 0 | 43 | 0 |
| A1 | STJA | 0 | 0 | 0 | 5 | 1 | 0 |
| A1 | SWTH | 0 | 0 | 0 | 0 | 2 | 0 |
| A1 | TOCH | 1 | 0 | 0 | 0 | 0 | 0 |
| A1 | TUVU | 0 | 0 | 0 | 0 | 0 | 2 |
| A1 | UNKN | 1 | 1 | 9 | 3 | 13 | 7 |
| A1 | VGSW | 0 | 4 | 0 | 0 | 0 | 1 |
| A1 | WAVI | 0 | 0 | 0 | 0 | 0 | 0 |
| A1 | WCSP | 79 | 1 | 72 | 0 | 69 | 0 |
| A1 | WEBL | 3 | 0 | 0 | 0 | 0 | 0 |
| A1 | WETA | 0 | 0 | 2 | 0 | 0 | 0 |
| A1 | WIFL | 3 | 0 | 2 | 0 | 11 | 0 |
| A1 | WIWA | 0 | 0 | 2 | 0 | 8 | 0 |
| A1 | WIWR | 0 | 0 | 0 | 0 | 0 | 0 |
| A1 | WOOD | 0 | 0 | 0 | 0 | 1 | 0 |
| A1 | YRWA | 2 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| A2 | AMCR | 0 | 0 | 0 | 0 | 0 | 0 |
| A2 | AMGO | 8 | 5 | 20 | 28 | 9 | 0 |
| A2 | AMRO | 20 | 5 | 9 | 1 | 11 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A2 | BEKI | 0 | 0 | 0 | 1 | 0 | 0 |
| A2 | BEWR | 2 | 0 | 2 | 0 | 3 | 0 |
| A2 | BHCO | 0 | 0 | 0 | 1 | 0 | 0 |
| A2 | BHGR | 1 | 0 | 1 | 0 | 6 | 0 |
| A2 | BTPI | 0 | 0 | 0 | 5 | 0 | 0 |
| A2 | BYWA | 0 | 0 | 0 | 0 | 0 | 0 |
| A2 | CAQU | 1 | 0 | 0 | 0 | 0 | 0 |
| A2 | CBCH | 0 | 0 | 0 | 0 | 1 | 0 |
| A2 | CEWA | 11 | 0 | 10 | 0 | 7 | 4 |
| A2 | CORA | 0 | 0 | 0 | 2 | 0 | 0 |
| A2 | COYE | 9 | 0 | 6 | 0 | 6 | 0 |
| A2 | DEJU | 31 | 0 | 65 | 1 | 75 | 1 |
| A2 | DOWO | 1 | 0 | 0 | 0 | 0 | 0 |
| A2 | EVGR | 0 | 2 | 0 | 1 | 1 | 3 |
| A2 | GBHE | 0 | 0 | 0 | 2 | 0 | 0 |
| A2 | HAFL | 1 | 0 | 0 | 0 | 1 | 0 |
| A2 | HAWO | 1 | 0 | 0 | 0 | 0 | 0 |
| A2 | HOWR | 1 | 0 | 0 | 0 | 0 | 0 |
| A2 | HUVI | 0 | 0 | 0 | 1 | 0 | 0 |
| A2 | MGWA | 6 | 0 | 14 | 0 | 12 | 0 |
| A2 | MODO | 0 | 1 | 0 | 2 | 0 | 2 |
| A2 | NOFL | 0 | 0 | 3 | 0 | 0 | 2 |
| A2 | OCWA | 0 | 0 | 1 | 0 | 2 | 0 |
| A2 | OSFL | 0 | 0 | 0 | 0 | 2 | 0 |
| A2 | PIWO | 0 | 0 | 0 | 0 | 0 | 0 |
| A2 | PUFI | 0 | 0 | 3 | 1 | 0 | 0 |
| A2 | RSTO | 21 | 0 | 18 | 0 | 33 | 0 |
| A2 | RTHA | 0 | 1 | 0 | 1 | 0 | 0 |
| A2 | RUHU | 1 | 1 | 1 | 1 | 2 | 0 |
| A2 | SOSP | 2 | 0 | 10 | 1 | 51 | 0 |
| A2 | STJA | 0 | 0 | 1 | 0 | 2 | 1 |
| A2 | SWTH | 0 | 0 | 3 | 0 | 0 | 0 |
| A2 | TOCH | 0 | 0 | 1 | 0 | 0 | 0 |
| A2 | TRSW | 3 | 2 | 11 | 14 | 0 | 3 |
| A2 | UNKN | 2 | 1 | 1 | 5 | 6 | 10 |
| A2 | VATH | 0 | 0 | 0 | 0 | 0 | 0 |
| A2 | VGSW | 4 | 4 | 0 | 1 | 3 | 1 |
| A2 | WAVI | 0 | 0 | 0 | 0 | 1 | 0 |
| A2 | WCSP | 65 | 4 | 93 | 0 | 87 | 0 |
| A2 | WEBL | 7 | 0 | 2 | 0 | 0 | 0 |
| A2 | WETA | 0 | 0 | 0 | 0 | 1 | 0 |
| A2 | WIFL | 18 | 0 | 8 | 0 | 24 | 0 |
| A2 | WIWA | 0 | 0 | 1 | 0 | 8 | 0 |
| A2 | WIWR | 0 | 0 | 0 | 0 | 0 | 0 |
| A2 | WOOD | 0 | 0 | 0 | 0 | 0 | 0 |
| A2 | YEWA | 0 | 0 | 1 | 0 | 0 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| A3 | AMCR | 0 | 0 | 0 | 0 | 0 | 4 |
| A3 | AMGO | 12 | 10 | 12 | 43 | 10 | 10 |
| A3 | AMKE | 0 | 1 | 0 | 0 | 0 | 0 |
| A3 | AMRO | 4 | 0 | 0 | 4 | 6 | 5 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A3 | BEWR | 14 | 0 | 10 | 0 | 8 | 0 |
| A3 | BHCO | 0 | 0 | 0 | 0 | 0 | 0 |
| A3 | BHGR | 3 | 0 | 2 | 1 | 6 | 0 |
| A3 | BTPI | 0 | 0 | 0 | 7 | 0 | 0 |
| A3 | BYWA | 0 | 0 | 0 | 0 | 1 | 0 |
| A3 | CBCH | 0 | 0 | 2 | 0 | 0 | 0 |
| A3 | CEWA | 0 | 0 | 1 | 5 | 3 | 20 |
| A3 | CORA | 0 | 4 | 0 | 1 | 0 | 0 |
| A3 | COYE | 26 | 0 | 42 | 0 | 32 | 0 |
| A3 | DEJU | 32 | 1 | 26 | 1 | 32 | 0 |
| A3 | DOWO | 0 | 0 | 0 | 1 | 1 | 0 |
| A3 | EVGR | 0 | 0 | 0 | 4 | 0 | 0 |
| A3 | GBHE | 0 | 0 | 0 | 2 | 0 | 0 |
| A3 | HAWO | 2 | 1 | 1 | 1 | 0 | 0 |
| A3 | HUVI | 0 | 0 | 0 | 0 | 0 | 0 |
| A3 | MGWA | 23 | 0 | 22 | 0 | 17 | 0 |
| A3 | MODO | 0 | 0 | 0 | 0 | 0 | 0 |
| A3 | NOFL | 0 | 1 | 0 | 1 | 0 | 0 |
| A3 | OCWA | 7 | 0 | 1 | 0 | 2 | 0 |
| A3 | OSFL | 1 | 0 | 0 | 0 | 1 | 0 |
| A3 | PSFL | 2 | 0 | 0 | 0 | 2 | 0 |
| A3 | PUFI | 0 | 0 | 0 | 2 | 0 | 0 |
| A3 | RSTO | 14 | 0 | 11 | 0 | 14 | 0 |
| A3 | RTHA | 0 | 2 | 0 | 3 | 0 | 0 |
| A3 | RUHU | 3 | 1 | 0 | 1 | 1 | 0 |
| A3 | RWBL | 0 | 0 | 2 | 0 | 0 | 0 |
| A3 | SOSP | 49 | 0 | 41 | 0 | 66 | 0 |
| A3 | SOVI | 0 | 0 | 0 | 0 | 0 | 0 |
| A3 | STJA | 1 | 1 | 4 | 8 | 6 | 2 |
| A3 | SWTH | 2 | 0 | 0 | 0 | 10 | 0 |
| A3 | TOCH | 1 | 0 | 3 | 0 | 0 | 0 |
| A3 | TUVU | 0 | 0 | 0 | 1 | 0 | 0 |
| A3 | UNKN | 3 | 0 | 1 | 4 | 19 | 5 |
| A3 | VATH | 0 | 0 | 0 | 0 | 0 | 0 |
| A3 | VGSW | 0 | 12 | 0 | 0 | 0 | 0 |
| A3 | WAVI | 0 | 0 | 1 | 0 | 0 | 0 |
| A3 | WCSP | 61 | 0 | 30 | 0 | 23 | 0 |
| A3 | WEBL | 0 | 0 | 1 | 0 | 0 | 0 |
| A3 | WETA | 0 | 0 | 0 | 1 | 0 | 0 |
| A3 | WIFL | 15 | 0 | 13 | 0 | 57 | 0 |
| A3 | WIWA | 2 | 0 | 2 | 0 | 1 | 0 |
| A3 | WIWR | 2 | 0 | 2 | 0 | 0 | 0 |
| A3 | WOOD | 0 | 0 | 0 | 0 | 0 | 0 |
| A3 | YEWA | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| A4 | AMCR | 0 | 0 | 0 | 2 | 0 | 0 |
| A4 | AMGO | 15 | 3 | 7 | 40 | 15 | 8 |
| A4 | AMRO | 5 | 0 | 7 | 6 | 7 | 0 |
| A4 | BEWR | 2 | 0 | 1 | 0 | 5 | 0 |
| A4 | BHCO | 0 | 0 | 0 | 0 | 0 | 0 |
| A4 | BHGR | 1 | 0 | 0 | 0 | 3 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A4 | BLGR | 0 | 0 | 0 | 0 | 0 | 0 |
| A4 | BYWA | 0 | 0 | 0 | 0 | 2 | 0 |
| A4 | CBCH | 0 | 0 | 0 | 0 | 0 | 0 |
| A4 | CEWA | 0 | 0 | 0 | 0 | 2 | 5 |
| A4 | CONI | 0 | 0 | 0 | 1 | 0 | 2 |
| A4 | CORA | 0 | 2 | 0 | 2 | 0 | 0 |
| A4 | COYE | 14 | 0 | 14 | 0 | 27 | 1 |
| A4 | DEJU | 63 | 1 | 50 | 0 | 58 | 0 |
| A4 | DOWO | 0 | 0 | 0 | 0 | 1 | 0 |
| A4 | EVGR | 2 | 5 | 0 | 5 | 0 | 0 |
| A4 | GBHE | 0 | 0 | 0 | 1 | 0 | 2 |
| A4 | HAWO | 0 | 0 | 2 | 0 | 2 | 0 |
| A4 | HOWR | 6 | 0 | 1 | 0 | 0 | 0 |
| A4 | HUVI | 0 | 0 | 0 | 0 | 0 | 0 |
| A4 | LENI | 0 | 0 | 0 | 1 | 0 | 0 |
| A4 | MGWA | 19 | 0 | 21 | 0 | 43 | 0 |
| A4 | MODO | 0 | 0 | 0 | 1 | 0 | 0 |
| A4 | NOFL | 0 | 1 | 3 | 0 | 1 | 0 |
| A4 | NOGO | 0 | 0 | 0 | 1 | 0 | 0 |
| A4 | OCWA | 5 | 0 | 1 | 0 | 17 | 0 |
| A4 | OSFL | 0 | 0 | 0 | 0 | 6 | 0 |
| A4 | PUFI | 1 | 0 | 0 | 3 | 0 | 0 |
| A4 | RSTO | 6 | 0 | 18 | 0 | 42 | 0 |
| A4 | RTHA | 0 | 0 | 0 | 1 | 1 | 0 |
| A4 | RUGR | 0 | 0 | 0 | 0 | 0 | 0 |
| A4 | RUHU | 2 | 2 | 0 | 1 | 3 | 0 |
| A4 | RWSW | 0 | 1 | 0 | 0 | 0 | 0 |
| A4 | SOSP | 6 | 0 | 13 | 0 | 48 | 0 |
| A4 | STJA | 0 | 0 | 0 | 0 | 0 | 0 |
| A4 | SWTH | 2 | 0 | 4 | 0 | 12 | 0 |
| A4 | TOCH | 0 | 0 | 0 | 0 | 1 | 0 |
| A4 | TRSW | 0 | 3 | 0 | 17 | 3 | 3 |
| A4 | UNKN | 0 | 2 | 4 | 3 | 8 | 4 |
| A4 | VATH | 1 | 0 | 0 | 0 | 0 | 0 |
| A4 | VGSW | 4 | 1 | 0 | 0 | 0 | 0 |
| A4 | WAVI | 0 | 0 | 0 | 0 | 2 | 0 |
| A4 | WCSP | 70 | 0 | 71 | 0 | 57 | 0 |
| A4 | WEBL | 2 | 0 | 7 | 0 | 4 | 0 |
| A4 | WETA | 0 | 0 | 0 | 0 | 0 | 0 |
| A4 | WIFL | 31 | 2 | 11 | 0 | 79 | 0 |
| A4 | WIWA | 0 | 0 | 4 | 0 | 10 | 0 |
| A4 | WIWR | 1 | 0 | 0 | 0 | 0 | 0 |
| A4 | WOOD | 0 | 0 | 0 | 0 | 0 | 0 |
| A4 | YEWA | 0 | 0 | 0 | 0 | 2 | 0 |
| A4 | YRWA | 2 | 0 | 0 | 0 | 3 | 4 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| A5 | AMCR | 0 | 1 | 0 | 1 | 0 | 0 |
| A5 | AMGO | 16 | 16 | 49 | 36 | 44 | 31 |
| A5 | AMKE | 0 | 0 | 0 | 1 | 0 | 0 |
| A5 | AMRO | 13 | 3 | 2 | 2 | 13 | 6 |
| A5 | BCCH | 4 | 0 | 1 | 0 | 0 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A5 | BEWR | 1 | 0 | 8 | 0 | 12 | 0 |
| A5 | BHCO | 0 | 0 | 3 | 0 | 0 | 0 |
| A5 | BHGR | 5 | 0 | 2 | 0 | 2 | 0 |
| A5 | BLGR | 2 | 0 | 0 | 0 | 0 | 0 |
| A5 | BTPI | 0 | 0 | 0 | 0 | 0 | 0 |
| A5 | BUSH | 3 | 0 | 0 | 0 | 0 | 0 |
| A5 | BYWA | 2 | 0 | 0 | 0 | 1 | 0 |
| A5 | CAGO | 0 | 2 | 0 | 0 | 0 | 0 |
| A5 | CAQU | 0 | 0 | 0 | 0 | 0 | 0 |
| A5 | CBCH | 0 | 0 | 0 | 0 | 1 | 0 |
| A5 | CEWA | 4 | 3 | 18 | 2 | 9 | 5 |
| A5 | COBU | 0 | 0 | 5 | 0 | 0 | 0 |
| A5 | CORA | 0 | 1 | 0 | 0 | 0 | 0 |
| A5 | COYE | 54 | 0 | 13 | 0 | 26 | 0 |
| A5 | DEJU | 29 | 0 | 24 | 2 | 60 | 0 |
| A5 | DOSQ | 0 | 0 | 0 | 0 | 0 | 0 |
| A5 | DOWO | 0 | 0 | 1 | 0 | 0 | 0 |
| A5 | EVGR | 2 | 1 | 0 | 6 | 0 | 1 |
| A5 | GBHE | 0 | 1 | 0 | 1 | 0 | 0 |
| A5 | HAWO | 0 | 0 | 1 | 0 | 0 | 0 |
| A5 | HOWR | 5 | 0 | 2 | 0 | 2 | 0 |
| A5 | MAWR | 0 | 0 | 1 | 0 | 0 | 0 |
| A5 | MGWA | 13 | 0 | 10 | 0 | 14 | 0 |
| A5 | MODO | 0 | 0 | 0 | 1 | 0 | 0 |
| A5 | NOFL | 2 | 1 | 0 | 2 | 2 | 2 |
| A5 | NOHA | 0 | 0 | 0 | 1 | 0 | 1 |
| A5 | OCWA | 12 | 0 | 8 | 0 | 26 | 0 |
| A5 | OSFL | 1 | 0 | 0 | 0 | 7 | 0 |
| A5 | PSFL | 0 | 0 | 0 | 0 | 1 | 0 |
| A5 | PUFI | 1 | 0 | 0 | 2 | 0 | 0 |
| A5 | RBNU | 0 | 0 | 0 | 0 | 1 | 0 |
| A5 | RSTO | 33 | 2 | 28 | 0 | 40 | 0 |
| A5 | RTHA | 0 | 1 | 0 | 0 | 0 | 0 |
| A5 | RUHU | 7 | 0 | 12 | 1 | 14 | 4 |
| A5 | SOSP | 6 | 0 | 18 | 0 | 36 | 0 |
| A5 | STJA | 0 | 1 | 2 | 4 | 4 | 0 |
| A5 | SWTH | 4 | 0 | 8 | 0 | 15 | 0 |
| A5 | TOCH | 0 | 0 | 3 | 0 | 1 | 0 |
| A5 | TRSW | 0 | 0 | 0 | 0 | 2 | 2 |
| A5 | UNKN | 8 | 2 | 0 | 3 | 15 | 2 |
| A5 | VGSW | 0 | 2 | 0 | 3 | 0 | 1 |
| A5 | WAVI | 1 | 0 | 0 | 0 | 1 | 0 |
| A5 | WCSP | 52 | 0 | 64 | 0 | 34 | 0 |
| A5 | WEBL | 1 | 0 | 0 | 0 | 1 | 0 |
| A5 | WETA | 1 | 0 | 0 | 0 | 0 | 0 |
| A5 | WIFL | 19 | 0 | 14 | 0 | 46 | 0 |
| A5 | WIWA | 0 | 0 | 3 | 0 | 1 | 0 |
| A5 | WOOD | 0 | 0 | 1 | 1 | 1 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| A6 | AMCR | 2 | 3 | 0 | 0 | 2 | 1 |
| A6 | AMGO | 16 | 15 | 20 | 38 | 18 | 9 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| A6 | AMRO | 6 | 1 | 4 | 1 | 8 | 0 |
| A6 | BEWR | 16 | 0 | 19 | 0 | 15 | 0 |
| A6 | BHGR | 0 | 1 | 0 | 0 | 4 | 0 |
| A6 | BLGR | 0 | 0 | 0 | 0 | 1 | 0 |
| A6 | BTPI | 0 | 5 | 0 | 15 | 0 | 1 |
| A6 | BUSH | 0 | 0 | 0 | 0 | 3 | 0 |
| A6 | BYWA | 0 | 0 | 0 | 0 | 1 | 0 |
| A6 | CBCH | 0 | 0 | 0 | 0 | 0 | 0 |
| A6 | CEWA | 0 | 0 | 1 | 0 | 11 | 0 |
| A6 | CORA | 0 | 3 | 0 | 2 | 0 | 3 |
| A6 | COYE | 8 | 0 | 20 | 0 | 43 | 0 |
| A6 | DEJU | 17 | 0 | 8 | 0 | 37 | 0 |
| A6 | DOWO | 1 | 0 | 0 | 0 | 0 | 0 |
| A6 | EVGR | 0 | 4 | 0 | 4 | 0 | 0 |
| A6 | GBHE | 0 | 1 | 0 | 13 | 0 | 0 |
| A6 | HAFL | 0 | 0 | 0 | 0 | 0 | 0 |
| A6 | HAWO | 0 | 0 | 0 | 0 | 0 | 0 |
| A6 | HETO | 0 | 0 | 0 | 0 | 0 | 0 |
| A6 | HOWR | 24 | 0 | 2 | 0 | 10 | 0 |
| A6 | HUVI | 0 | 0 | 0 | 0 | 0 | 0 |
| A6 | MGWA | 9 | 0 | 23 | 0 | 14 | 0 |
| A6 | MODO | 0 | 0 | 1 | 9 | 0 | 0 |
| A6 | NOFL | 0 | 1 | 3 | 0 | 1 | 0 |
| A6 | NOHA | 0 | 0 | 0 | 0 | 0 | 0 |
| A6 | OCWA | 7 | 0 | 3 | 0 | 11 | 0 |
| A6 | OSFL | 1 | 0 | 0 | 0 | 0 | 0 |
| A6 | PIWO | 0 | 0 | 0 | 1 | 0 | 0 |
| A6 | PSFL | 1 | 0 | 0 | 0 | 0 | 0 |
| A6 | PUFI | 1 | 0 | 0 | 0 | 0 | 0 |
| A6 | RBSA | 0 | 0 | 0 | 0 | 0 | 0 |
| A6 | RSTO | 13 | 0 | 18 | 0 | 25 | 0 |
| A6 | RTHA | 0 | 0 | 0 | 1 | 0 | 0 |
| A6 | RUGR | 1 | 0 | 2 | 0 | 2 | 0 |
| A6 | RUHU | 0 | 0 | 2 | 1 | 7 | 0 |
| A6 | SOSP | 10 | 0 | 31 | 0 | 32 | 0 |
| A6 | STJA | 0 | 1 | 0 | 1 | 0 | 0 |
| A6 | SWTH | 2 | 0 | 0 | 0 | 8 | 0 |
| A6 | TRSW | 0 | 0 | 0 | 6 | 0 | 0 |
| A6 | TUVU | 0 | 0 | 0 | 2 | 0 | 0 |
| A6 | UNKN | 6 | 2 | 4 | 1 | 2 | 2 |
| A6 | VGSW | 0 | 1 | 0 | 3 | 0 | 0 |
| A6 | WAVI | 0 | 0 | 0 | 0 | 1 | 0 |
| A6 | WCSP | 65 | 0 | 73 | 0 | 57 | 0 |
| A6 | WETA | 1 | 0 | 0 | 0 | 0 | 0 |
| A6 | WIFL | 7 | 0 | 13 | 0 | 36 | 0 |
| A6 | WIWA | 0 | 0 | 0 | 0 | 1 | 0 |
| A6 | WIWR | 0 | 0 | 0 | 0 | 4 | 0 |
| A6 | WOOD | 0 | 0 | 0 | 0 | 1 | 0 |
| A6 | YRWA | 1 | 0 | 0 | 0 | 0 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
|---|---|---|---|---|---|---|---|
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| B1 | AMCR | 0 | 1 | 0 | 4 | 0 | 1 |
| B1 | AMGO | 4 | 7 | 1 | 10 | 0 | 0 |
| B1 | AMRO | 16 | 0 | 19 | 0 | 12 | 0 |
| B1 | BCCH | 1 | 0 | 1 | 0 | 1 | 0 |
| B1 | BEWR | 1 | 0 | 1 | 0 | 6 | 0 |
| B1 | BHGR | 10 | 0 | 11 | 0 | 5 | 0 |
| B1 | BLGR | 0 | 0 | 0 | 0 | 1 | 0 |
| B1 | BTPI | 1 | 0 | 7 | 0 | 0 | 0 |
| B1 | BYWA | 3 | 0 | 6 | 0 | 13 | 0 |
| B1 | CBCH | 22 | 0 | 15 | 0 | 42 | 0 |
| B1 | CEWA | 2 | 0 | 0 | 0 | 0 | 0 |
| B1 | CORA | 0 | 0 | 0 | 3 | 0 | 0 |
| B1 | COYE | 7 | 0 | 12 | 0 | 14 | 0 |
| B1 | DEJU | 12 | 0 | 15 | 0 | 9 | 0 |
| B1 | DOSQ | 2 | 0 | 9 | 0 | 5 | 0 |
| B1 | EVGR | 2 | 4 | 2 | 9 | 0 | 0 |
| B1 | GCKI | 15 | 0 | 19 | 0 | 13 | 0 |
| B1 | GRJA | 0 | 0 | 1 | 0 | 2 | 0 |
| B1 | HAFL | 0 | 0 | 0 | 0 | 1 | 0 |
| B1 | HAWO | 2 | 0 | 0 | 0 | 1 | 0 |
| B1 | HETH | 0 | 0 | 0 | 0 | 0 | 0 |
| B1 | HETO | 1 | 0 | 2 | 0 | 18 | 0 |
| B1 | HOWR | 0 | 0 | 0 | 0 | 0 | 0 |
| B1 | HUVI | 9 | 0 | 9 | 0 | 26 | 0 |
| B1 | MGWA | 14 | 0 | 7 | 0 | 3 | 0 |
| B1 | MODO | 0 | 0 | 0 | 0 | 1 | 0 |
| B1 | NOFL | 2 | 0 | 1 | 0 | 1 | 0 |
| B1 | OCWA | 27 | 0 | 4 | 0 | 8 | 0 |
| B1 | OSFL | 3 | 0 | 0 | 0 | 2 | 0 |
| B1 | PISI | 0 | 0 | 3 | 2 | 0 | 0 |
| B1 | PIWO | 0 | 0 | 1 | 0 | 0 | 0 |
| B1 | PSFL | 13 | 0 | 17 | 0 | 24 | 0 |
| B1 | PUFI | 27 | 0 | 1 | 0 | 5 | 0 |
| B1 | RBNU | 0 | 0 | 0 | 0 | 0 | 0 |
| B1 | RCKI | 2 | 0 | 0 | 0 | 0 | 0 |
| B1 | RECR | 0 | 0 | 0 | 3 | 0 | 0 |
| B1 | RSTO | 5 | 0 | 3 | 0 | 6 | 0 |
| B1 | RUGR | 0 | 0 | 2 | 0 | 1 | 0 |
| B1 | RUHU | 8 | 0 | 3 | 1 | 2 | 0 |
| B1 | SOSP | 20 | 0 | 26 | 0 | 24 | 0 |
| B1 | SOVI | 2 | 0 | 0 | 0 | 0 | 0 |
| B1 | STJA | 6 | 3 | 3 | 7 | 3 | 0 |
| B1 | SWTH | 50 | 0 | 38 | 1 | 68 | 0 |
| B1 | TOSO | 0 | 0 | 0 | 0 | 1 | 0 |
| B1 | TRES | 0 | 0 | 0 | 1 | 0 | 0 |
| B1 | UNKN | 21 | 0 | 7 | 2 | 15 | 0 |
| B1 | VATH | 1 | 0 | 0 | 0 | 0 | 0 |
| B1 | WAVI | 8 | 0 | 8 | 0 | 5 | 0 |
| B1 | WCSP | 2 | 0 | 3 | 0 | 4 | 0 |
| B1 | WETA | 1 | 0 | 0 | 0 | 2 | 0 |
| B1 | WIFL | 17 | 0 | 14 | 0 | 16 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B1 | WIWA | 36 | 0 | 29 | 0 | 28 | 0 |
| B1 | WIWR | 25 | 0 | 25 | 0 | 25 | 0 |
| B1 | WOOD | 0 | 0 | 0 | 0 | 1 | 0 |
| B1 | YEWA | 0 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| B2 | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| B2 | AMCR | 0 | 0 | 0 | 0 | 0 | 2 |
| B2 | AMGO | 0 | 1 | 0 | 6 | 0 | 0 |
| B2 | AMRO | 3 | 0 | 0 | 1 | 3 | 0 |
| B2 | BCCH | 2 | 0 | 0 | 0 | 0 | 0 |
| B2 | BHCO | 0 | 0 | 0 | 1 | 0 | 0 |
| B2 | BHGR | 6 | 0 | 2 | 0 | 3 | 0 |
| B2 | BLGR | 1 | 0 | 1 | 0 | | |
| B2 | BRCR | 0 | 0 | 0 | 0 | 4 | 0 |
| B2 | BTPI | 0 | 0 | 0 | 2 | 1 | 0 |
| B2 | BYWA | 1 | 0 | 11 | 0 | 14 | 0 |
| B2 | CBCH | 16 | 0 | 27 | 0 | 22 | 0 |
| B2 | CORA | 0 | 0 | 0 | 2 | 0 | 0 |
| B2 | DEJU | 0 | 0 | 0 | 0 | 7 | 0 |
| B2 | DOSQ | 5 | 0 | 7 | 0 | 4 | 0 |
| B2 | DOWO | 0 | 0 | 0 | 0 | 1 | 0 |
| B2 | EVGR | 5 | 4 | 0 | 6 | 0 | 1 |
| B2 | GCKI | 52 | 0 | 35 | 0 | 40 | 0 |
| B2 | GRJA | 0 | 0 | 0 | 0 | 0 | 0 |
| B2 | HAWO | 3 | 0 | 2 | 0 | 0 | 0 |
| B2 | HETO | 14 | 0 | 10 | 0 | 22 | 0 |
| B2 | HOFI | 0 | 1 | 0 | 0 | 0 | 0 |
| B2 | HUVI | 7 | 0 | 9 | 0 | 8 | 0 |
| B2 | MGWA | 2 | 0 | 4 | 0 | 0 | 0 |
| B2 | NOFL | 0 | 0 | 0 | 0 | 0 | 0 |
| B2 | OCWA | 1 | 0 | 2 | 0 | 0 | 0 |
| B2 | PISI | 0 | 1 | 2 | 0 | 0 | 0 |
| B2 | PSFL | 26 | 0 | 32 | 0 | 43 | 0 |
| B2 | PUFI | 1 | 0 | 2 | 3 | 0 | 0 |
| B2 | RBNU | 1 | 0 | 0 | 0 | 0 | 0 |
| B2 | RCKI | 0 | 0 | 0 | 0 | 1 | 0 |
| B2 | RECR | 1 | 0 | 0 | 5 | 0 | 0 |
| B2 | RODO | 1 | 0 | 0 | 0 | 0 | 0 |
| B2 | RUHU | 0 | 0 | 0 | 0 | 1 | 0 |
| B2 | SOVI | 0 | 0 | 0 | 0 | 0 | 0 |
| B2 | STJA | 9 | 6 | 5 | 2 | 3 | 0 |
| B2 | SWTH | 30 | 0 | 21 | 0 | 26 | 0 |
| B2 | TOCH | 0 | 0 | 0 | 0 | 1 | 0 |
| B2 | TOSO | 2 | 0 | 0 | 0 | 0 | 0 |
| B2 | UNKN | 7 | 2 | 6 | 7 | 4 | 3 |
| B2 | VATH | 2 | 0 | 3 | 0 | 12 | 0 |
| B2 | WAVI | 0 | 0 | 2 | 0 | 2 | 0 |
| B2 | WETA | 0 | 0 | 1 | 0 | 3 | 0 |
| B2 | WIWA | 28 | 0 | 37 | 0 | 10 | 0 |
| B2 | WIWR | 58 | 0 | 78 | 0 | 90 | 0 |
| B2 | WOOD | 0 | 0 | 1 | 0 | 0 | 0 |
| | | | | | | | |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
|---|---|---|---|---|---|---|---|
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| B3 | AMCR | 0 | 0 | 0 | 1 | 1 | 0 |
| B3 | AMGO | 1 | 0 | 0 | 9 | 0 | 2 |
| B3 | AMRO | 3 | 0 | 3 | 0 | 2 | 0 |
| B3 | BCCH | 1 | 0 | 0 | 0 | 0 | 0 |
| B3 | BHGR | 6 | 0 | 1 | 0 | 8 | 0 |
| B3 | BLGR | 0 | 0 | 0 | 0 | 1 | 0 |
| B3 | BRCR | 0 | 0 | 0 | 0 | 2 | 0 |
| B3 | BTPI | 0 | 0 | 8 | 0 | 2 | 0 |
| B3 | BUSH | 0 | 0 | 3 | 0 | 0 | 0 |
| B3 | BYWA | 0 | 0 | 2 | 0 | 1 | 0 |
| B3 | CBCH | 16 | 0 | 22 | 0 | 16 | 0 |
| B3 | CEDW | 0 | 0 | 0 | 0 | 1 | 0 |
| B3 | CEWA | 0 | 0 | 0 | 0 | 0 | 1 |
| B3 | COHA | 0 | 0 | 1 | 0 | 0 | 0 |
| B3 | CORA | 0 | 0 | 0 | 2 | 0 | 1 |
| B3 | COYE | 1 | 0 | 1 | 0 | 0 | 0 |
| B3 | DEJU | 0 | 0 | 1 | 0 | 4 | 0 |
| B3 | DOSQ | 7 | 0 | 2 | 0 | 3 | 0 |
| B3 | DOWO | 0 | 0 | 0 | 0 | 1 | 0 |
| B3 | EVGR | 2 | 0 | 0 | 11 | 1 | 0 |
| B3 | GCKI | 17 | 0 | 43 | 0 | 28 | 0 |
| B3 | GRJA | 1 | 0 | 1 | 0 | 0 | 0 |
| B3 | HAFL | 0 | 0 | 1 | 0 | 0 | 0 |
| B3 | HAWO | 0 | 0 | 0 | 0 | 0 | 0 |
| B3 | HETO | 2 | 0 | 0 | 0 | 0 | 0 |
| B3 | HUVI | 8 | 0 | 2 | 0 | 12 | 0 |
| B3 | MGWA | 0 | 0 | 3 | 0 | 0 | 0 |
| B3 | MODO | 0 | 0 | 1 | 0 | 0 | 0 |
| B3 | NOFL | 0 | 0 | 0 | 0 | 0 | 0 |
| B3 | NPOW | 0 | 0 | 0 | 0 | 0 | 0 |
| B3 | OCWA | 0 | 0 | 0 | 0 | 0 | 0 |
| B3 | OSFL | 0 | 0 | 0 | 0 | 0 | 0 |
| B3 | PISI | 1 | 0 | 0 | 0 | 0 | 0 |
| B3 | PSFL | 24 | 0 | 33 | 0 | 43 | 0 |
| B3 | RBNU | 0 | 0 | 0 | 0 | 0 | 0 |
| B3 | RECR | 0 | 0 | 0 | 4 | 0 | 0 |
| B3 | RODO | 1 | 0 | 0 | 0 | 0 | 0 |
| B3 | RSTO | 1 | 0 | 0 | 0 | 0 | 0 |
| B3 | RUGR | 0 | 0 | 1 | 0 | 0 | 0 |
| B3 | SOSP | 1 | 0 | 0 | 0 | 0 | 0 |
| B3 | STJA | 6 | 0 | 7 | 0 | 5 | 0 |
| B3 | SWTH | 31 | 0 | 18 | 0 | 35 | 0 |
| B3 | UNKN | 3 | 0 | 5 | 1 | 7 | 2 |
| B3 | VATH | 2 | 0 | 4 | 0 | 6 | 0 |
| B3 | WAVI | 0 | 0 | 0 | 0 | 2 | 0 |
| B3 | WETA | 1 | 0 | 0 | 0 | 0 | 0 |
| B3 | WIFL | 0 | 0 | 0 | 0 | 0 | 0 |
| B3 | WIWA | 31 | 0 | 21 | 0 | 25 | 0 |
| B3 | WIWR | 62 | 0 | 82 | 0 | 118 | 0 |
| B3 | WOOD | 1 | 0 | 0 | 0 | 1 | 0 |
| B3 | WWPE | 0 | 0 | 0 | 0 | 0 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
|---|---|---|---|---|---|---|---|
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| B4 | AMCR | 0 | 0 | 0 | 4 | 6 | 1 |
| B4 | AMGO | 4 | 0 | 1 | 22 | 4 | 3 |
| B4 | AMRO | 18 | 1 | 18 | 3 | 24 | 0 |
| B4 | BEWR | 0 | 0 | 0 | 0 | 10 | 0 |
| B4 | BHCO | 0 | 0 | 2 | 0 | 0 | 0 |
| B4 | BHGR | 6 | 0 | 7 | 0 | 7 | 0 |
| B4 | BLGR | 0 | 0 | 0 | 0 | 0 | 0 |
| B4 | BRCR | 1 | 0 | 1 | 0 | 0 | 0 |
| B4 | BTPI | 0 | 0 | 3 | 4 | 3 | 0 |
| B4 | BYWA | 3 | 0 | 4 | 0 | 2 | 0 |
| B4 | CBCH | 38 | 0 | 34 | 0 | 40 | 0 |
| B4 | CEWA | 9 | 1 | 1 | 3 | 3 | 1 |
| B4 | CORA | 0 | 0 | 0 | 1 | 0 | 0 |
| B4 | COYE | 19 | 0 | 20 | 0 | 27 | 0 |
| B4 | DEJU | 5 | 0 | 17 | 0 | 11 | 0 |
| B4 | DOSQ | 2 | 0 | 8 | 0 | 2 | 0 |
| B4 | DOWO | 0 | 0 | 1 | 0 | 0 | 0 |
| B4 | EVGR | 0 | 0 | 1 | 7 | 3 | 4 |
| B4 | GBHE | 0 | 0 | 0 | 1 | 0 | 0 |
| B4 | GCKI | 14 | 0 | 25 | 0 | 21 | 0 |
| B4 | GRJA | 0 | 0 | 0 | 0 | 0 | 0 |
| B4 | HAWO | 0 | 0 | 0 | 1 | 0 | 0 |
| B4 | HETO | 1 | 0 | 3 | 0 | 1 | 0 |
| B4 | HUVI | 5 | 0 | 8 | 0 | 18 | 0 |
| B4 | MGWA | 3 | 0 | 16 | 0 | 13 | 0 |
| B4 | MODO | 0 | 0 | 0 | 0 | 0 | 0 |
| B4 | NOFL | 3 | 1 | 0 | 1 | 1 | 0 |
| B4 | NPOW | 0 | 0 | 0 | 0 | 0 | 0 |
| B4 | OCWA | 2 | 0 | 22 | 0 | 33 | 0 |
| B4 | OSFL | 0 | 0 | 0 | 0 | 0 | 0 |
| B4 | PISI | 4 | 0 | 0 | 4 | 0 | 0 |
| B4 | PIWO | 0 | 0 | 0 | 0 | 0 | 0 |
| B4 | PSFL | 3 | 0 | 5 | 0 | 1 | 0 |
| B4 | PUFI | 17 | 0 | 7 | 2 | 0 | 0 |
| B4 | RBNU | 0 | 0 | 2 | 0 | 3 | 0 |
| B4 | RCKI | 1 | 0 | 0 | 0 | 0 | 0 |
| B4 | RECR | 0 | 0 | 0 | 2 | 0 | 0 |
| B4 | RSTO | 2 | 0 | 1 | 0 | 5 | 0 |
| B4 | RUHU | 5 | 0 | 8 | 1 | 7 | 0 |
| B4 | SOSP | 24 | 0 | 52 | 0 | 47 | 0 |
| B4 | SOVI | 1 | 0 | 0 | 0 | 2 | 0 |
| B4 | STJA | 0 | 1 | 6 | 4 | 7 | 2 |
| B4 | SWTH | 50 | 0 | 32 | 0 | 62 | 0 |
| B4 | TOCH | 0 | 0 | 0 | 0 | 0 | 0 |
| B4 | UNKN | 9 | 1 | 8 | 0 | 35 | 3 |
| B4 | VATH | 0 | 0 | 1 | 0 | 2 | 0 |
| B4 | WAVI | 1 | 0 | 9 | 0 | 4 | 0 |
| B4 | WCSP | 0 | 0 | 3 | 0 | 1 | 0 |
| B4 | WEBL | 0 | 0 | 0 | 0 | 0 | 0 |
| B4 | WETA | 3 | 0 | 2 | 1 | 1 | 0 |
| B4 | WIFL | 13 | 0 | 16 | 0 | 9 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B4 | WIWA | 16 | 0 | 52 | 0 | 39 | 0 |
| B4 | WIWR | 17 | 0 | 21 | 0 | 31 | 0 |
| B4 | WOOD | 1 | 0 | 1 | 0 | 0 | 0 |
| B4 | YEWA | 0 | 0 | 1 | 0 | 2 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| B5 | AMCR | 1 | 2 | 1 | 11 | 0 | 0 |
| B5 | AMGO | 0 | 1 | 0 | 4 | 0 | 1 |
| B5 | AMRO | 5 | 0 | 6 | 0 | 4 | 0 |
| B5 | BEWR | 0 | 0 | 0 | 0 | 1 | 0 |
| B5 | BHGR | 1 | 0 | 1 | 0 | 9 | 0 |
| B5 | BLGR | 0 | 0 | 0 | 0 | 1 | 0 |
| B5 | BRCR | 1 | 0 | 0 | 0 | 2 | 0 |
| B5 | BTPI | 0 | 0 | 1 | 0 | 2 | 0 |
| B5 | BYWA | 9 | 0 | 24 | 0 | 16 | 0 |
| B5 | CAGE | 0 | 0 | 0 | 1 | 0 | 0 |
| B5 | CAGO | 0 | 2 | 0 | 0 | 0 | 1 |
| B5 | CBCH | 15 | 0 | 15 | 0 | 23 | 0 |
| B5 | CORA | 0 | 0 | 0 | 1 | 0 | 0 |
| B5 | DEJU | 7 | 0 | 8 | 0 | 9 | 0 |
| B5 | DOSQ | 15 | 0 | 20 | 0 | 9 | 0 |
| B5 | DOWO | 0 | 0 | 0 | 0 | 2 | 0 |
| B5 | EVGR | 0 | 2 | 0 | 5 | 0 | 5 |
| B5 | GCKI | 23 | 0 | 38 | 0 | 37 | 0 |
| B5 | HAWO | 0 | 0 | 2 | 0 | 1 | 0 |
| B5 | HETO | 4 | 0 | 23 | 0 | 22 | 0 |
| B5 | HUVI | 3 | 0 | 8 | 0 | 22 | 0 |
| B5 | MGWA | 1 | 0 | 0 | 0 | 1 | 0 |
| B5 | MOCH | 0 | 0 | 0 | 0 | 1 | 0 |
| B5 | NOFL | 1 | 0 | 0 | 1 | 0 | 0 |
| B5 | NPOW | 0 | 0 | 0 | 0 | 0 | 0 |
| B5 | OCWA | 5 | 0 | 6 | 0 | 11 | 0 |
| B5 | PISI | 0 | 0 | 0 | 0 | 2 | 0 |
| B5 | PIWO | 1 | 0 | 0 | 0 | 0 | 0 |
| B5 | PSFL | 25 | 0 | 14 | 0 | 21 | 0 |
| B5 | PUFI | 0 | 0 | 1 | 1 | 0 | 0 |
| B5 | RBNU | 1 | 0 | 1 | 0 | 1 | 0 |
| B5 | RECR | 0 | 0 | 0 | 6 | 0 | 0 |
| B5 | RTHA | 0 | 0 | 0 | 0 | 0 | 0 |
| B5 | RSTO | 0 | 0 | 1 | 0 | 0 | 0 |
| B5 | RUGR | 2 | 0 | 0 | 0 | 0 | 0 |
| B5 | RUHU | 0 | 0 | 0 | 0 | 1 | 0 |
| B5 | SOSP | 0 | 0 | 0 | 0 | 2 | 0 |
| B5 | SOVI | 0 | 0 | 0 | 0 | 0 | 0 |
| B5 | STJA | 0 | 0 | 1 | 1 | 5 | 0 |
| B5 | SWTH | 30 | 1 | 23 | 0 | 22 | 0 |
| B5 | UNKN | 9 | 1 | 6 | 1 | 6 | 1 |
| B5 | VATH | 1 | 0 | 4 | 0 | 8 | 0 |
| B5 | WAVI | 3 | 0 | 2 | 0 | 1 | 0 |
| B5 | WETA | 1 | 0 | 1 | 0 | 4 | 0 |
| B5 | WIFL | 0 | 0 | 0 | 0 | 0 | 0 |
| B5 | WIWA | 18 | 0 | 31 | 0 | 29 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| B5 | WIWR | 41 | 0 | 68 | 0 | 67 | 0 |
| B5 | WOOD | 1 | 0 | 1 | 0 | 3 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| B6 | AMGO | 1 | 1 | 0 | 2 | 2 | 0 |
| B6 | AMRO | 2 | 0 | 0 | 0 | 3 | 0 |
| B6 | BHGR | 0 | 0 | 0 | 0 | 4 | 0 |
| B6 | BLGR | 1 | 0 | 0 | 0 | 0 | 0 |
| B6 | BTPI | 0 | 0 | 0 | 0 | 0 | 0 |
| B6 | BYWA | 0 | 0 | 0 | 0 | 2 | 0 |
| B6 | CBCH | 16 | 0 | 13 | 0 | 23 | 0 |
| B6 | CORA | 0 | 0 | 0 | 2 | 1 | 0 |
| B6 | COYE | 2 | 0 | 0 | 0 | 1 | 0 |
| B6 | DEJU | 13 | 0 | 15 | 0 | 16 | 0 |
| B6 | DOSQ | 7 | 0 | 6 | 0 | 4 | 0 |
| B6 | EVGR | 2 | 3 | 0 | 6 | 0 | 0 |
| B6 | GCKI | 41 | 0 | 29 | 0 | 32 | 0 |
| B6 | GRJA | 1 | 0 | 0 | 1 | 0 | 0 |
| B6 | HAFL | 0 | 0 | 1 | 0 | 0 | 0 |
| B6 | HAWO | 8 | 0 | 0 | 0 | 0 | 0 |
| B6 | HETO | 2 | 0 | 0 | 0 | 7 | 0 |
| B6 | HUVI | 2 | 0 | 3 | 0 | 6 | 0 |
| B6 | MGWA | 4 | 0 | 5 | 0 | 3 | 0 |
| B6 | NOFL | 1 | 0 | 2 | 1 | 0 | 0 |
| B6 | NPOW | 0 | 0 | 0 | 0 | 0 | 0 |
| B6 | OCWA | 5 | 0 | 11 | 0 | 14 | 0 |
| B6 | OSFL | 0 | 0 | 0 | 0 | 0 | 0 |
| B6 | PISI | 0 | 0 | 0 | 1 | 0 | 0 |
| B6 | PIWO | 0 | 0 | 0 | 0 | 1 | 0 |
| B6 | PSFL | 20 | 0 | 14 | 0 | 16 | 0 |
| B6 | PUFI | 0 | 0 | 1 | 1 | 0 | 0 |
| B6 | RBNU | 0 | 0 | 0 | 0 | 1 | 0 |
| B6 | RECR | 0 | 0 | 0 | 2 | 0 | 0 |
| B6 | RTHA | 0 | 0 | 0 | 0 | 0 | 0 |
| B6 | RSTO | 1 | 0 | 7 | 0 | 2 | 0 |
| B6 | RUHU | 2 | 0 | 5 | 1 | 4 | 0 |
| B6 | RUGR | 1 | 0 | 0 | 0 | 0 | 0 |
| B6 | SOSP | 0 | 0 | 5 | 0 | 2 | 0 |
| B6 | STJA | 5 | 0 | 11 | 8 | 6 | 0 |
| B6 | SWTH | 16 | 0 | 8 | 0 | 36 | 0 |
| B6 | TOCH | 0 | 0 | 1 | 0 | 1 | 0 |
| B6 | TOSO | 1 | 0 | 0 | 0 | 0 | 0 |
| B6 | UNKN | 6 | 1 | 2 | 0 | 6 | 0 |
| B6 | VATH | 3 | 0 | 22 | 0 | 26 | 0 |
| B6 | WAVI | 7 | 0 | 4 | 0 | 2 | 0 |
| B6 | WCSP | 0 | 0 | 1 | 0 | 0 | 0 |
| B6 | WETA | 2 | 0 | 1 | 0 | 2 | 0 |
| B6 | WIFL | 0 | 0 | 0 | 0 | 0 | 0 |
| B6 | WIWA | 41 | 0 | 30 | 0 | 40 | 0 |
| B6 | WIWR | 21 | 0 | 66 | 0 | 93 | 0 |
| B6 | YRWA | 0 | 0 | 0 | 0 | 1 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
|---|---|---|---|---|---|---|---|
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| C1 | AMGO | 1 | 4 | 0 | 2 | 0 | 2 |
| C1 | AMCR | 0 | 0 | 1 | 1 | 0 | 0 |
| C1 | AMRO | 0 | 0 | 2 | 0 | 1 | 0 |
| C1 | BHGR | 0 | 0 | 0 | 0 | 0 | 0 |
| C1 | BLGR | 0 | 0 | 0 | 0 | 0 | 0 |
| C1 | BRCR | 0 | 0 | 0 | 0 | 6 | 0 |
| C1 | BTPI | 2 | 0 | 2 | 0 | 3 | 0 |
| C1 | BUSH | 0 | 0 | 0 | 0 | 1 | 0 |
| C1 | BYWA | 0 | 1 | 2 | 0 | 4 | 0 |
| C1 | CBCH | 23 | 1 | 22 | 0 | 13 | 0 |
| C1 | CORA | 1 | 1 | 0 | 3 | 0 | 1 |
| C1 | DEJU | 11 | 0 | 7 | 0 | 1 | 0 |
| C1 | DOSQ | 5 | 0 | 46 | 1 | 2 | 0 |
| C1 | DOWO | 0 | 0 | 0 | 0 | 0 | 0 |
| C1 | EVGR | 4 | 2 | 0 | 10 | 0 | 0 |
| C1 | GCKI | 39 | 0 | 56 | 0 | 51 | 0 |
| C1 | GRJA | 7 | 0 | 2 | 0 | 1 | 0 |
| C1 | HAWO | 5 | 0 | 1 | 0 | 0 | 0 |
| C1 | HETH | 0 | 0 | 1 | 0 | 1 | 0 |
| C1 | HETO | 13 | 0 | 14 | 0 | 30 | 0 |
| C1 | HUVI | 12 | 0 | 6 | 0 | 11 | 0 |
| C1 | NOFL | 0 | 0 | 0 | 0 | 0 | 0 |
| C1 | HOWR | 0 | 0 | 0 | 0 | 2 | 0 |
| C1 | OCWA | 0 | 0 | 0 | 0 | 1 | 0 |
| C1 | PISI | 3 | 0 | 0 | 6 | 0 | 0 |
| C1 | PSFL | 27 | 0 | 18 | 0 | 30 | 0 |
| C1 | RBNU | 0 | 0 | 4 | 0 | 0 | 0 |
| C1 | RBSA | 0 | 0 | 0 | 0 | 0 | 0 |
| C1 | RCKI | 0 | 0 | 1 | 0 | 0 | 0 |
| C1 | RECR | 0 | 0 | 0 | 10 | 0 | 0 |
| C1 | RSTO | 1 | 0 | 2 | 0 | 0 | 0 |
| C1 | SOSP | 0 | 0 | 1 | 0 | 0 | 0 |
| C1 | STJA | 3 | 0 | 1 | 1 | 1 | 0 |
| C1 | SWTH | 1 | 0 | 0 | 0 | 2 | 0 |
| C1 | UNKN | 5 | 3 | 1 | 4 | 5 | 1 |
| C1 | VATH | 5 | 0 | 2 | 0 | 8 | 0 |
| C1 | WETA | 2 | 0 | 0 | 0 | 1 | 0 |
| C1 | WIWR | 5 | 0 | 12 | 0 | 45 | 1 |
| C1 | WOOD | 2 | 0 | 0 | 0 | 0 | 0 |

| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
|---|---|---|---|---|---|---|---|
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| C2 | AMCR | 1 | 0 | 0 | 0 | 0 | 0 |
| C2 | AMGO | 0 | 1 | 0 | 0 | 0 | 0 |
| C2 | AMRO | 0 | 0 | 0 | 0 | 0 | 0 |
| C2 | BHGR | 3 | 0 | 0 | 0 | 0 | 0 |
| C2 | BLGR | 0 | 0 | 0 | 0 | 0 | 0 |
| C2 | BRCR | 0 | 0 | 1 | 0 | 2 | 0 |
| C2 | BUSH | 1 | 0 | 0 | 0 | 1 | 0 |
| C2 | BYWA | 11 | 0 | 19 | 0 | 18 | 0 |
| C2 | CBCH | 16 | 0 | 12 | 0 | 35 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| C2 | DEJU | 5 | 0 | 13 | 0 | 7 | 0 |
| C2 | DOSQ | 6 | 0 | 23 | 0 | 4 | 0 |
| C2 | EVGR | 0 | 2 | 0 | 7 | 1 | 3 |
| C2 | GCKI | 61 | 0 | 60 | 0 | 59 | 0 |
| C2 | GRJA | 0 | 0 | 0 | 0 | 8 | 0 |
| C2 | HAFL | 0 | 0 | 0 | 0 | 1 | 0 |
| C2 | HETH | 0 | 0 | 0 | 0 | 0 | 0 |
| C2 | HETO | 32 | 0 | 35 | 0 | 43 | 0 |
| C2 | HUVI | 2 | 0 | 9 | 0 | 4 | 0 |
| C2 | NOFL | 0 | 0 | 0 | 0 | 0 | 0 |
| C2 | OCWA | 0 | 0 | 0 | 0 | 1 | 0 |
| C2 | PISI | 0 | 2 | 0 | 1 | 0 | 0 |
| C2 | PSFL | 10 | 0 | 8 | 0 | 27 | 0 |
| C2 | PUFI | 0 | 0 | 0 | 1 | 0 | 0 |
| C2 | RECR | 0 | 2 | 0 | 5 | 0 | 0 |
| C2 | RBNU | 0 | 0 | 2 | 0 | 0 | 0 |
| C2 | STJA | 2 | 1 | 0 | 1 | 1 | 0 |
| C2 | SWTH | 0 | 0 | 1 | 0 | 2 | 0 |
| C2 | TOCH | 0 | 0 | 1 | 0 | 0 | 0 |
| C2 | UNKN | 9 | 0 | 1 | 0 | 4 | 3 |
| C2 | VATH | 7 | 0 | 3 | 0 | 6 | 0 |
| C2 | WAVI | 2 | 0 | 0 | 0 | 0 | 0 |
| C2 | WETA | 0 | 0 | 1 | 0 | 1 | 0 |
| C2 | WIWA | 9 | 0 | 9 | 0 | 5 | 0 |
| C2 | WIWR | 12 | 0 | 22 | 0 | 33 | 0 |
| C2 | WOOD | 0 | 0 | 0 | 0 | 1 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| C3 | AMGO | 0 | 0 | 0 | 5 | 0 | 4 |
| C3 | AMRO | 1 | 0 | 2 | 0 | 1 | 0 |
| C3 | BCCH | 1 | 0 | 0 | 0 | 0 | 0 |
| C3 | BHGR | 0 | 0 | 0 | 0 | 0 | 0 |
| C3 | BRCR | 0 | 0 | 0 | 0 | 2 | 0 |
| C3 | BTPI | 1 | 0 | 1 | 0 | 2 | 0 |
| C3 | BUSH | 0 | 0 | 0 | 1 | 0 | 0 |
| C3 | BYWA | 1 | 0 | 9 | 0 | 0 | 0 |
| C3 | CBCH | 33 | 0 | 23 | 0 | 24 | 0 |
| C3 | CORA | 0 | 0 | 0 | 1 | 2 | 0 |
| C3 | DEJU | 4 | 0 | 4 | 0 | 6 | 0 |
| C3 | DOSQ | 6 | 0 | 14 | 0 | 12 | 0 |
| C3 | DOWO | 1 | 0 | 0 | 0 | 0 | 0 |
| C3 | EVGR | 5 | 6 | 0 | 16 | 3 | 11 |
| C3 | GBHE | 0 | 0 | 0 | 0 | 0 | 2 |
| C3 | GCKI | 46 | 0 | 45 | 0 | 33 | 0 |
| C3 | GRJA | 3 | 0 | 0 | 3 | 1 | 0 |
| C3 | HAFL | 0 | 0 | 1 | 0 | 0 | 0 |
| C3 | HAWO | 2 | 0 | 0 | 0 | 0 | 0 |
| C3 | HETH | 1 | 0 | 0 | 0 | 0 | 0 |
| C3 | HETO | 21 | 0 | 11 | 0 | 15 | 0 |
| C3 | HUVI | 8 | 0 | 11 | 0 | 21 | 0 |
| C3 | LEOW | 0 | 0 | 0 | 0 | 0 | 0 |
| C3 | MGWA | 0 | 0 | 1 | 0 | 0 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| C3 | MOQU | 0 | 0 | 0 | 0 | 0 | 0 |
| C3 | NOFL | 0 | 0 | 0 | 0 | 1 | 0 |
| C3 | NSOW | 0 | 0 | 0 | 0 | 0 | 0 |
| C3 | OCWA | 1 | 0 | 0 | 0 | 0 | 0 |
| C3 | PISI | 0 | 0 | 0 | 2 | 1 | 0 |
| C3 | PSFL | 39 | 0 | 41 | 1 | 54 | 0 |
| C3 | PUFI | 0 | 0 | 0 | 1 | 0 | 0 |
| C3 | RBNU | 1 | 0 | 2 | 0 | 2 | 0 |
| C3 | RCKI | 0 | 0 | 0 | 0 | 1 | 0 |
| C3 | RTHA | 0 | 0 | 0 | 0 | 1 | 0 |
| C3 | RECR | 0 | 4 | 0 | 3 | 0 | 0 |
| C3 | RSTO | 0 | 0 | 0 | 0 | 2 | 0 |
| C3 | RUGR | 1 | 0 | 0 | 0 | 0 | 0 |
| C3 | SOVI | 0 | 0 | 0 | 0 | 0 | 0 |
| C3 | STJA | 2 | 0 | 0 | 4 | 5 | 0 |
| C3 | SWTH | 6 | 0 | 4 | 0 | 12 | 1 |
| C3 | TOSO | 1 | 0 | 0 | 0 | 0 | 0 |
| C3 | UNKN | 2 | 1 | 4 | 6 | 20 | 1 |
| C3 | VATH | 17 | 0 | 4 | 0 | 15 | 0 |
| C3 | WETA | 0 | 0 | 0 | 0 | 0 | 0 |
| C3 | WIWA | 1 | 0 | 2 | 0 | 6 | 0 |
| C3 | WIWR | 39 | 0 | 37 | 0 | 66 | 0 |
| C3 | WOOD | 2 | 0 | 0 | 0 | 1 | 0 |
| C3 | YRWA | 1 | 0 | 0 | 0 | 0 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| C4 | AMCR | 0 | 0 | 0 | 0 | 1 | 0 |
| C4 | AMGO | 1 | 2 | 0 | 1 | 0 | 2 |
| C4 | AMRO | 8 | 1 | 1 | 0 | 0 | 0 |
| C4 | BHGR | 0 | 0 | 0 | 0 | 0 | 0 |
| C4 | BLGR | 0 | 0 | 0 | 0 | 0 | 0 |
| C4 | BRCR | 0 | 0 | 5 | 0 | 5 | 0 |
| C4 | BTPI | 1 | 0 | 5 | 1 | 1 | 0 |
| C4 | BUSH | 2 | 0 | 0 | 0 | 0 | 0 |
| C4 | BYWA | 7 | 0 | 8 | 0 | 5 | 0 |
| C4 | CBCH | 32 | 0 | 28 | 0 | 41 | 0 |
| C4 | CORA | 0 | 0 | 1 | 1 | 0 | 0 |
| C4 | DEJU | 1 | 0 | 11 | 0 | 2 | 0 |
| C4 | DOSQ | 10 | 0 | 43 | 0 | 13 | 0 |
| C4 | EVGR | 8 | 1 | 1 | 10 | 3 | 0 |
| C4 | GCKI | 61 | 0 | 54 | 0 | 52 | 0 |
| C4 | GRJA | 9 | 0 | 1 | 0 | 0 | 0 |
| C4 | HAFL | 1 | 0 | 1 | 0 | 2 | 0 |
| C4 | HAWO | 5 | 0 | 1 | 0 | 0 | 0 |
| C4 | HETH | 0 | 0 | 0 | 0 | 1 | 0 |
| C4 | HETO | 20 | 0 | 18 | 0 | 18 | 0 |
| C4 | HUVI | 7 | 0 | 3 | 1 | 18 | 0 |
| C4 | MGWA | 0 | 0 | 2 | 0 | 0 | 0 |
| C4 | MODO | 0 | 0 | 0 | 0 | 0 | 0 |
| C4 | NPOW | 0 | 0 | 0 | 0 | 0 | 0 |
| C4 | OCWA | 1 | 0 | 0 | 0 | 1 | 0 |
| C4 | PISI | 5 | 0 | 0 | 3 | 0 | 1 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| C4 | PSFL | 30 | 0 | 30 | 0 | 29 | 0 |
| C4 | PUFI | 0 | 0 | 0 | 6 | 0 | 0 |
| C4 | RBNU | 0 | 0 | 2 | 0 | 2 | 0 |
| C4 | RCKI | 2 | 0 | 0 | 0 | 1 | 0 |
| C4 | RECR | 0 | 0 | 0 | 1 | 0 | 0 |
| C4 | RSTO | 1 | 0 | 2 | 0 | 3 | 0 |
| C4 | STJA | 5 | 0 | 4 | 0 | 4 | 0 |
| C4 | SWTH | 5 | 0 | 7 | 0 | 13 | 0 |
| C4 | UNKN | 3 | 0 | 8 | 2 | 9 | 5 |
| C4 | VATH | 11 | 0 | 5 | 0 | 8 | 0 |
| C4 | WAVI | 1 | 0 | 0 | 0 | 0 | 0 |
| C4 | WETA | 0 | 0 | 0 | 0 | 1 | 0 |
| C4 | WIWA | 6 | 0 | 1 | 0 | 3 | 0 |
| C4 | WIWR | 31 | 0 | 25 | 0 | 48 | 0 |
| C4 | WOOD | 1 | 0 | 0 | 0 | 2 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| C5 | AMGO | 0 | 0 | 1 | 1 | 0 | 0 |
| C5 | AMRO | 3 | 0 | 0 | 0 | 5 | 0 |
| C5 | BHGR | 0 | 0 | 0 | 0 | 1 | 0 |
| C5 | BTPI | 0 | 0 | 0 | 0 | 0 | 0 |
| C5 | BUSH | 0 | 0 | 2 | 0 | 4 | 0 |
| C5 | BRCR | 0 | 0 | 0 | 0 | 2 | 0 |
| C5 | BYWA | 24 | 0 | 13 | 0 | 10 | 0 |
| C5 | CAGO | 0 | 1 | 0 | 0 | 0 | 0 |
| C5 | CBCH | 30 | 0 | 15 | 0 | 26 | 0 |
| C5 | CORA | 0 | 0 | 0 | 0 | 0 | 0 |
| C5 | DEJU | 1 | 0 | 5 | 0 | 7 | 0 |
| C5 | DOSQ | 5 | 0 | 28 | 0 | 2 | 0 |
| C5 | EVGR | 2 | 1 | 0 | 14 | 1 | 4 |
| C5 | GCKI | 40 | 0 | 48 | 0 | 43 | 0 |
| C5 | GRJA | 1 | 0 | 2 | 0 | 0 | 0 |
| C5 | HETO | 20 | 0 | 36 | 0 | 40 | 0 |
| C5 | HUVI | 2 | 0 | 5 | 0 | 6 | 0 |
| C5 | NOFL | 0 | 0 | 0 | 0 | 0 | 0 |
| C5 | NPOW | 0 | 0 | 0 | 0 | 0 | 0 |
| C5 | OCWA | 0 | 0 | 0 | 0 | 3 | 0 |
| C5 | OSFL | 0 | 0 | 0 | 0 | 0 | 0 |
| C5 | PSFL | 52 | 0 | 36 | 0 | 79 | 0 |
| C5 | PUFI | 0 | 0 | 1 | 2 | 0 | 0 |
| C5 | RBNU | 1 | 0 | 0 | 0 | 1 | 0 |
| C5 | RECR | 1 | 1 | 0 | 2 | 0 | 0 |
| C5 | RSTO | 0 | 0 | 1 | 0 | 0 | 0 |
| C5 | STJA | 3 | 0 | 6 | 1 | 0 | 0 |
| C5 | SWTH | 9 | 0 | 4 | 0 | 4 | 0 |
| C5 | UNKN | 4 | 0 | 0 | 3 | 15 | 1 |
| C5 | VATH | 2 | 0 | 7 | 0 | 20 | 0 |
| C5 | WAVI | 2 | 0 | 1 | 0 | 0 | 0 |
| C5 | WETA | 1 | 0 | 0 | 0 | 0 | 0 |
| C5 | WIWA | 6 | 0 | 6 | 0 | 5 | 0 |
| C5 | WIWR | 28 | 0 | 38 | 0 | 64 | 0 |
| C5 | WOOD | 0 | 0 | 0 | 0 | 2 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
|---|---|---|---|---|---|---|---|
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| C6 | AMCR | 0 | 0 | 0 | 0 | 0 | 0 |
| C6 | AMDI | 2 | 0 | 0 | 0 | 0 | 0 |
| C6 | AMRO | 2 | 0 | 0 | 0 | 2 | 0 |
| C6 | BEWR | 0 | 0 | 0 | 0 | 0 | 0 |
| C6 | BHGR | 0 | 0 | 0 | 0 | 3 | 0 |
| C6 | BLGR | 0 | 0 | 0 | 0 | 0 | 0 |
| C6 | BRCR | 0 | 0 | 1 | 0 | 5 | 0 |
| C6 | BTPI | 0 | 0 | 3 | 0 | 0 | 0 |
| C6 | BYWA | 5 | 0 | 3 | 0 | 7 | 0 |
| C6 | CAGO | 0 | 0 | 0 | 1 | 0 | 0 |
| C6 | CBCH | 34 | 0 | 17 | 0 | 28 | 0 |
| C6 | COYE | 0 | 0 | 0 | 0 | 1 | 0 |
| C6 | DEJU | 8 | 0 | 3 | 0 | 15 | 0 |
| C6 | DOSQ | 11 | 0 | 13 | 0 | 3 | 0 |
| C6 | DOWO | 0 | 0 | 0 | 0 | 1 | 0 |
| C6 | EVGR | 3 | 2 | 0 | 5 | 0 | 0 |
| C6 | GCKI | 59 | 0 | 40 | 0 | 50 | 0 |
| C6 | GRJA | 0 | 0 | 0 | 0 | 1 | 0 |
| C6 | HETO | 19 | 0 | 24 | 0 | 16 | 0 |
| C6 | HUVI | 3 | 0 | 5 | 0 | 22 | 0 |
| C6 | NOFL | 0 | 0 | 0 | 0 | 0 | 0 |
| C6 | NPOW | 0 | 0 | 0 | 0 | 0 | 0 |
| C6 | OCWA | 0 | 0 | 0 | 0 | 1 | 0 |
| C6 | PSFL | 55 | 0 | 44 | 0 | 79 | 0 |
| C6 | PUFI | 0 | 0 | 0 | 1 | 0 | 0 |
| C6 | RBNU | 0 | 0 | 0 | 0 | 3 | 0 |
| C6 | RECR | 0 | 0 | 0 | 0 | 0 | 0 |
| C6 | RSTO | 0 | 0 | 0 | 0 | 1 | 0 |
| C6 | RUGR | 0 | 0 | 0 | 0 | 0 | 0 |
| C6 | STJA | 1 | 0 | 0 | 1 | 2 | 0 |
| C6 | SWTH | 2 | 0 | 1 | 0 | 6 | 0 |
| C6 | UNKN | 4 | 1 | 4 | 0 | 10 | 1 |
| C6 | VATH | 3 | 0 | 7 | 0 | 23 | 0 |
| C6 | WAVI | 4 | 0 | 0 | 0 | 3 | 0 |
| C6 | WIWA | 3 | 0 | 4 | 0 | 16 | 0 |
| C6 | WIWR | 38 | 0 | 36 | 0 | 81 | 0 |
| C6 | WOOD | 1 | 0 | 0 | 0 | 1 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
|---|---|---|---|---|---|---|---|
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| D1 | AMGO | 3 | 0 | 0 | 4 | 0 | 0 |
| D1 | AMRO | 0 | 0 | 3 | 0 | 13 | 0 |
| D1 | BHGR | 1 | 0 | 1 | 1 | 8 | 0 |
| D1 | BRCR | 5 | 0 | 10 | 0 | 11 | 0 |
| D1 | BTPI | 0 | 0 | 1 | 0 | 0 | 0 |
| D1 | BYWA | 0 | 0 | 3 | 0 | 0 | 0 |
| D1 | CBCH | 34 | 0 | 45 | 0 | 28 | 0 |
| D1 | CEWA | 1 | 0 | 0 | 0 | 0 | 0 |
| D1 | CORA | 0 | 0 | 0 | 1 | 0 | 0 |
| D1 | COYE | 0 | 0 | 1 | 0 | 0 | 0 |
| D1 | DEJU | 1 | 0 | 1 | 0 | 8 | 0 |
| D1 | DOSQ | 7 | 0 | 13 | 0 | 4 | 0 |
| D1 | DOWO | 0 | 0 | 0 | 0 | 1 | 0 |
| D1 | EVGR | 5 | 8 | 1 | 34 | 0 | 11 |
| D1 | GCKI | 15 | 0 | 16 | 0 | 9 | 0 |
| D1 | GRJA | 3 | 0 | 0 | 0 | 2 | 0 |
| D1 | HAFL | 3 | 0 | 1 | 0 | 2 | 0 |
| D1 | HAWO | 3 | 0 | 1 | 0 | 2 | 0 |
| D1 | HETO | 2 | 0 | 9 | 0 | 7 | 0 |
| D1 | HEWA | 1 | 0 | 0 | 0 | 0 | 0 |
| D1 | HUVI | 4 | 0 | 4 | 0 | 16 | 0 |
| D1 | MODO | 0 | 0 | 0 | 0 | 0 | 0 |
| D1 | MGWA | 1 | 0 | 0 | 0 | 0 | 0 |
| D1 | NOFL | 0 | 0 | 0 | 1 | 2 | 0 |
| D1 | NPOW | 0 | 0 | 0 | 0 | 0 | 0 |
| D1 | OCWA | 0 | 0 | 0 | 0 | 0 | 0 |
| D1 | PISI | 0 | 0 | 1 | 0 | 0 | 0 |
| D1 | PIWO | 0 | 0 | 0 | 0 | 1 | 0 |
| D1 | PSFL | 29 | 0 | 44 | 0 | 46 | 0 |
| D1 | PUFI | 0 | 0 | 0 | 2 | 0 | 0 |
| D1 | RBNU | 6 | 0 | 5 | 0 | 13 | 0 |
| D1 | RECR | 2 | 0 | 0 | 1 | 0 | 0 |
| D1 | RSTO | 5 | 0 | 9 | 0 | 18 | 0 |
| D1 | RUHU | 1 | 0 | 3 | 0 | 1 | 0 |
| D1 | SOSP | 0 | 0 | 0 | 0 | 0 | 0 |
| D1 | STJA | 1 | 1 | 1 | 1 | 0 | 1 |
| D1 | SWTH | 5 | 0 | 3 | 0 | 14 | 0 |
| D1 | TOCH | 0 | 0 | 1 | 0 | 0 | 0 |
| D1 | UNKN | 7 | 1 | 7 | 4 | 5 | 1 |
| D1 | VATH | 3 | 0 | 4 | 0 | 9 | 0 |
| D1 | VGSW | 0 | 2 | 0 | 0 | 0 | 0 |
| D1 | WAVI | 0 | 0 | 0 | 0 | 0 | 0 |
| D1 | WCSP | 0 | 0 | 1 | 0 | 0 | 0 |
| D1 | WETA | 0 | 0 | 0 | 0 | 1 | 0 |
| D1 | WIFL | 0 | 0 | 0 | 0 | 0 | 0 |
| D1 | WIWA | 26 | 0 | 27 | 0 | 30 | 0 |
| D1 | WIWR | 53 | 0 | 86 | 0 | 88 | 1 |
| D1 | WOOD | 0 | 0 | 0 | 0 | 2 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
|---|---|---|---|---|---|---|---|
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| D2 | AMCR | 0 | 0 | 0 | 1 | 0 | 0 |
| D2 | AMGO | 0 | 1 | 0 | 11 | 0 | 0 |
| D2 | AMRO | 3 | 0 | 3 | 0 | 5 | 0 |
| D2 | BAOW | 0 | 0 | 0 | 0 | 0 | 0 |
| D2 | BHGR | 2 | 0 | 0 | 0 | 0 | 0 |
| D2 | BLGR | 0 | 0 | 0 | 0 | 2 | 0 |
| D2 | BRCR | 5 | 0 | 21 | 0 | 22 | 0 |
| D2 | BTPI | 1 | 0 | 0 | 0 | 0 | 0 |
| D2 | BUSH | 0 | 0 | 0 | 0 | 8 | 0 |
| D2 | BYWA | 0 | 0 | 5 | 0 | 1 | 0 |
| D2 | CAGO | 0 | 0 | 0 | 1 | 0 | 0 |
| D2 | CBCH | 32 | 0 | 34 | 0 | 59 | 0 |
| D2 | CORA | 0 | 1 | 0 | 5 | 0 | 0 |
| D2 | DEJU | 0 | 0 | 6 | 0 | 8 | 0 |
| D2 | DOSQ | 1 | 0 | 20 | 0 | 2 | 0 |
| D2 | DOWO | 0 | 0 | 1 | 0 | 0 | 0 |
| D2 | EVGR | 4 | 8 | 1 | 9 | 5 | 3 |
| D2 | GCKI | 38 | 0 | 24 | 0 | 23 | 0 |
| D2 | GRJA | 5 | 1 | 1 | 0 | 0 | 0 |
| D2 | HAFL | 2 | 0 | 9 | 0 | 1 | 0 |
| D2 | HAWO | 3 | 1 | 3 | 0 | 1 | 0 |
| D2 | HETO | 5 | 0 | 13 | 0 | 24 | 0 |
| D2 | HUVI | 6 | 0 | 0 | 0 | 13 | 0 |
| D2 | MGWA | 2 | 0 | 0 | 0 | 3 | 0 |
| D2 | NOFL | 0 | 0 | 0 | 2 | 0 | 0 |
| D2 | OCWA | 0 | 0 | 0 | 0 | 0 | 0 |
| D2 | OSFL | 1 | 0 | 0 | 0 | 0 | 0 |
| D2 | PISI | 0 | 0 | 0 | 0 | 4 | 1 |
| D2 | PSFL | 35 | 0 | 44 | 0 | 52 | 0 |
| D2 | PUFI | 0 | 0 | 0 | 0 | 0 | 0 |
| D2 | NPOW | 0 | 0 | 0 | 0 | 0 | 0 |
| D2 | RBNU | 3 | 0 | 3 | 0 | 13 | 0 |
| D2 | RCKI | 0 | 0 | 0 | 0 | 0 | 0 |
| D2 | RECR | 0 | 0 | 0 | 1 | 0 | 0 |
| D2 | RSTO | 0 | 0 | 4 | 0 | 7 | 0 |
| D2 | RUHU | 3 | 0 | 3 | 0 | 2 | 0 |
| D2 | SSHA | 0 | 0 | 0 | 1 | 0 | 0 |
| D2 | STJA | 3 | 0 | 1 | 2 | 4 | 0 |
| D2 | SWTH | 4 | 0 | 2 | 0 | 8 | 0 |
| D2 | TOCH | 1 | 0 | 0 | 0 | 0 | 0 |
| D2 | TRSW | 0 | 0 | 0 | 0 | 0 | 1 |
| D2 | UNKN | 11 | 0 | 3 | 1 | 10 | 3 |
| D2 | VATH | 9 | 0 | 5 | 0 | 7 | 0 |
| D2 | WAVI | 0 | 0 | 0 | 0 | 0 | 0 |
| D2 | WCSP | 0 | 0 | 0 | 0 | 0 | 0 |
| D2 | WETA | 6 | 0 | 7 | 0 | 1 | 0 |
| D2 | WIFL | 0 | 0 | 0 | 0 | 0 | 0 |
| D2 | WIWA | 10 | 0 | 19 | 0 | 23 | 0 |
| D2 | WIWR | 79 | 0 | 78 | 0 | 96 | 0 |
| D2 | WOOD | 0 | 0 | 1 | 0 | 1 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
|---|---|---|---|---|---|---|---|
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| D3 | AMCR | 0 | 0 | 0 | 4 | 0 | 0 |
| D3 | AMGO | 0 | 0 | 0 | 2 | 0 | 0 |
| D3 | AMRO | 0 | 0 | 4 | 0 | 4 | 0 |
| D3 | BAOW | 0 | 0 | 3 | 0 | 0 | 0 |
| D3 | BCCH | 2 | 0 | 0 | 0 | 0 | 0 |
| D3 | BHCO | 1 | 0 | 0 | 0 | 0 | 0 |
| D3 | BHGR | 0 | 0 | 2 | 0 | 3 | 0 |
| D3 | BRCR | 7 | 0 | 2 | 0 | 7 | 0 |
| D3 | BTPI | 1 | 0 | 0 | 0 | 0 | 1 |
| D3 | BUSH | 0 | 0 | 0 | 0 | 1 | 0 |
| D3 | BYWA | 1 | 0 | 8 | 0 | 8 | 0 |
| D3 | CAGO | 0 | 2 | 0 | 0 | 0 | 0 |
| D3 | CBCH | 50 | 0 | 47 | 0 | 34 | 0 |
| D3 | CORA | 0 | 0 | 0 | 1 | 1 | 0 |
| D3 | DEJU | 7 | 0 | 2 | 0 | 4 | 0 |
| D3 | DOSQ | 7 | 0 | 13 | 0 | 6 | 0 |
| D3 | EVGR | 3 | 2 | 0 | 10 | 1 | 14 |
| D3 | GCKI | 21 | 0 | 17 | 0 | 9 | 0 |
| D3 | GHOW | 0 | 0 | 0 | 0 | 1 | 0 |
| D3 | GRJA | 1 | 0 | 5 | 3 | 4 | 0 |
| D3 | HAWO | 1 | 0 | 6 | 0 | 2 | 0 |
| D3 | HETO | 5 | 0 | 8 | 0 | 0 | 0 |
| D3 | HUVI | 4 | 0 | 4 | 0 | 8 | 0 |
| D3 | MGWA | 0 | 0 | 2 | 0 | 0 | 0 |
| D3 | NOFL | 0 | 0 | 0 | 0 | 0 | 0 |
| D3 | NPOW | 0 | 0 | 0 | 0 | 0 | 0 |
| D3 | OCWA | 0 | 0 | 0 | 0 | 2 | 0 |
| D3 | PISI | 0 | 0 | 0 | 0 | 0 | 0 |
| D3 | PIWO | 0 | 0 | 0 | 0 | 0 | 0 |
| D3 | PSFL | 38 | 0 | 21 | 0 | 39 | 0 |
| D3 | PUFI | 2 | 0 | 0 | 2 | 0 | 0 |
| D3 | RBNU | 1 | 0 | 4 | 0 | 12 | 0 |
| D3 | RCKI | 0 | 0 | 0 | 0 | 1 | 0 |
| D3 | RECR | 1 | 0 | 0 | 3 | 0 | 0 |
| D3 | RSTO | 2 | 0 | 0 | 0 | 1 | 0 |
| D3 | RTHA | 0 | 0 | 1 | 0 | 0 | 0 |
| D3 | RUHU | 0 | 0 | 1 | 0 | 0 | 0 |
| D3 | SOVI | 0 | 0 | 0 | 0 | 0 | 0 |
| D3 | STJA | 4 | 2 | 3 | 2 | 16 | 0 |
| D3 | SWTH | 11 | 0 | 5 | 0 | 8 | 0 |
| D3 | TOCH | 0 | 0 | 0 | 0 | 1 | 0 |
| D3 | UNKN | 3 | 0 | 2 | 1 | 5 | 0 |
| D3 | VATH | 1 | 0 | 0 | 0 | 7 | 0 |
| D3 | WETA | 0 | 2 | 1 | 0 | 2 | 0 |
| D3 | WIWA | 18 | 0 | 20 | 0 | 30 | 0 |
| D3 | WIWR | 73 | 0 | 63 | 0 | 100 | 0 |
| D3 | WOOD | 1 | 0 | 1 | 0 | 2 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| D4 | AMCR | 0 | 0 | 0 | 1 | 0 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| D4 | AMGO | 0 | 1 | 0 | 6 | 1 | 1 |
| D4 | AMRO | 1 | 0 | 2 | 0 | 6 | 0 |
| D4 | BHGR | 1 | 0 | 0 | 0 | 2 | 0 |
| D4 | BRCR | 12 | 0 | 6 | 0 | 7 | 0 |
| D4 | BTPI | 0 | 0 | 0 | 0 | 1 | 0 |
| D4 | BUSH | 0 | 0 | 4 | 0 | 0 | 0 |
| D4 | BYWA | 3 | 0 | 2 | 0 | 2 | 0 |
| D4 | CORA | 0 | 0 | 0 | 6 | 0 | 0 |
| D4 | CBCH | 23 | 0 | 14 | 0 | 28 | 0 |
| D4 | DEJU | 8 | 0 | 10 | 0 | 6 | 0 |
| D4 | DOSQ | 4 | 0 | 3 | 0 | 2 | 0 |
| D4 | EVGR | 9 | 4 | 0 | 9 | 1 | 2 |
| D4 | GCKI | 39 | 0 | 35 | 0 | 39 | 0 |
| D4 | GRJA | 0 | 0 | 0 | 0 | 1 | 0 |
| D4 | HAWO | 6 | 0 | 7 | 0 | 3 | 0 |
| D4 | HETO | 20 | 0 | 30 | 0 | 33 | 0 |
| D4 | HUVI | 1 | 0 | 1 | 0 | 11 | 0 |
| D4 | MGWA | 0 | 0 | 1 | 0 | 1 | 0 |
| D4 | NOFL | 0 | 0 | 0 | 0 | 0 | 0 |
| D4 | OCWA | 0 | 0 | 1 | 0 | 1 | 0 |
| D4 | OSFL | 0 | 0 | 0 | 0 | 3 | 0 |
| D4 | PSFL | 55 | 0 | 45 | 0 | 78 | 0 |
| D4 | PUFI | 0 | 0 | 0 | 5 | 1 | 0 |
| D4 | RBNU | 1 | 0 | 4 | 0 | 16 | 0 |
| D4 | RECR | 1 | 0 | 0 | 4 | 0 | 0 |
| D4 | RSTO | 0 | 0 | 3 | 0 | 0 | 0 |
| D4 | RUHU | 0 | 0 | 0 | 0 | 1 | 0 |
| D4 | SOSP | 0 | 0 | 0 | 0 | 1 | 0 |
| D4 | STJA | 4 | 0 | 0 | 1 | 6 | 0 |
| D4 | SWTH | 9 | 0 | 4 | 0 | 14 | 0 |
| D4 | TRSW | 0 | 0 | 0 | 0 | 1 | 0 |
| D4 | UNKN | 5 | 1 | 5 | 5 | 10 | 0 |
| D4 | VATH | 18 | 0 | 6 | 0 | 16 | 0 |
| D4 | WAVI | 0 | 0 | 0 | 0 | 0 | 0 |
| D4 | WEBL | 2 | 0 | 0 | 0 | 0 | 0 |
| D4 | WETA | 3 | 0 | 4 | 0 | 7 | 0 |
| D4 | WIFL | 0 | 0 | 0 | 0 | 1 | 0 |
| D4 | WIWA | 12 | 0 | 10 | 0 | 17 | 0 |
| D4 | WIWR | 84 | 0 | 67 | 0 | 112 | 0 |
| D4 | WOOD | 1 | 0 | 3 | 0 | 2 | 0 |
| D4 | YEWA | 0 | 0 | 2 | 0 | 0 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| D5 | AMCR | 0 | 0 | 0 | 0 | 0 | 0 |
| D5 | AMGO | 0 | 1 | 0 | 2 | 0 | 0 |
| D5 | AMRO | 2 | 0 | 0 | 0 | 1 | 0 |
| D5 | BAOW | 0 | 0 | 0 | 0 | 0 | 0 |
| D5 | BHGR | 0 | 0 | 0 | 0 | 2 | 0 |
| D5 | BLGR | 0 | 0 | 0 | 0 | 0 | 0 |
| D5 | BRCR | 17 | 0 | 18 | 0 | 14 | 0 |
| D5 | BTPI | 5 | 0 | 1 | 0 | 0 | 0 |
| D5 | BYWA | 0 | 0 | 1 | 0 | 6 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| D5 | CBCH | 40 | 0 | 26 | 0 | 24 | 0 |
| D5 | CEWA | 0 | 0 | 2 | 0 | 1 | 0 |
| D5 | CORA | 0 | 0 | 2 | 1 | 0 | 1 |
| D5 | COYE | 0 | 0 | 0 | 0 | 1 | 0 |
| D5 | DEJU | 1 | 0 | 1 | 0 | 7 | 0 |
| D5 | DOSQ | 5 | 0 | 8 | 1 | 1 | 0 |
| D5 | EVGR | 0 | 7 | 0 | 12 | 3 | 3 |
| D5 | GCKI | 31 | 0 | 28 | 0 | 32 | 0 |
| D5 | GRJA | 4 | 0 | 7 | 0 | 0 | 0 |
| D5 | GROW | 0 | 0 | 0 | 0 | 0 | 0 |
| D5 | HAFL | 0 | 0 | 1 | 0 | 3 | 0 |
| D5 | HAWO | 4 | 0 | 2 | 0 | 0 | 0 |
| D5 | HETO | 35 | 0 | 38 | 0 | 30 | 0 |
| D5 | HETH | 0 | 0 | 0 | 0 | 0 | 0 |
| D5 | HUVI | 1 | 1 | 3 | 0 | 5 | 0 |
| D5 | NOFL | 0 | 0 | 0 | 1 | 0 | 0 |
| D5 | OCWA | 0 | 0 | 0 | 0 | 2 | 0 |
| D5 | OSFL | 0 | 0 | 0 | 0 | 0 | 0 |
| D5 | PIWO | 0 | 0 | 0 | 1 | 0 | 0 |
| D5 | PSFL | 37 | 0 | 38 | 0 | 93 | 0 |
| D5 | PUFI | 0 | 0 | 0 | 2 | 0 | 0 |
| D5 | RBNU | 0 | 0 | 3 | 0 | 12 | 0 |
| D5 | RCKI | 0 | 0 | 1 | 0 | 0 | 0 |
| D5 | RECR | 1 | 0 | 0 | 2 | 0 | 0 |
| D5 | RSTO | 0 | 0 | 0 | 0 | 2 | 0 |
| D5 | RUHU | 1 | 0 | 1 | 0 | 1 | 0 |
| D5 | STJA | 2 | 0 | 0 | 1 | 4 | 0 |
| D5 | SWTH | 3 | 0 | 1 | 0 | 3 | 0 |
| D5 | UNKN | 3 | 4 | 4 | 0 | 15 | 0 |
| D5 | VATH | 7 | 0 | 5 | 0 | 25 | 0 |
| D5 | WETA | 0 | 0 | 1 | 0 | 1 | 0 |
| D5 | WIWA | 4 | 0 | 5 | 0 | 9 | 0 |
| D5 | WIWR | 86 | 0 | 70 | 0 | 120 | 0 |
| D5 | WOOD | 0 | 0 | 2 | 0 | 3 | 0 |
| | | | | | | | |
| | | 1993 | 1993 | 1994 | 1994 | 1995 | 1995 |
| SITE | SPECIES | <50M | FLYOVER | <50M | FLYOVER | <50M | FLYOVER |
| D6 | AMGO | 0 | 0 | 0 | 4 | 0 | 0 |
| D6 | AMRO | 4 | 0 | 1 | 0 | 3 | 0 |
| D6 | BHGR | 2 | 0 | 0 | 0 | 2 | 0 |
| D6 | BLGR | 0 | 0 | 1 | 0 | 0 | 0 |
| D6 | BRCR | 23 | 0 | 27 | 0 | 13 | 0 |
| D6 | BTPI | 0 | 0 | 0 | 0 | 1 | 0 |
| D6 | BYWA | 2 | 0 | 1 | 0 | 3 | 0 |
| D6 | CBCH | 35 | 0 | 25 | 0 | 35 | 0 |
| D6 | CORA | 0 | 0 | 0 | 0 | 0 | 0 |
| D6 | COYE | 2 | 0 | 3 | 0 | 0 | 0 |
| D6 | DEJU | 3 | 0 | 4 | 0 | 7 | 0 |
| D6 | DOSQ | 9 | 0 | 24 | 0 | 10 | 0 |
| D6 | DOWO | 0 | 0 | 1 | 0 | 0 | 0 |
| D6 | EVGR | 7 | 2 | 0 | 7 | 0 | 1 |
| D6 | GCKI | 21 | 0 | 30 | 0 | 27 | 0 |
| D6 | GRJA | 4 | 0 | 0 | 0 | 0 | 0 |

DETECTIONS OF BIRDS BY STAND: 1993-1995

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| D6 | GROW | 0 | 0 | 0 | 0 | 0 | 0 |
| D6 | HAFL | 0 | 0 | 0 | 0 | 1 | 0 |
| D6 | HAWO | 7 | 0 | 2 | 0 | 1 | 0 |
| D6 | HETO | 33 | 0 | 10 | 0 | 7 | 0 |
| D6 | HUVI | 4 | 0 | 4 | 0 | 14 | 0 |
| D6 | MGWA | 3 | 0 | 3 | 0 | 0 | 0 |
| D6 | NOFL | 0 | 0 | 0 | 0 | 1 | 0 |
| D6 | OCWA | 0 | 0 | 0 | 0 | 1 | 0 |
| D6 | PIWO | 1 | 0 | 0 | 0 | 0 | 0 |
| D6 | PUFI | 0 | 0 | 1 | 1 | 0 | 0 |
| D6 | PSFL | 44 | 0 | 52 | 0 | 61 | 0 |
| D6 | RBNU | 0 | 0 | 2 | 0 | 15 | 0 |
| D6 | RBSA | 0 | 0 | 0 | 0 | 0 | 0 |
| D6 | RCKI | 2 | 0 | 0 | 0 | 0 | 0 |
| D6 | SOSP | 0 | 0 | 0 | 0 | 0 | 0 |
| D6 | STJA | 6 | 0 | 8 | 5 | 12 | 0 |
| D6 | SWTH | 6 | 0 | 5 | 0 | 3 | 0 |
| D6 | TOCH | 0 | 0 | 0 | 0 | 1 | 0 |
| D6 | TUVU | 0 | 3 | 0 | 0 | 0 | 0 |
| D6 | UNKN | 7 | 0 | 4 | 5 | 9 | 0 |
| D6 | VATH | 5 | 0 | 4 | 0 | 13 | 0 |
| D6 | WETA | 3 | 0 | 4 | 0 | 3 | 0 |
| D6 | WIFL | 0 | 0 | 0 | 0 | 1 | 0 |
| D6 | WIWA | 16 | 0 | 9 | 0 | 10 | 0 |
| D6 | WIWR | 79 | 0 | 87 | 0 | 105 | 0 |
| D6 | WOOD | 0 | 0 | 2 | 0 | 3 | 0 |

PITFALL CAPTURES OF AMPHIBIAN SPECIES BY STAND: 1992

| STAND | AMGR | ASTR | BUBO | DITE | ENES | PLVE | HYRE | RAAU | RASP | TAGR | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 6 | | | | 10 | 17 | | | | 4 | 37 |
| A2 | | | | | 8 | 7 | | | | 1 | 16 |
| A3 | 6 | 1 | | | | | 1 | | | 2 | 10 |
| A4 | 10 | | | | 3 | 2 | | | | | 15 |
| A5 | 9 | | | | 1 | 29 | | | | 2 | 41 |
| A6 | 1 | | | | 7 | 12 | | | | 2 | 22 |
| B1 | | | | 1 | 3 | 9 | | 1 | | | 14 |
| B2 | 5 | 6 | | 1 | | | | | | 1 | 13 |
| B3 | 6 | | | | 2 | 2 | 1 | | | | 11 |
| B4 | 1 | | | | | 3 | | | 1 | 2 | 7 |
| B5 | 14 | | | | 2 | 1 | 1 | | | 3 | 21 |
| B6 | 14 | | | | | | | | | | 14 |
| C1 | 18 | | | | | | | | | | 18 |
| C2 | 11 | 1 | | | 3 | 2 | | | | | 17 |
| C3 | 6 | | | | | | | | | | 6 |
| C4 | 11 | | | | 5 | | | | | | 16 |
| C5 | 6 | | | 1 | 2 | 5 | | | | | 14 |
| C6 | 2 | | | | 7 | 10 | | | | | 19 |
| D1 | 2 | | 1 | | 24 | 18 | | | 1 | | 46 |
| D2 | 5 | | | | 32 | 2 | 1 | 1 | | 1 | 42 |
| D3 | 3 | | | | 9 | 8 | | 3 | | | 23 |
| D4 | 13 | | | 1 | 5 | 2 | | 1 | | 1 | 23 |
| D5 | 1 | 3 | | | 5 | 9 | | | | 1 | 19 |
| D6 | 2 | | | | 3 | 2 | | | | 1 | 8 |
| TOTAL | 152 | 11 | 1 | 4 | 131 | 140 | 4 | 6 | 2 | 21 | 472 |

PITFALL CAPTURES OF AMPHIBIAN SPECIES BY STAND: 1993

| STAND | AMGR | AMMA | ASTR | DITE | ENES | PLVE | HYRE | RAAU | RACA | TAGR | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | | | | | 1 | 12 | | | | | 13 |
| A2 | | | | | | 1 | | | | | 1 |
| A3 | | | | | | | | | 1 | | 1 |
| A4 | 1 | | | | | | 1 | 1 | | | 3 |
| A5 | | | | | | 4 | | | | | 4 |
| A6 | | | | | 1 | 5 | | | | | 6 |
| B1 | | | | | | 1 | | | | | 1 |
| B2 | | | 1 | | 2 | | | | | | 3 |
| B3 | 2 | | | | 1 | | | | | | 3 |
| B4 | | | | | | | | 1 | | | 1 |
| B5 | 5 | | | | | 5 | | | | 2 | 12 |
| B6 | 6 | | | | | | | | | 1 | 7 |
| C1 | 6 | | | | | | | | | | 6 |
| C2 | 2 | | | | 2 | 3 | | | | | 7 |
| C3 | | | | | | | | | | | |
| C4 | 6 | | | | | | | | | | 6 |
| C5 | | | | | | 4 | | | | | 4 |
| C6 | 3 | | | | 9 | 3 | | | | | 15 |
| D1 | | | | | 1 | 7 | | | | | 8 |
| D2 | 1 | 1 | | | 10 | | | 2 | | | 14 |
| D3 | | | | | 17 | 6 | | 3 | | 1 | 27 |
| D4 | 12 | | | 1 | 1 | 1 | 2 | | 1 | | 18 |
| D5 | 4 | | | | 1 | 3 | | | | | 8 |
| D6 | | | | | 5 | 2 | | 2 | | | 9 |
| TOTAL | 48 | 1 | 1 | 1 | 51 | 57 | 3 | 9 | 2 | 4 | 177 |

PITFALL CAPTURES OF AMPHIBIAN SPECIES BY STAND: 1994

| STAND | AMGR | ASTR | DITE | ENES | PLVE | HYRE | RAAU | RACA | TAGR | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 1 | | | | 3 | | | | 1 | 5 |
| A2 | | | | | 3 | 1 | 1 | | 2 | 7 |
| A3 | 2 | | | | | | | | | 2 |
| A4 | 1 | | | 1 | 1 | | | | | 3 |
| A5 | | | | | 5 | 1 | | | | 6 |
| A6 | | | | 1 | 1 | | | | 1 | 3 |
| B1 | 1 | | | 1 | 4 | | | | | 6 |
| B2 | 2 | 2 | | 1 | | | 1 | | | 6 |
| B3 | 5 | | | | 1 | | | 1 | | 7 |
| B4 | 1 | | | | 2 | | | | | 3 |
| B5 | 15 | | | | | | | | 3 | 18 |
| B6 | 8 | | | | | | | | | 8 |
| C1 | 6 | | | | | | | | | 6 |
| C2 | 4 | | | 2 | 4 | | | | | 10 |
| C3 | 3 | | 1 | | | | | | | 4 |
| C4 | 2 | | | 1 | | | | | | 3 |
| C5 | 5 | | | | 1 | | | | | 6 |
| C6 | 4 | | | 3 | 7 | | | | | 14 |
| D1 | | | | 10 | 7 | 1 | 2 | | 1 | 21 |
| D2 | 4 | | | 2 | | | 2 | | | 8 |
| D3 | 2 | | | 6 | 7 | | 1 | | | 16 |
| D4 | 7 | | 1 | 1 | 4 | | | | | 13 |
| D5 | 1 | 2 | 2 | 2 | 6 | | | | | 13 |
| D6 | 3 | | | 3 | | | | | 1 | 7 |
| TOTAL | 77 | 4 | 4 | 34 | 56 | 3 | 7 | 1 | 9 | 195 |

PITFALL CAPTURES OF AMPHIBIAN SPECIES BY STAND: 1992+1993+1994

| STAND | AMGR | AMMA | ASTR | BUBO | DITE | ENES | PLVE | HYRE | RAAU | RASP | RACA | TAGR | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 7 | | | | | 11 | 32 | | | | | 5 | 55 |
| A2 | | | | | | 8 | 11 | 1 | 1 | | | 3 | 24 |
| A3 | 8 | | 1 | | | | | 1 | | | 1 | 2 | 13 |
| A4 | 12 | | | | | 4 | 3 | 1 | 1 | | | | 21 |
| A5 | 9 | | | | | 1 | 38 | 1 | | | | 2 | 51 |
| A6 | 1 | | | | | 9 | 18 | | | | | 3 | 31 |
| B1 | 1 | | | | 1 | 4 | 14 | | 1 | | | | 21 |
| B2 | 7 | | 9 | | 1 | 3 | | | 1 | | | 1 | 22 |
| B3 | 13 | | | | | 3 | 3 | 1 | | | 1 | | 21 |
| B4 | 2 | | | | | | 5 | | 1 | 1 | | 2 | 11 |
| B5 | 34 | | | | | 2 | 6 | 1 | | | | 8 | 51 |
| B6 | 28 | | | | | | | | | | | 1 | 29 |
| C1 | 30 | | | | | | | | | | | | 30 |
| C2 | 17 | | 1 | | | 7 | 9 | | | | | | 34 |
| C3 | 9 | | | | 1 | | | | | | | | 10 |
| C4 | 19 | | | | | 6 | | | | | | | 25 |
| C5 | 11 | | | | 1 | 2 | 10 | | | | | | 24 |
| C6 | 9 | | | | | 19 | 20 | | | | | | 48 |
| D1 | 2 | | | 1 | | 35 | 32 | 1 | 2 | 1 | | 1 | 75 |
| D2 | 10 | 1 | | | | 44 | 2 | 1 | 5 | | | 1 | 64 |
| D3 | 5 | | | | | 32 | 21 | | 7 | | | 1 | 66 |
| D4 | 32 | | | | 3 | 7 | 7 | 2 | 1 | | 1 | 1 | 54 |
| D5 | 6 | | 5 | | 2 | 8 | 18 | | | | | 1 | 40 |
| D6 | 5 | | | | | 11 | 4 | | 2 | | | 2 | 24 |
| TOTAL | 277 | 1 | 16 | 1 | 9 | 216 | 253 | 10 | 22 | 2 | 3 | 34 | 844 |

PITFALL CAPTURES OF MAMMALIAN SPECIES BY STAND: 1992

| STAND | CLGA | GLSA | MILO | MIOR | MITO | MUER | NEGI | PEMA | PEKE | SCOR | SOBE | SOCI | SOMO | SOSP | SOTR | SOVA | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | | | | 3 | | 1 | | 6 | | | | | 1 | | 13 | 1 | 25 |
| A2 | | | | 2 | | 1 | | 5 | 1 | | | | 1 | 1 | 2 | 4 | 17 |
| A3 | | | | 3 | | | 2 | 5 | | | | | 3 | | 8 | 5 | 26 |
| A4 | | | | 13 | | | | 2 | | | | | 4 | | 8 | 17 | 44 |
| A5 | | | | 4 | 1 | 1 | | 2 | | 1 | | | 1 | | | 2 | 12 |
| A6 | | | 1 | 1 | | 2 | | 15 | | | | | 3 | | 19 | 2 | 43 |
| B1 | 10 | | | 1 | | | 3 | 8 | 1 | | | | 9 | | 29 | 4 | 65 |
| B2 | 1 | 1 | | | | | 2 | 3 | 4 | | 2 | | 6 | | 25 | | 44 |
| B3 | | | | 5 | | 1 | 3 | 3 | 3 | 1 | 2 | | 4 | | 23 | | 45 |
| B4 | | | | 3 | 1 | 1 | 1 | 2 | | | 1 | | 6 | | 24 | 8 | 47 |
| B5 | | | | 3 | | | 1 | | 1 | | 2 | | 7 | | 41 | 2 | 57 |
| B6 | | | 2 | | | | | 4 | 5 | | 2 | 1 | 18 | | 34 | 2 | 68 |
| C1 | | | | | | | | | 3 | | | | 4 | | 13 | | 20 |
| C2 | 1 | | | | | | 1 | 1 | | 1 | | | 6 | | 29 | | 39 |
| C3 | | 2 | | | | | | 2 | 4 | | | | 5 | | 21 | | 34 |
| C4 | | | | | | | | 1 | 3 | 1 | | | | | 30 | | 35 |
| C5 | | | | | | | | 3 | 4 | | 1 | | 10 | 1 | 41 | | 60 |
| C6 | | | | 2 | | | 2 | 3 | 7 | | | | 1 | | 39 | 3 | 57 |
| D1 | 20 | | | 1 | | | 2 | 4 | | | 1 | | 1 | | 47 | | 76 |
| D2 | 8 | | | 2 | | | 5 | 5 | | | 1 | | 4 | 2 | 32 | 5 | 64 |
| D3 | | | | 1 | | | 2 | 4 | 3 | | 5 | | 1 | | 36 | 3 | 55 |
| D4 | 1 | | | | | | 3 | | 1 | | 4 | | 4 | | 27 | 1 | 41 |
| D5 | | | | | 1 | | 7 | 4 | 4 | | 4 | | 1 | | 40 | 1 | 62 |
| D6 | | | | | | 2 | | 2 | 2 | | | | 1 | | 17 | | 24 |
| TOTAL | 41 | 3 | 3 | 44 | 3 | 9 | 34 | 84 | 46 | 4 | 25 | 1 | 101 | 4 | 598 | 60 | 1060 |

PITFALL CAPTURES OF MAMMALIAN SPECIES BY STAND: 1993

| STAND | CLGA | GLSA | MILO | MIOR | MITO | MUER | NEGI | PEMA | PEKE | PESP | SCOR | SOBE | SOMO | SOPA | SOSP | SOTR | SOVA | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 1 | | | 20 | | | 5 | 2 | | | | | 8 | | | 26 | | 62 |
| A2 | | | | 2 | | | 1 | | | 1 | | | 3 | | 1 | 12 | | 20 |
| A3 | | | | 23 | | | 2 | 1 | | | | | 7 | | | 18 | 7 | 58 |
| A4 | | | | 33 | | | 2 | 5 | 1 | | | 1 | 11 | | | 11 | 5 | 69 |
| A5 | | | | 11 | | | | 8 | 1 | | 1 | | 4 | | 1 | 2 | 2 | 30 |
| A6 | | | | 14 | | | 2 | 13 | 1 | 1 | | | 5 | | 4 | 14 | 3 | 57 |
| B1 | 4 | | | 5 | | | 1 | 7 | 1 | | 2 | | | | | 16 | 3 | 39 |
| B2 | | | | 1 | | | 1 | 1 | | | 1 | | 7 | | 5 | 27 | | 43 |
| B3 | | | | 1 | | | 1 | 6 | 2 | | 1 | | 8 | | | 26 | 1 | 46 |
| B4 | | | 3 | 11 | 3 | 2 | 2 | 7 | | | | 1 | 8 | | | 31 | 5 | 73 |
| B5 | 1 | | | 2 | | | 1 | 1 | 2 | | | 2 | 3 | | 2 | 39 | 3 | 56 |
| B6 | 1 | | | 8 | | | 4 | | 5 | 1 | | | 12 | 1 | | 38 | 1 | 71 |
| C1 | | | | | | | | 1 | 4 | | | | 2 | | | 2 | 1 | 10 |
| C2 | | 1 | | | | | 1 | 3 | 8 | | | 1 | 4 | | 2 | 16 | | 36 |
| C3 | 2 | | | | | | 4 | 3 | 2 | | 1 | | | | | 14 | | 26 |
| C4 | | 1 | | | | | | 1 | 11 | | | | 2 | | | 26 | | 41 |
| C5 | 1 | | | | | | 2 | | 6 | | | | 2 | | 1 | 25 | | 37 |
| C6 | 5 | | | | | | 4 | 4 | 6 | | | | 2 | | 1 | 20 | | 42 |
| D1 | 6 | | 1 | | | | 4 | | | 3 | | | 5 | | | 33 | | 52 |
| D2 | 7 | | | 3 | | | 1 | 2 | | | | 1 | 6 | | 2 | 74 | 1 | 97 |
| D3 | 5 | | | 3 | 1 | | 12 | 5 | 4 | | | | 3 | | 1 | 42 | 1 | 77 |
| D4 | | | | | | | 7 | 1 | 3 | | | | 6 | | 1 | 26 | 1 | 45 |
| D5 | | | | | | | 11 | 1 | | | | | 3 | | | 39 | | 54 |
| D6 | | | | 1 | | | | | 1 | | | | 1 | | | 30 | | 33 |
| TOTAL | 33 | 2 | 4 | 138 | 4 | 2 | 68 | 72 | 58 | 6 | 6 | 6 | 112 | 1 | 21 | 607 | 34 | 1174 |

PITFALL CAPTURES OF MAMMALIAN SPECIES BY STAND: 1994

| STAND | CLGA | GLSA | MILO | MIOR | MISP | MITO | MUER | NEGI | PEKE | PEMA | PESP | SCOR | SCTO | SOBE | SOCI | SOMO | SOSP | SOTR | SOVA | TATO | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | | | | 40 | | | 2 | 5 | | 7 | 5 | | | 1 | | 1 | | 16 | 7 | | 84 |
| A2 | | | | 15 | | | 2 | | | 2 | 9 | | | | | 4 | | 7 | 8 | | 47 |
| A3 | | | 1 | 26 | | | 1 | 4 | | | | | | | | 2 | | 13 | 9 | | 56 |
| A4 | | | 3 | 49 | | 3 | 1 | 5 | 1 | 9 | 21 | | | 2 | | 2 | | 30 | 1 | | 127 |
| A5 | 1 | | | 31 | | | | | | 10 | 9 | | | | | 3 | | 2 | 9 | | 65 |
| A6 | 1 | | 5 | 45 | 1 | 1 | 1 | 6 | 1 | 23 | 5 | | 1 | | | 12 | 1 | 23 | 10 | | 136 |
| B1 | | | 1 | 10 | | 1 | 1 | 2 | 4 | 12 | 4 | 2 | | 2 | | 3 | | 22 | 5 | 2 | 71 |
| B2 | | | | | | | | 4 | 2 | 1 | 2 | | 2 | 1 | | 10 | | 28 | | 1 | 51 |
| B3 | | | | 6 | | | 1 | 6 | 4 | 2 | 1 | 1 | | 1 | | 5 | 1 | 35 | 1 | 1 | 65 |
| B4 | | | 4 | 5 | | 5 | | 3 | | 9 | 1 | 2 | | | 1 | 3 | | 14 | 1 | | 48 |
| B5 | 4 | | 1 | 4 | | 2 | | 5 | 4 | 1 | | 1 | | 1 | | 3 | | 32 | 2 | | 60 |
| B6 | 1 | | | 3 | | | 1 | 3 | 4 | 1 | | | | 1 | | 2 | | 33 | 3 | | 52 |
| C1 | | | | | | | | | 4 | | | 1 | | | | | 1 | 4 | | | 10 |
| C2 | 1 | | | | | | 1 | 3 | 6 | 1 | 2 | | | 1 | | 3 | 1 | 35 | | | 54 |
| C3 | 1 | | 1 | 2 | | | | | 5 | 2 | | | 1 | | | 3 | | 24 | 1 | | 40 |
| C4 | 1 | | | | | | | 1 | 5 | | | | | 1 | | 1 | | 26 | | | 35 |
| C5 | | | | | | | | 3 | 2 | 1 | | 1 | | 3 | | 13 | | 21 | 3 | | 47 |
| C6 | | | | 1 | | | | | 7 | 1 | | 1 | | | | 2 | | 37 | 2 | | 51 |
| D1 | 25 | 1 | | 9 | | | | 2 | | 2 | 5 | | | 1 | | 1 | 1 | 24 | 1 | 1 | 73 |
| D2 | 22 | 1 | 3 | 10 | | | | 4 | 2 | 1 | | | | 1 | | 3 | | 38 | 2 | | 87 |
| D3 | 5 | | 1 | 4 | | | | 16 | 4 | 5 | 1 | | | 4 | | 3 | 1 | 37 | | | 81 |
| D4 | 1 | | | 3 | | | | 16 | 4 | 1 | | | | 4 | | 3 | | 26 | 2 | | 60 |
| D5 | | | 1 | 4 | | 1 | | 14 | 1 | 1 | | 1 | | 1 | | 2 | | 38 | | | 64 |
| D6 | | | | 2 | | | | 4 | 2 | | | | | 1 | | 2 | | 11 | | | 22 |
| TOTAL | 63 | 2 | 21 | 269 | 1 | 13 | 11 | 106 | 62 | 92 | 65 | 10 | 4 | 26 | 1 | 86 | 6 | 576 | 67 | 5 | 1486 |

PITFALL CAPTURES OF MAMMALIAN SPECIES BY STAND: 1992+1993+1994

| TOTAL | CLGA | GLSA | MILO | MIOR | MISP | MITO | MUER | NEGI | PEMA | PEKE | PESP | SCOR | SCTO | SOBE | SOCI | SOMO | SOPA | SOSP | SOTR | SOVA | TATO | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A1 | 1 |  |  | 63 |  |  | 3 | 10 | 15 |  | 5 |  |  | 1 |  | 10 |  |  | 55 | 8 |  | 171 |
| A2 |  |  |  | 19 |  |  | 3 | 1 | 7 | 1 | 10 |  |  |  |  | 8 |  | 2 | 21 | 12 |  | 84 |
| A3 |  |  | 1 | 52 |  |  | 1 | 8 | 6 |  |  |  |  |  |  | 12 |  |  | 39 | 21 |  | 140 |
| A4 |  |  | 3 | 95 |  | 3 | 1 | 7 | 16 | 2 | 21 |  |  | 3 |  | 17 |  |  | 49 | 23 |  | 240 |
| A5 | 1 |  |  | 46 |  | 1 | 1 |  | 20 | 1 | 9 | 2 |  |  |  | 8 |  | 1 | 4 | 13 |  | 107 |
| A6 | 1 |  | 6 | 60 | 1 | 1 | 3 | 8 | 51 | 2 | 6 |  | 1 |  |  | 20 |  | 5 | 56 | 15 |  | 236 |
| B1 | 14 |  | 1 | 16 |  | 1 | 1 | 6 | 27 | 6 | 4 | 4 |  | 2 |  | 12 |  |  | 67 | 12 | 2 | 175 |
| B2 | 1 | 1 |  | 1 |  |  |  | 7 | 5 | 6 | 2 | 1 | 2 | 3 |  | 23 |  | 5 | 80 |  | 1 | 138 |
| B3 |  |  |  | 12 |  |  | 2 | 10 | 11 | 9 | 1 | 3 |  | 3 |  | 17 |  | 1 | 84 | 2 | 1 | 156 |
| B4 |  |  | 7 | 19 |  | 9 | 3 | 6 | 18 |  | 1 | 2 |  | 2 | 1 | 17 |  |  | 69 | 14 |  | 168 |
| B5 | 5 |  | 1 | 9 |  | 2 |  | 7 | 2 | 7 |  | 1 |  | 5 |  | 13 |  | 2 | 112 | 7 |  | 173 |
| B6 | 2 |  | 2 | 11 |  |  | 1 | 7 | 5 | 14 | 1 |  |  | 3 | 1 | 32 | 1 |  | 105 | 6 |  | 191 |
| C1 |  |  |  |  |  |  |  |  | 1 | 11 |  | 1 |  |  |  | 6 |  | 1 | 19 | 1 |  | 40 |
| C2 | 2 | 1 |  |  |  |  | 1 | 5 | 5 | 14 | 2 | 1 |  | 2 |  | 13 |  | 3 | 80 |  |  | 129 |
| C3 | 3 | 2 | 1 | 2 |  |  |  | 4 | 7 | 11 |  | 1 | 1 |  |  | 8 |  |  | 59 | 1 |  | 100 |
| C4 | 1 | 1 |  |  |  |  |  | 1 | 2 | 19 |  | 1 |  | 1 |  | 3 |  |  | 82 |  |  | 111 |
| C5 | 1 |  |  |  |  |  |  | 5 | 4 | 12 |  | 1 |  | 4 |  | 25 |  | 2 | 87 | 3 |  | 144 |
| C6 | 5 |  |  | 3 |  |  |  | 6 | 8 | 20 |  | 1 |  |  |  | 5 |  | 1 | 96 | 5 |  | 150 |
| D1 | 51 | 1 | 1 | 10 |  |  |  | 8 | 6 |  | 8 |  |  | 2 |  | 7 |  | 1 | 104 | 1 | 1 | 201 |
| D2 | 37 | 1 | 3 | 15 |  |  |  | 10 | 8 | 2 |  |  |  | 3 |  | 13 |  | 4 | 144 | 8 |  | 248 |
| D3 | 10 |  | 1 | 8 |  | 1 |  | 30 | 14 | 11 | 1 |  |  | 9 |  | 7 |  | 2 | 115 | 4 |  | 213 |
| D4 | 2 |  |  | 3 |  |  |  | 26 | 2 | 8 |  |  |  | 8 |  | 13 |  | 1 | 79 | 4 |  | 146 |
| D5 |  |  | 1 | 4 |  | 2 |  | 32 | 6 | 5 |  | 1 |  | 5 |  | 6 |  |  | 117 | 1 |  | 180 |
| D6 |  |  |  | 3 |  |  | 2 | 4 | 2 | 5 |  |  |  | 1 |  | 4 |  |  | 58 |  |  | 79 |
| TOTAL | 137 | 7 | 28 | 451 | 1 | 20 | 22 | 208 | 248 | 166 | 71 | 20 | 4 | 57 | 2 | 299 | 1 | 31 | 1781 | 161 | 5 | 3720 |

Total number of detections per site per year for clearcut sites. (n) is the number of nights sampled per site.

| SITE | A1 | | A2 | | A3 | | A4 | | A5 | | A6 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year (n) | 93 (6) | 94 (6) | 93 (6) | 94 (6) | 93 (6) | 94 (6) | 93 (6) | 94 (6) | 93 (6) | 94 (7) | 93 (6) | 94 (6) | 93 (36) | 94 (37) |
| MYYU | 2 | 2 | 0 | 3 | 2 | 3 | 3 | 10 | 2 | 2 | 25 | 3 | 34 | 23 |
| MYGR | 15 | 1 | 10 | 2 | 18 | 35 | 29 | 9 | 4 | 2 | 26 | 0 | 102 | 49 |
| EPFU | 5 | 8 | 1 | 4 | 6 | 14 | 0 | 0 | 7 | 6 | 4 | 4 | 23 | 36 |
| LANO | 9 | 6 | 6 | 2 | 7 | 35 | 12 | 2 | 41 | 31 | 7 | 14 | 82 | 90 |
| LACI | 1 | 0 | 2 | 0 | 8 | 6 | 2 | 0 | 19 | 5 | 0 | 0 | 32 | 11 |
| PLTO | 0 | 1 | 0 | 0 | 0 | 1 | 4 | 1 | 0 | 0 | 1 | 0 | 5 | 3 |
| Myotis sp. | 3 | 2 | 5 | 2 | 3 | 2 | 6 | 1 | 2 | 2 | 3 | 1 | 22 | 10 |
| Non-myotis sp. | 2 | 0 | 1 | 0 | 6 | 0 | 6 | 0 | 6 | 0 | 3 | 0 | 24 | 0 |
| FB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 5 | 2 | 5 | 5 |
| **TOTAL** | **37** | **20** | **25** | **13** | **50** | **96** | **62** | **23** | **81** | **48** | **69** | **22** | **324** | **222** |

Total number of detections per site per year for pre-commercially thinned sites. (n) is the number of nights sampled per site.

| SITE | B1 | | B2 | | B3 | | B4 | | B5 | | B6 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year (n) | 93 (6) | 94 (6) | 93 (6) | 94 (6) | 93 (7) | 94 (6) | 93 (6) | 94 (6) | 93 (6) | 94 (6) | 93 (6) | NS* | 93 (37) | 94 (30) |
| MYYU | 1 | 5 | 0 | 0 | 0 | 0 | 3 | 14 | 1 | 2 | 0 | - | 5 | 21 |
| MYGR | 0 | 3 | 2 | 0 | 2 | 0 | 10 | 3 | 1 | 6 | 0 | - | 15 | 12 |
| EPFU | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | - | 2 | 0 |
| LANO | 8 | 1 | 4 | 0 | 1 | 1 | 3 | 9 | 0 | 0 | 0 | - | 16 | 11 |
| LACI | 4 | 0 | 0 | 0 | 1 | 0 | 1 | 4 | 0 | 0 | 0 | - | 6 | 4 |
| PLTO | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | - | 2 | 0 |
| Myotis sp. | 0 | 0 | 0 | 0 | 0 | 0 | 8 | 12 | 4 | 3 | 1 | - | 13 | 15 |
| Non-myotis sp. | 3 | 0 | 5 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | - | 10 | 0 |
| FB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | - | 0 | 0 |
| **TOTAL** | **18** | **9** | **11** | **0** | **5** | **1** | **28** | **42** | **6** | **11** | **1** | **-** | **69** | **63** |

* Site not sampled during 1994.

Total number of detections per site per year for young unthinned sites. (n) is the number of nights sampled per site.

| SITE | C1 | | C2 | | C3 | | C4 | | C5 | | C6 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year (n) | 93 (6) | 94 (6) | 93 (6) | 94 (6) | 93 (6) | 94 (6) | 93 (7) | 94 (6) | 93 (6) | 94 (6) | 93 (8) | 94 (6) | 93 (39) | 94 (36) |
| MYYU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MYGR | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| EPFU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LANO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LACI | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| PLTO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Myotis sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Non-myotis sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **TOTAL** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

Total number of detections per site per year for mature sites. (n) is the number of nights sampled per site.

| SITE | D1 | | D2 | | D3 | | D4 | | D5 | | D6 | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year (n) | 93 (6) | 94 (6) | 93 (6) | 94 (6) | 93 (8) | 94 (6) | 93 (5) | 94 (6) | 93 (6) | 94 (6) | 93 (6) | 94 (6) | 93 (37) | 94 (36) |
| MYYU | 1 | 7 | 1 | 6 | 0 | 1 | 12 | 6 | 6 | 7 | 13 | 3 | 33 | 30 |
| MYGR | 4 | 6 | 5 | 7 | 0 | 1 | 5 | 14 | 30 | 34 | 19 | 15 | 63 | 71 |
| EPFU | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LANO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| LACI | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 14 | 0 |
| PLTO | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Myotis sp. | 2 | 9 | 4 | 10 | 1 | 1 | 5 | 1 | 10 | 4 | 6 | 13 | 28 | 38 |
| Non-Myotis sp. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5 | 0 |
| FB | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 |
| **TOTAL** | **7** | **22** | **24** | **24** | **1** | **3** | **22** | **21** | **47** | **44** | **42** | **31** | **143** | **145** |

Litter depth (cm) and percent cover of vegetation variables by age class

| SITE | A1 | | A2 | | A3 | | A4 | | A5 | | A6 | | All A Sites | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Var* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* |
| **depth** | 3.56 | 1.51 | 8.54 | 20.28 | 5.37 | 2.07 | 11.95 | 23.49 | 3.91 | 1.51 | 5.47 | 8.91 | 6.47 | 13.56 |
| **bpshr** | 23.86 | 16.49 | 15.54 | 14.59 | 6.75 | 7.18 | 14.77 | 15.89 | 20.18 | 19.61 | 8.65 | 9.91 | 14.96 | 15.74 |
| **evshr** | 28.18 | 17.88 | 27.56 | 14.75 | 0.53 | 2.23 | 5.75 | 11.97 | 36.07 | 19.76 | 21.74 | 18.09 | 19.97 | 19.88 |
| **odshr** | 1.07 | 3.78 | 0.61 | 1.79 | 1.49 | 3.04 | 6.72 | 9.04 | 0.98 | 4.19 | 6.49 | 12.32 | 2.89 | 7.30 |
| **fern** | 28.75 | 22.18 | 25.46 | 17.07 | 37.39 | 30.44 | 23.05 | 26.63 | 16.77 | 20.67 | 17.56 | 18.83 | 24.83 | 24.14 |
| **litter** | 81.05 | 13.34 | 70.82 | 22.62 | 75.46 | 18.19 | 45.91 | 28.27 | 72.46 | 15.25 | 73.77 | 18.74 | 69.91 | 22.94 |
| **moss** | 8.70 | 10.45 | 11.53 | 10.83 | 8.65 | 10.02 | 10.58 | 11.66 | 15.77 | 11.43 | 3.63 | 6.97 | 9.81 | 10.97 |
| **soil** | 0.39 | 2.07 | 2.53 | 10.79 | 2.37 | 7.71 | 6.07 | 10.60 | 0.23 | 1.32 | 2.30 | 6.04 | 2.31 | 7.67 |
| **rock** | 1.11 | 3.14 | 2.14 | 3.38 | 0.04 | 0.18 | 3.04 | 8.46 | 2.60 | 4.34 | 0.89 | 2.92 | 1.63 | 4.60 |
| **forb** | 16.02 | 13.03 | 23.88 | 17.20 | 32.47 | 19.40 | 37.23 | 24.33 | 12.23 | 10.16 | 46.67 | 21.61 | 28.08 | 21.86 |
| **grass** | 4.26 | 6.59 | 2.81 | 7.46 | 22.56 | 25.85 | 3.68 | 5.24 | 0.89 | 2.60 | 7.75 | 11.30 | 6.99 | 14.41 |
| **lobaria** | 0.00 | 0.00 | 0.00 | 0.00 | 0.11 | 0.67 | 0.00 | 0.00 | 0.07 | 0.26 | 0.00 | 0.00 | 0.03 | 0.29 |
| **FWD** | 17.37 | 8.99 | 10.25 | 6.38 | 18.26 | 14.62 | 12.72 | 14.77 | 14.56 | 14.89 | 25.11 | 17.68 | 16.38 | 14.28 |
| **CWD** | 5.60 | 6.13 | 5.89 | 8.40 | 13.23 | 14.10 | 12.04 | 11.32 | 8.60 | 8.37 | 9.72 | 10.40 | 9.18 | 10.51 |
| **stump** | 2.98 | 5.58 | 2.89 | 5.42 | 1.86 | 3.40 | 3.05 | 6.31 | 4.68 | 7.26 | 2.98 | 6.03 | 3.08 | 5.85 |
| **other** | 0.00 | 0.00 | 0.14 | 0.69 | 2.32 | 9.48 | 1.46 | 9.21 | 3.67 | 12.40 | 1.35 | 9.20 | 1.49 | 8.40 |

Litter depth (cm) and percent cover of vegetation variables by age class

| SITE | B1 | | B2 | | B3 | | B4 | | B5 | | B6 | | All B Sites | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Var* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* |
| **depth** | 5.16 | 1.58 | 7.57 | 2.39 | 5.54 | 2.68 | 4.82 | 1.73 | 4.65 | 1.66 | 22.00 | 32.87 | 8.29 | 14.92 |
| **bpshr** | 10.63 | 11.66 | 6.00 | 8.28 | 5.53 | 6.94 | 18.44 | 15.03 | 2.02 | 4.26 | 7.09 | 7.72 | 8.28 | 10.94 |
| **evshr** | 7.07 | 11.34 | 0.00 | 0.00 | 0.02 | 0.13 | 15.12 | 21.54 | 9.33 | 18.97 | 12.63 | 18.51 | 7.36 | 15.79 |
| **odshr** | 0.72 | 2.48 | 0.93 | 2.42 | 0.04 | 0.18 | 0.12 | 0.68 | 0.14 | 0.69 | 0.61 | 1.79 | 0.43 | 1.68 |
| **fern** | 20.42 | 17.89 | 5.58 | 8.27 | 9.98 | 12.95 | 21.12 | 15.68 | 26.40 | 24.07 | 8.05 | 11.94 | 15.26 | 17.71 |
| **litter** | 82.46 | 16.04 | 66.58 | 18.76 | 59.56 | 23.51 | 81.32 | 13.78 | 82.11 | 13.98 | 49.37 | 29.41 | 70.23 | 23.76 |
| **moss** | 11.67 | 13.78 | 26.84 | 17.88 | 39.75 | 25.08 | 10.95 | 11.47 | 9.82 | 10.81 | 15.84 | 18.42 | 19.15 | 20.13 |
| **soil** | 1.51 | 4.45 | 0.00 | 0.00 | 0.53 | 2.76 | 0.89 | 4.16 | 0.28 | 0.95 | 1.54 | 4.28 | 0.79 | 3.31 |
| **rock** | 1.35 | 3.06 | 0.02 | 0.13 | 0.11 | 0.67 | 0.11 | 0.67 | 0.19 | 1.32 | 0.32 | 1.13 | 0.35 | 1.56 |
| **forb** | 4.84 | 8.35 | 1.33 | 3.94 | 5.14 | 9.96 | 8.51 | 13.07 | 3.37 | 7.60 | 4.42 | 7.74 | 4.60 | 9.14 |
| **grass** | 8.60 | 16.19 | 0.09 | 0.28 | 0.16 | 0.70 | 6.32 | 13.53 | 0.60 | 1.54 | 3.04 | 8.39 | 3.13 | 9.86 |
| **lobaria** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.18 | 1.31 | 0.00 | 0.00 | 0.02 | 0.13 | 0.03 | 0.54 |
| **FWD** | 7.47 | 12.95 | 39.82 | 25.18 | 28.56 | 23.78 | 11.54 | 14.92 | 6.86 | 9.65 | 19.04 | 19.26 | 18.88 | 22.04 |
| **CWD** | 3.11 | 5.81 | 11.82 | 12.80 | 8.89 | 11.17 | 4.67 | 6.86 | 5.77 | 6.50 | 13.79 | 13.73 | 8.01 | 10.72 |
| **stump** | 0.96 | 4.19 | 3.81 | 7.06 | 3.26 | 5.06 | 2.02 | 5.55 | 3.51 | 9.14 | 2.79 | 5.49 | 2.73 | 6.36 |
| **other** | 1.56 | 2.58 | 1.77 | 2.14 | 3.35 | 7.87 | 3.16 | 7.16 | 2.84 | 2.75 | 1.46 | 1.88 | 2.36 | 4.82 |

Litter depth (cm) and percent cover of vegetation variables by age class

| **SITE** | **C1** | | **C2** | | **C3** | | **C4** | | **C5** | | **C6** | | **All C Sites** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Var* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* |
| **depth** | 6.95 | 1.78 | 6.05 | 1.87 | 6.30 | 1.91 | 8.12 | 2.48 | 16.61 | 26.80 | 6.44 | 2.93 | 8.41 | 11.74 |
| **bpshr** | 0.00 | 0.00 | 0.42 | 1.14 | 0.07 | 0.26 | 0.42 | 1.59 | 0.33 | 1.47 | 0.40 | 1.59 | 0.27 | 1.21 |
| **evshr** | 0.23 | 0.94 | 6.65 | 11.79 | 0.51 | 1.70 | 0.56 | 1.80 | 1.39 | 4.08 | 1.40 | 5.46 | 1.79 | 6.08 |
| **odshr** | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.13 | 0.00 | 0.00 | 0.02 | 0.13 | 0.04 | 0.18 | 0.01 | 0.11 |
| **fern** | 2.42 | 10.13 | 19.49 | 24.61 | 4.23 | 10.40 | 1.65 | 3.86 | 2.44 | 5.88 | 5.23 | 10.87 | 5.91 | 14.22 |
| **litter** | 78.95 | 16.62 | 83.33 | 11.75 | 67.72 | 19.91 | 79.39 | 15.73 | 70.00 | 29.81 | 81.58 | 14.12 | 76.83 | 19.80 |
| **moss** | 5.93 | 7.41 | 7.37 | 8.16 | 15.11 | 17.87 | 9.60 | 14.17 | 6.61 | 7.60 | 10.00 | 13.42 | 9.10 | 12.49 |
| **soil** | 0.00 | 0.00 | 0.12 | 0.68 | 0.00 | 0.00 | 0.00 | 0.00 | 1.46 | 4.52 | 0.60 | 2.76 | 0.36 | 2.24 |
| **rock** | 0.02 | 0.13 | 0.70 | 2.02 | 0.16 | 0.70 | 0.04 | 0.18 | 0.46 | 1.29 | 0.91 | 3.59 | 0.38 | 1.82 |
| **forb** | 0.30 | 1.46 | 0.28 | 0.95 | 1.30 | 3.40 | 1.30 | 6.63 | 0.12 | 0.33 | 0.70 | 2.48 | 0.67 | 3.32 |
| **grass** | 0.00 | 0.00 | 0.02 | 0.13 | 0.00 | 0.00 | 1.42 | 10.50 | 1.37 | 6.17 | 0.02 | 0.13 | 0.47 | 5.02 |
| **lobaria** | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.02 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 |
| **FWD** | 13.40 | 10.93 | 15.19 | 12.94 | 9.46 | 7.74 | 26.86 | 23.07 | 16.28 | 17.61 | 11.60 | 10.85 | 15.46 | 15.77 |
| **CWD** | 6.44 | 8.83 | 5.56 | 8.88 | 11.86 | 12.38 | 12.14 | 11.96 | 8.93 | 10.95 | 10.05 | 13.44 | 9.16 | 11.48 |
| **stump** | 2.32 | 6.68 | 1.58 | 4.66 | 2.67 | 5.09 | 1.49 | 2.68 | 4.23 | 11.91 | 1.58 | 4.75 | 2.31 | 6.70 |
| **other** | 3.95 | 3.69 | 2.44 | 3.38 | 3.65 | 3.58 | 4.49 | 4.46 | 2.16 | 2.25 | 3.35 | 5.67 | 3.34 | 4.06 |

Litter depth (cm) and percent cover of vegetation variables by age class

| SITE | D1 | | D2 | | D3 | | D4 | | D5 | | D6 | | All D Sites | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Var* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* | *Mean* | *SD* |
| **depth** | 52.56 | 25.43 | 64.04 | 21.93 | 5.18 | 1.59 | 33.54 | 29.44 | 6.60 | 2.02 | 55.79 | 22.34 | 36.28 | 31.02 |
| **bpshr** | 2.44 | 5.64 | 0.65 | 2.63 | 6.00 | 8.54 | 3.70 | 5.74 | 1.91 | 6.62 | 4.00 | 8.53 | 3.12 | 6.81 |
| **evshr** | 44.35 | 31.85 | 56.77 | 22.35 | 36.32 | 30.02 | 1.81 | 4.81 | 0.44 | 1.94 | 0.26 | 1.46 | 23.32 | 30.80 |
| **odshr** | 0.79 | 2.37 | 0.04 | 0.18 | 1.74 | 5.39 | 0.04 | 0.18 | 1.18 | 3.70 | 0.19 | 0.71 | 0.66 | 2.93 |
| **fern** | 0.02 | 0.13 | 0.09 | 0.66 | 23.75 | 28.19 | 11.07 | 18.41 | 36.68 | 26.55 | 0.02 | 0.13 | 11.94 | 22.42 |
| **litter** | 5.30 | 4.99 | 5.11 | 4.25 | 57.98 | 21.78 | 30.07 | 29.90 | 72.28 | 20.18 | 6.96 | 2.53 | 29.62 | 32.03 |
| **moss** | 0.02 | 0.13 | 0.00 | 0.00 | 34.30 | 23.55 | 15.63 | 22.84 | 18.07 | 18.88 | 0.02 | 0.13 | 11.34 | 20.04 |
| **soil** | 27.68 | 24.78 | 16.07 | 13.63 | 0.02 | 0.13 | 10.18 | 15.15 | 0.00 | 0.00 | 14.46 | 17.00 | 11.40 | 17.68 |
| **rock** | 3.91 | 12.20 | 2.28 | 4.48 | 0.95 | 4.19 | 9.67 | 16.65 | 0.00 | 0.00 | 4.44 | 9.31 | 3.54 | 10.08 |
| **forb** | 0.04 | 0.18 | 0.09 | 0.66 | 3.68 | 7.76 | 8.04 | 15.81 | 9.56 | 17.21 | 0.07 | 0.26 | 3.58 | 10.80 |
| **grass** | 36.86 | 25.86 | 27.53 | 23.73 | 0.12 | 0.33 | 21.18 | 23.63 | 0.02 | 0.13 | 32.42 | 22.89 | 19.69 | 24.51 |
| **lobaria** | 0.14 | 0.69 | 0.04 | 0.18 | 0.04 | 0.18 | 0.05 | 0.22 | 0.02 | 0.13 | 0.18 | 0.70 | 0.08 | 0.43 |
| **FWD** | 3.84 | 4.47 | 5.79 | 6.77 | 14.44 | 10.86 | 7.65 | 4.81 | 8.88 | 10.08 | 7.81 | 5.64 | 8.07 | 8.21 |
| **CWD** | 2.95 | 5.32 | 3.47 | 9.84 | 8.28 | 9.86 | 7.09 | 7.83 | 7.11 | 7.10 | 9.51 | 12.76 | 6.40 | 9.41 |
| **stump** | 1.11 | 2.70 | 1.35 | 3.25 | 1.60 | 3.74 | 2.07 | 5.53 | 2.40 | 5.74 | 1.19 | 3.18 | 1.62 | 4.22 |
| **other** | 1.35 | 3.51 | 1.33 | 3.12 | 3.47 | 4.43 | 1.49 | 3.04 | 3.88 | 4.78 | 2.40 | 4.35 | 2.32 | 4.06 |