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# A SUMMARY OF BAT RESEARCH IN THE PEND D'OREILLE VALLEY IN SOUTHERN BRITISH COLUMBIA

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A summary of bat research in the Pend d'Oreille Valley in southern British Columbia

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## ABSTRACT

The diversity, abundance and reproductive condition of bat species in the Pend d'Oreille Valley (POV) in southern British Columbia was surveyed during the summers of 1994-98. Fourteen sites near water bodies, roadways, and forest edges were sampled in 1994-98. The five-year total was 479 bat captures (466 adults, 13 juveniles) during regular mistnetting/harp trapping in the POV, at an overall rate of 6.8 bats per night or 1.8 bats per net-night. A total of 85 bats was captured in 1994 (14.2 bats per night or 3.5 bats per net-night), 155 bats in 1995 (6.7 bats per night or 1.9 bats per net-night), 174 bats in 1996 (7.0 bats per night or 1.9 bats per net-night), 52 bats in 1997 (3.5 bats per night or 0.9 bats per net-night), and 13 bats in 1998 (4.3 bats per night or 1.3 bats per net-night). The nine species of bats captured during the study included big brown, silver-haired, hoary, California, western long-eared, little brown, long-legged, Yuma, and Townsend's big-eared bats. Townsend's big-eared bat is a provincially blue-listed species. Little brown bats were the most common species captured, followed by silver-haired, big brown, California, and western long-eared bats. Small numbers of long-legged, hoary, Yuma, and Townsend's big-eared bats were captured. Males and females were caught for most species, with the exceptions of the Yuma bat, for which only females were caught, and hoary and Townsend's big-eared bats, for which only males were caught. All species were reproductively active, based on the presence of reproductive females, males with enlarged testes, or juveniles. The large numbers of silver-haired and big brown bats captured in the POV is unusual, as these large-bodied species are uncommon at other sites in B.C. Townsend's big-eared bats were found roosting in a mine, a cave, and a building in 1995-97, and were also captured flying along an overgrown roadway and out of a mine. Building roosts used by little brown and big brown bats were also identified.

Roost sites were located for five species of bats in the POV: big brown, silver-haired, California, western long-eared, and long-legged (see Figure 7, Appendix 3, Vonhof 1996, 1997, 1999, Vonhof and Gwilliam 1999). A total of 124 roost trees were located, 46 used by big brown bats, 46 by silver-haired bats, 20 by California bats, 9 by western long-eared bats, and 3 by long-legged bats. In general, a measure of tree size (either DBH or tree height), decay stage, and tree species significantly discriminated between roost and randomly selected cavity trees for all bat species. Both big brown and silver-haired bats primarily used roosts in decay stage 2 (live, unhealthy) trembling aspen (*Populus tremuloides*) trees, but also used small numbers of roosts in other tree species and decay stages. Roosts used by these two species tended to be in abandoned primary cavity excavating bird cavities or natural hollows, although several loose bark and crack roosts were used. California, western long-eared, and long-legged bats tended to roost beneath loose bark rather than in cavities. California bats preferred Douglas-fir (*Pseudotsuga menziesii*) trees, but also roosted in grand fir (*Abies grandis*) and western white pine (*Pinus monticola*) trees, and showed strong preferences for trees in intermediate decay stages (4 and 5). Western long-eared bats roosted in lodgepole pine (*Pinus contorta*), grand fir and Douglas-fir, and to a lesser extent western white pine and western larch (*Larix occidentalis*), in trees in decay stages 4 and 5. The three long-legged bat roosts were in Douglas-fir, western white pine, and grand fir trees in decay stages 4 and 5.

Entire groups of bats were captured using a modified funnel trap, and all captured individuals were banded with numbered aluminum bands. Based on band recaptures and radio-tagging entire groups of bats, silver-haired bat social groups were compositionally stable, with no change in group composition within years and entire groups of individuals returning to use the same roost trees year after year. Data on big brown bats was weaker, but it appears that at least some individuals return to the same roost sites between years.  The POV supports an exceptionally diverse and abundant bat community, although current and future resource developments may negatively affect the bat fauna.

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## TABLE OF CONTENTS

## LIST OF FIGURES

## LIST OF TABLES AND APPENDICES

## INTRODUCTION

British Columbia supports the most diverse bat fauna of any Canadian province (Nagorsen and Brigham 1993), but empirical data on species distribution and abundance is still fragmentary for most areas. Within the Columbia Basin, lowland and riparian areas providing suitable habitat for bats have been significantly impacted as a result of hydroelectric development and forest management activities. The Columbia Basin Fish and Wildlife Compensation Program has identified the need to investigate the status of bat populations and their habitat requirements in the Pend d'Oreille Valley (POV), located within the southern portion of the compensation area. The valley is unique because it has an east-west orientation, which results in an abundance of south-facing slopes and associated dry, warm climate. Past hydroelectric development in the POV has modified forested habitat in the valley. Upgrades to the Seven Mile Generating Station and the Waneta Plant will result in further habitat disruption, through the clearing of large areas of forest cover for powerline establishment and increased water fluctuations in riparian habitat.

No surveys of the bat fauna in the POV had taken place until 1994 (Rasheed and Holroyd 1995, Vonhof 1995). These preliminary, and subsequent (Vonhof 1996, 1997) surveys confirmed the presence of at least nine bat species in the valley, including one provincially blue-listed species (Townsend's big-eared bat, *Corynorhinus townsendii*). Large numbers of relatively large-bodied bat species that can carry radio-transmitters without significantly compromising their flight ability, such as big brown bats (*Eptesicus fuscus*) and silver-haired bats (*Lasionycteris noctivagans*), were present in the valley. Recently, radio-transmitters weighing only 0.5g have been developed, permitting smaller species of bats (*Myotis* spp.) to be studied using radio-telemetry as well. Thus, an ideal and somewhat unique opportunity was presented to study the roost-site requirements of a number of forest-dwelling bat species of different sizes in the same area.

All forest-dwelling bats in British Columbia may be affected by forest management practices which change important habitat characteristics, such as reducing the numbers of wildlife trees, decreasing the availability of older seral stages, and simplifying both the vegetation community and vertical and horizontal forest structure. Bats traditionally have not been included in forest management plans, in spite of the fact that they are the most abundant wildlife tree using mammals, and often have specialized habitat requirements. This may be due in part to the fact that our current knowledge of the roosting habitat requirements of forest-dwelling bats is fragmentary at best. It is clear that in order to maintain and/or enhance existing populations of forest-dwelling bats it is essential to gain a better understanding of their roost-site preferences and the ecological factors influencing their roosting habitat requirements.

This report summarizes the results of surveys to investigate the diversity and relative abundance of bats, as well as the roost-site requirements of five species of bats (big brown, silver-haired, California, *Myotis californicus*, western long-eared, *M. evotis*, and long-legged, *M. volans*), in the POV during the summers of 1994-98 (see also Vonhof 1996, 1997, 1999, Vonhof and Gwilliam 1999). The studies specifically addressed the following objectives:

(1) to determine the species of bats present in the valley, and whether reproductive populations of the different bat species were present,

(2) to investigate the presence of red- or blue-listed bat species,

(3) to characterize roosting habitat used by forest-dwelling bats, with particular emphasis on reproductive females,

(4) to compare attributes of confirmed roost sites with available potential roosts at the level of the patch and the stand to determine the criteria used for roost selection, and

(5) to provide practical management recommendations that will assist managers in conserving and/or enhancing bat populations within the Compensation Area.

## METHODS AND MATERIALS

### *Study Area*

The POV, located in southern British Columbia, south and east of the city of Trail, occurs in the Southern Interior Mountains Ecoprovince and the Selkirk-Bitterroot Foothills Ecoregion (Figure 1). The valley has a general east-west orientation with elevations ranging from 450 to 1500m. The POV lies within the Interior Cedar Hemlock (ICH) biogeoclimatic zone and is characterized by cool, wet winters and warm, dry summers. Three subzones are present within the valley: the very dry warm Interior Cedar-Hemlock (ICHxw), the dry warm Interior Cedar-Hemlock (ICHdw), and the moist, warm Interior Cedar-Hemlock (ICHmw2).

### *Bat Captures*

The POV was surveyed for bats between 13 July and 4 August 1994, 15 June and 28 July 1995, 23 May and 9 August 1996, 6 June and 10 August 1997, and 17 July and 21 July 1998. Data from 1994 comes from Rasheed and Holroyd (1995) and Vonhof (1995). Four sites were sampled for bats in 1994, eight in 1995, seven in 1996, five in 1997, and one in 1998 (Figure 2, Appendix 1). Netting sites in the Nine Mile Valley (Handley Marsh, Substation Marsh) could not be netted in 1996-98 because access was denied by the land owner. Netting effort was restricted in terms of locations (16 mile valley only) and number of netting sessions in 1997-98 because the focus was on capturing animals for radio-tracking studies (Vonhof 1999, Vonhof and

Gwilliam 1999). Sites were selected based on the presence of suitable habitat, including marshes, small ponds, shallow areas of the Seven Mile and Waneta Reservoirs, clearcut edges, and overgrown roads, at various locations and elevations throughout the valley. Ponds and marshes proved to be the most successful netting sites and preference was given to netting these areas. At each site 2-5 mistnets (mean 3.8) ranging in length from 5.5 to 12.8m were set. Mistnets were placed directly over the surface of water bodies or perpendicular to forest edges in clearcuts and roadways, depending on the characteristics of the netting site. In addition, harp traps (Tuttle 1974) were placed on overgrown roadways in the Tillicum and Limpid Creek drainages.

Captured bats were held in cloth bags for a minimum of one hour before taking measurements, to ensure clearing of the digestive tract. Individuals were identified to species, sexed, and aged as adults or juveniles (young of the year) based on the degree of ossification of the metacarpal-phalange joints (Racey 1974). Mass and forearm length was measured and reproductive condition (Racey 1974) was assessed for all captured individuals (see Appendix 2 for all bat capture data).

*Roosting Sites*

Roost-sites were located using radio-telemetry. Small (0.7g) radio-transmitters were attached between the scapulae of female silver-haired, big brown, California, western long-eared, and long-legged bats (*N* = 21, 25, 7, 3, and 3, respectively), using Skin Bond® surgical adhesive. Preference was given to radio-tagging reproductive females, although several non-reproductive female big brown bats were radio-tagged as well. Bats were tracked to their roost-sites during the day using Lotek radio receivers (Lotek STR 1000 and SRX 400, Lotek Engineering Inc., Newmarket, Ontario). Tracking continued on successive days for as long as radio-transmitters remained functional (2-3 weeks). Residence times and roost-switching distances were determined from the radio-tracking data. Residence time was the number of consecutive days an individual bat used a particular roost tree, and roost switching distance was the distance between subsequent trees used by the same bat. Roost switching distance was calculated using GIS (Arc/INFO) based on GPS locations (Trimble Navigation; ProXRS with differential correction; sub-meter accuracy) of all trees. Any roost-sites found were observed at dusk to determine (i) the exact type and location of the roost on the tree, and (ii) the colony size. Roost trees used by the same individual were considered independently in statistical analyses, as only 7% of roosts contained only one individual, and therefore the use of a particular roost tree usually reflected simultaneous decisions made by different individuals.

Once roosting sites were located, we established a 17.8m radius (0.1 ha) plot around the roost tree, and measured a range of tree characteristics (Table 1). Diameter at breast height (DBH) was measured, and all tree heights and entrance heights were determined with a clinometer. Entrance aspect was determined with a compass corrected to true north. The number of limbs remaining was counted directly, and the condition of the top of the tree (broken versus present), the canopy layer it occupied (emergent, canopy, sub-canopy, tall shrub, or shrub), and the tree species were noted. Two observers independently estimated the percent bark remaining on the tree and the mean was taken. In addition, the horizontal distance to and height of the nearest neighbouring tree and the nearest tree of the same or greater height were measured. The former was the closest tree to the roost tree in any direction of any height, although trees were only considered if they had a DBH of ≥10 cm. The latter tree is defined the closest tree to the roost of the same height as the roost or above in a 90° arc bisected by the roost entrance, and would be the first tree an emerging bat would encounter as it flies from the roost. If there was more than one cavity on the tree, the distance to and height of the nearest tree of the same or greater height was measured for each of the entrances, and the one with the shortest distance to the roost was included in the analysis.

Each roost tree was also classified into one of nine decay stages defined by the British Columbia Wildlife Tree Classification System (Backhouse and Lousier 1991, Vonhof and Barclay 1996), which is based on characteristics of the tree such as the percent bark remaining, number of limbs present, condition of the top, and condition of the heartwood and sapwood. Based on this classification system, several categories of trees were discriminated. Wildlife trees were defined as trees falling into decay stages 2-7, as, by definition, decay stage 1 trees and decay stage 8-9 trees are unable to provide suitable roosting opportunities for bats (Vonhof and Barclay 1996). Cavity trees were defined as wildlife trees containing at least one cavity suitable for bats (loose bark, or a branch or woodpecker hole that obviously went into a central cavity) but not known to contain bats, whereas non-cavity trees were wildlife trees that did not contain an obvious cavity.

Site characteristics were also measured within the plot (Table 1). To estimate percent canopy closure one observer took readings with a moosehorn at half the radius of the plot (~ 9m) along each of four transects in the four cardinal directions. The height of at least two trees (range 2-6) within the canopy was measured using a clinometer and the mean was calculated to estimate canopy height within the plot. The number of live coniferous, live deciduous, and wildlife trees in each plot were counted.

To reflect the fact that habitat selection is hierarchical (Wiens 1981, Wiens and Rotenberry 1981, Powell 1994), roost trees were compared with random trees at two different geographical scales: the patch and the stand. We obtained a sample of random trees from the same patch by randomly selecting and measuring one wildlife tree in the 0.1ha plot around each roost tree. An additional plot was established around a randomly selected wildlife tree in another area of the same stand (as in Vonhof and Barclay 1996). The plot was located by selecting a random point between 100 and 300m from the roost tree along a transect established in a randomly selected direction, and locating the nearest wildlife tree to the random point (focal tree). A 0.1 ha plot was established around the focal tree and the tree and site characteristics of the focal tree were measured in the same fashion as for roost trees. Based on initial analyses indicating a significant difference between the characteristics of cavity and non-cavity wildlife trees (see Results), this design was modified such that one cavity and one non-cavity wildlife tree were measured at each geographic scale in 1996, and in 1997 only cavity trees were measured.

Roost trees were compared with cavity trees using logistic regression (Hosmer and Lemeshow 1989), to determine whether bats exhibit preferences for particular tree and site characteristics. To combine the distances to and heights of nearest trees into meaningful measures of clutter, the angle between the top of the roost tree and the top of both the nearest neighbouring tree, and the nearest tree of the same or greater height, was calculated. This provided a measure of the amount of clutter closest to the roost in any direction (nearest neighbouring tree), and closest to the roost in the direction of the entrance (nearest tree of same or greater height), with a smaller angle indicating more clutter. Because of the mechanics of logistic regression analysis, categorical variables must be converted into dummy variables, and the number of new variables required is one less than the number of categories. To reduce the number of degrees of freedom taken up by dummy variables, we combined categories for several variables. Decay stages were grouped into low (decay stages 2 and 3), intermediate (4 and 5) and high (6 and 7) categories, which were then converted into two dummy variables. Similarly, tree layers were combined into high (emergent and canopy), middle (sub-canopy), and low (tall shrub and shrub) categories, with two corresponding dummy variables. There were 10 species of trees in the POV, and clearly not all species could be included in the analyses. To reduce this effect, we chose the three tree species that comprised > 15% of the total for big brown, silver-haired, or California bats (trembling aspen, *Populus tremuloides*; Douglas-fir, *Pseudotsuga menziesii*; and western white pine, *Pinus monticola*; see Figure 9) and created three dummy variables. Dummy variables were coded such that the effect of each category was compared to the average effect of all of the categories. To reduce the number of continuous variables in the model we calculated Kendall's correlations among continuous independent variables (Table 4), and excluded one of any pair of variables that had a Kendall's tao coefficient >0.4. This was done on the combined sample of cavity trees from both geographic scales, and included roost trees.

Model selection was stepwise. Variables were entered into the model based on low values of significance for the score statistic, and were removed based on the change in log-likelihood if they were removed from the model. If the slope for a particular variable is positive, then as the value for that variable increases the observation is more likely to fall into the category of the dependent variable coded with the higher number in the analysis (roost trees in all cases). The logistic regression analysis also provided jack-knifed estimates of the correct classification rate for each category of the dependent variable, with a cutoff probability of 0.5.

Comparisons were made between cavity and non-cavity trees (coded 1 and 0, respectively), and between roost trees and cavity trees (see Results; coded 1 and 0, respectively) for each bat species at each geographic scale. The samples of cavity trees for both the patch and stand scales in roost versus cavity tree analyses were obtained by pooling all of the cavity trees measured at each scale. Roost trees were not included in the cavity versus non-cavity tree analysis. The reproductive condition of the bats was not included in any analyses, as sample sizes within reproductive classes were too low for meaningful analysis.

*Group Stability and Composition*

To catch silver-haired and big brown bats from selected colonies as they left their roost we used a specialized funnel trap. The trap was elevated to the height of the roost entrance by climbing the tree, and positioned around the roost entrance using nylon webbing and buckles. All captured bats were sexed, and standard measurements were taken. Small (2mm diameter) sections of wing membrane were taken from each individual for genetic analysis, and stored in 20% dimethyl sulfoxide in saturated NaCl solution for later analysis in the laboratory (see Vonhof 1999). Numbered aluminum split ring bands were placed on the forearms of captured bats for individual identification, as well as silver-haired and big brown bats captured during the course of regular mistnetting.

We used two approaches to examine group stability. The first, performed in collaboration with Dr. B. Betts of Eastern Oregon University, was to outfit three entire groups of silver-haired bats (19, 11, and 16 individuals, respectively) with radio-transmitters and track their movements for as long as the radio-transmitters remained active or attached to the bats. This provided data on short-term group stability. The second approach was to use limited data from recaptures of banded bats of both species within captured groups, to assess longer-term group stability between years.

## RESULTS

### *Sampling Effort and Bats Captured*

Mistnetting took place on 6 nights or a total of 24 net-nights in 1994 (i.e., a single net set up for one night equals one net-night), 23 nights or a total of 83 net-nights in 1995, 25 nights or 94 net-nights in 1996, 13 nights or 59 net-nights in 1997, and on 3 nights or 10 net-nights in 1998. A total of 85 bats was captured in 1994 (14.2 bats per night or 3.5 bats per net-night), 155 bats in 1995 (6.7 bats per night or 1.9 bats per net-night), 174 bats in 1996 (7.0 bats per night or 1.9 bats per net-night), 52 bats in 1997 (3.5 bats per night or 0.9 bats per net-night), and 13 bats in 1998 (4.3 bats per night or 1.3 bats per net-night). The five-year total was 479 bat captures during regular mistnetting/harp trapping in the POV, at an overall rate of 6.8 bats per night or 1.8 bats per net-night. Nets were up for an average of 171, 169, 80, 126, and 125 min. each night in 1994-98, respectively. Capture data on each individual bat is summarized in Appendix 2.

### *Species Captured*

Nine species of bats were captured in the POV: big brown (*Eptesicus fuscus*), silver-haired (*Lasionycteris noctivagans*), hoary (*Lasiurus cinereus*), California (*Myotis californicus*), western long-eared (*M. evotis*), little brown (*M. lucifugus*), long-legged (*M. volans*), Yuma (*M. yumanensis*), and Townsend's big-eared bats (*Plecotus townsendii*). Little brown bats accounted for the greatest proportion of captures, with 38.4% (*N*=184) of captures, followed by big brown, silver-haired, California, western long-eared, and long-legged bats (Figure 3). Hoary, Townsend's big-eared, and Yuma bats accounted for only small proportions of captured bats (Figure 3).

Large numbers of silver-haired, big brown, and little brown bats and small numbers of California, long-legged, and western-long-eared bats, as well as a single hoary bat, were captured on the six mistnetting nights in 1994 (Figure 4). The most common species of bat captured in 1995-96 was the little brown bat, followed by big brown, silver-haired, California, and western long-eared bats (Figure 4). Small numbers of long-legged bats were captured in both 1995-96 (Figure 4). Nearly equal numbers of California, silver-haired and western long-eared bats were captured in both 1995-96, whereas greater numbers of big brown, little brown, and long-legged bats were captured in 1996 than in 1995. Only six species were captured in 1997, and captures of four of these declined from 1995-96. Within 1997 these six species were captured in nearly equal numbers. Of the five bat species captured in 1998 at the 16 Mile Marsh, big brown and silver-haired bats were caught in the largest numbers (Figure 4). Yuma bats were captured only in 1995, and single hoary bats were captured in 1994 and 1995 (Figure 4). Townsend's big-eared bats were captured during regular mistnetting/harp-trapping in 1995 and 1996 (Figure 4), but were also captured in a cave and a building in the study area in 1996 and 1997 (see below). The capture of Townsend's big-eared bats in 1995-97 is significant, as it is provincially blue-listed.

*Locations of Bat Captures*

Bats were captured at nine of the 14 mistnetting/harp trap sites sampled. The most productive netting sites were the Waneta Reservoir below the Seven Mile Dam, Handley Marsh, Sixteen Mile Marsh, and Harcourt Marsh (Figure 2, Appendix 1). The greatest number of species was captured at the three marsh netting sites, with many captures of big brown, California, little brown, silver-haired, and western long-eared bats (Table 2). Large numbers of little brown bats, and the only Yuma bats, were captured at the Waneta Reservoir site. These were the only species captured at this site, and only little brown bats were captured at the Seven Mile Reservoir netting site. The two hoary bats were both captured at the Handley Marsh (Table

2). The two Townsend's big-eared bats captured during regular sampling were caught on the road to the Heinz cabin, just off 16 Mile road, and at Maloney's Mine. Both California and long-legged bats were commonly captured at sampling sites along roadways, as were a small number of little brown and western long-eared bats. Long-legged bats were only captured at sites in the Tillicum and Limpid Creek drainages. Only silver-haired and little brown bats were captured at the Gerrard Pond netting site, at the extreme eastern end of the study area.

*Sex, Age, and Reproductive Condition*

Of the 479 bats captured in 1994-98 in the POV, 466 were adult. Females accounted for 61.6% of adult captures (*N* = 37, 87, 117, 33, and 13 in 1994-98, respectively), while males accounted for 38.4% (*N* = 35, 68, 57, 19, and 0, respectively). Both male and female big brown, California, little brown, silver-haired, and western long-eared bats were caught (Figure 5). Among little brown bats males outnumbered females, whereas among California, silver-haired, long-legged, and particularly big brown bats, females outnumbered males. Only female Yuma bats were caught, whereas only male hoary and Townsend's big-eared bats were caught (Figure 5). Female long-legged bats were captured in all years, but males were not captured in 1995. Equal numbers of males and females were captured in 1994. More females were captured in 1996 than 1995 for the species for which females were captured, with the exception of western-long-eared bats (Figure 5a). In 1997, consistent with a lower overall capture rate, fewer females were captured for all species but long-legged and western long-eared bats, and no female little brown bats were captured. Fewer males were captured in 1996 than 1995 for all species for which males were captured, except big brown and long-legged bats (Figure 5b). In 1997, the captures of male big brown, little brown and silver-haired bats decreased, whereas the number of male California bats increased and the number of male long-legged and western long-eared bats stayed constant. Only females were captured in 1998. Juveniles were only captured during regular mistnetting in 1994, and included big brown (n = 4, 1 female and 3 males), silver-haired (n = 8, 4 females and 4 males), and little brown bats (n = 1, male). The juvenile silver-haired and big brown bats were captured at both Handley Marsh and Sixteen Mile Marsh on 29 July and 4 August 1994, respectively, and juveniles of these species were also seen or captured at tree roosts in 1996-98. The single juvenile little brown bat was captured at the Seven Mile Reservoir on 15 July 1994.

Pregnant or lactating females were captured for all of the bat species for which females were captured in the three years of intensive survey (1995-97; Figure 6). Data in Figure 6 is provided for these three years only, as surveys in 1994 and 1998 were limited to a few weeks in each summer, and could not provide an accurate indication of the mix of different reproductive classes. Nonreproductive females of all species were captured, except long-legged and Yuma bats in 1995 (Figure 6). Postlactating female California bats were captured in 1995, silver-haired bats in 1996, and both long-legged and western long-eared bats in 1997. The number of non-reproductive females captured increased between 1995-96 and again in 1996-97 for all bat species, with the exception of California bats in 1997 (Figure 6). No reproductive long-legged bats or western-long-eared bats were captured in 1996, but reproductive individuals were caught in 1995 and 1997. The number of pregnant and lactating bats decreased between 1995 and 1996, but then increased in 1997 for California, silver-haired, long-legged, and western long-eared bats (Figure 6). No lactating California bats were captured in 1996 or 1997, and no pregnant silver-haired bats were captured in 1997. Neither pregnant nor lactating female western long-eared bats were captured in 1996-97, although postlactating females were captured in 1997. Only non-reproductive big brown bat females were captured in 1997. Male big brown, silver-haired, California, and little brown bats with enlarged testes were captured in 1995-96. Based on the presence of either reproductive females or males with enlarged testes, all species were confirmed to be reproductively active within the POV with the exception of Townsend's big-eared bats and hoary bats.

The earliest capture dates each year of detectably pregnant bats were: 16 June in 1995 (big brown bats; Table 3), 26 June in 1996 (silver-haired bats), and 7 July in 1997 (California bats). Pregnant females of most other species were captured in the last week of June or first week of July in 1995-97, with the exception of long-legged bats in 1995 and 1997, for which the first detectably pregnant females were captured on 15 July and 22 July, respectively. Lactating female big brown and little brown bats were captured from 17 July – 23 July in 1995-96 (Table 3), and lactating silver-haired bats were captured from 16 July – 21 July in 1995-97. The first lactating female California (1995 only) and long-legged bats (1995 and 1997 only) were not captured until 28 July – 1 August, suggesting that parturition may take place later in these two species.

In 1994, lactating female silver-haired and big brown bats were captured. The female big brown and California bats captured in 1994 were pregnant. Postlactating female silver-haired and western long-eared bats were captured in 1994, as were non-reproductive female long-legged, little brown, western long-eared, silver-haired, and big brown bats. In 1998, lactating big brown and silver-haired bats, and non-reproductive females of these two species as well as little brown and western long-eared bats, were captured.

Habitat Selection

Roost Trees

During 1995-98, 124 roost trees were located using radio-telemetry. The mean (± SD) tree and site characteristics of roosts used by the five bat species are outlined in Tables 4 and 5, respectively, GPS locations and selected tree and site characteristics for each tree are found in Appendix 3, and roost locations are plotted in Figure 7. Forty-six roosts (15, 24, and 7 in 1995-97, respectively) were used by big brown bats, 46 (12, 18, 11, and 5 in 1995-98, respectively) by silver-haired bats, 20 (4, 6, and 10 in 1995-97, respectively) by California bats, nine by western long-eared bats (1997 only), and three by long-legged bats (1997 only). Overall, 28 roosts were found in natural hollows, 45 in abandoned primary cavity excavator (PCE) hollows, 36 beneath loose bark, and nine in cracks (Table 6). For three big brown bat roosts the nature of the cavity could not be determined. Big brown bats roosted in natural hollows and abandoned PCE hollows in equal numbers, whereas silver-haired bats roosted more often in PCE hollows than in natural cavities. Both species also roosted less commonly beneath loose bark and in cracks. In contrast, California bats roosted primarily beneath loose bark, and used only small numbers of natural hollows, PCE hollows, and cracks. All western long-eared and long-legged bats roosted beneath loose bark. Mean group sizes, based on emergence counts, were 11 individuals (range 1-35) for silver-haired bats, 25 (range 1-61) for big brown bats, 9 (range 1-34) for California bats, and 3 (range 1-7) for western long-eared bats. The three long-legged bat colonies contained 1, 1, and 8 individuals. Group size was not significantly correlated with either tree height or DBH for any bat species ($P > 0.05$ in all cases).

Significant correlations were observed between the distance to the nearest neighbouring tree and the angle between the roost tree and the nearest neighbouring tree (Kendall's tao, $T$ = -

0.631, $P < 0.001$), and the distance to the nearest tree of the same or greater height and its angle with the roost tree ($T = -0.477$, $P < 0.001$). Therefore, the two distance measurements were not included in the logistic regression analyses of tree characteristics in favour of the angular measurements of clutter. Percent canopy closure was strongly correlated with the number of coniferous trees ($T = 0.417$, $P < 0.001$), and weakly correlated with the numbers of deciduous ($T = 0.156$, $P < 0.01$) and wildlife ($T = 0.119$, $P < 0.05$) trees, and was therefore removed from the analysis. The following analyses therefore included 15 tree characteristics (eight categorical [seven dummy and one indicator] and seven continuous variables), and six continuous site characteristics.

*Cavity Versus Non-Cavity Wildlife Trees*

Cavity trees differed significantly from non-cavity trees in four characteristics (Table 7). Cavity trees tended to be larger in diameter and have less bark remaining than non-cavity trees. Furthermore, they tended to be trembling aspen, and be an emergent or canopy tree, more often than non-cavity wildlife trees. Model fit was good (Hosmer-Lemeshow Goodness-of-Fit: $\chi^2=9.30$, $P > 0.3$), and 72.9% of trees were correctly classified by the analysis. Because of these differences between cavity and non-cavity trees, and to reflect the fact that bats are secondary cavity users and must choose among trees with cavities, the sample of random tree used for comparison with roost trees was limited to cavity trees.

*Silver-Haired Bat Roost-Tree Preferences*

Of the 15 tree characteristics initially entered into the multiple logistic regression analysis, two explained significant proportions of the variation between silver-haired bat roost trees and cavity trees in the same forest patch (Table 8). Roost trees tended to be in low decay stage trees (see Figure 8) with fewer limbs than cavity trees in the same forest patch.

Relative to cavity trees in other areas of the same stand, roost trees used by silver-haired bats had greater DBH, fewer limbs, a shorter distance to the nearest wildlife tree, and were in low decay stage trees and in trembling aspen more often (Table 8). Correct classification rates were >70%, and model fit was excellent (Hosmer Lemeshow Goodness-of-Fit: $P > 0.8$) for tree characteristics (Table 8).

Silver-haired bats roosted in trembling aspen (67% of roost trees; Figure 9) trees most often, but also used relatively high numbers of Douglas-fir and ponderosa pine (*Pinus ponderosa*) trees. Small numbers of grand fir (*Abies grandis*), lodgepole pine (*Pinus contorta*), western hemlock (*Thuja plicata*), and paper birch (*Betula papyrifera*) trees were used as well. Natural and PCE hollow roosts were found in all of these species with the exception of grand fir, while bark roosts were found in Douglas-fir and grand fir trees. Two crack roosts were located in ponderosa pine trees, and one in a trembling aspen.

Over 55% of silver-haired bat roost trees were in decay stage 2 trees (Figure 8). Natural and PCE hollow roosts were found in all three decay classes, but the low decay stage trees tended to be trembling aspen, and the intermediate and high decay stage trees were conifers. The four bark roosts were in intermediate decay stage trees.

One site characteristic explained a significant proportion of the variation between roost trees used by silver-haired bats and cavity trees at the level of the stand (Table 9). Silver-haired bat roost trees were situated in patches of forest with lower slope than those of cavity trees. Model fit ($P > 0.1$) was good, and the correct classification rate was 66.4% (Table 9).

*Big Brown Bat Roost-Tree Preferences*

Four tree characteristics explained significant proportions of the variation between roost trees used by big brown bats and cavity trees in the same forest patch (Table 8). Big brown bat roost trees tended to be trembling aspen, taller, and in intermediate stages of decay less often than cavity trees in the same forest patch. The significant effect of medium tree-layer on the discrimination between the two groups is most likely a result of the greater use of trees in the sub-canopy by big brown bats relative to those in the lower layer, rather than a preference for trees in the middle layer per se, as 85% of big brown roost trees were emergent or in the canopy (Figure 10).

Relative to cavity trees in other areas of the same stand, big brown bat roost trees were taller, had larger DBH, greater percent bark remaining, fewer limbs remaining, were closer to the nearest wildlife tree, and were in trembling aspen trees more often (Table 8).

Big brown bats roosted primarily in trembling aspen trees (see above; Figure 9), with 78% of roosts in this tree species. They also used small numbers of Douglas-fir and western white pine trees, which accounted for all of the bark roosts. Two other roosts were found in ponderosa pine (crack roost) and western larch (*Larix occidentalis*; unknown cavity type) trees.

As with silver-haired bats, big brown bats roosted mainly in low decay stage (2 and 3) trees, with over 60% of big brown bat roosts in decay stage 2 trees (Figure 8). All natural cavity and PCE hollow roosts were found in low decay stage trees, whereas the bark roosts used by big brown bats were found in intermediate (5) and high (6) decay stage trees.

Of the six site characteristics originally included in the model, only the number of canopy layers and the number of coniferous trees in the 0.1ha plot around the tree explained significant proportions of the variation between big brown roost trees and cavity trees from other areas of the same stand (Table 9). Roost trees used by big brown bats occurred in areas with a greater number of canopy layers and fewer coniferous trees than cavity trees from other areas of the same stand.

Correct classification rates were high for analyses of tree characteristics (> 80%), but lower for site characteristics (68.1%), and model fit was good in all cases (Tables 8 and 9).

*California Bat Roost-Tree Preferences*

Of the fifteen tree characteristics initially entered into the multiple logistic regression analysis, three explained significant proportions of the variation between California bat roost trees and cavity trees in the same forest patch (Table 8). Roost trees were taller, had larger DBH, and were in intermediate stages of decay more often than random cavity trees

Tree height, percent bark remaining, and whether the tree was Douglas-fir explained a significant proportion of the variation between roost trees and cavity trees in other areas of the same stand (Table 8). Roost trees were taller, had less bark remaining, and were Douglas-fir more often than cavity trees from other areas of the same stand. Correct classification rates were high for both analyses of tree characteristics (≥ 86%), and the models fit the data well ($P > 0.1$).

California bats roosted in only three tree species: Douglas-fir, grand fir, and western white pine, and preferentially roosted in Douglas-fir (see above; Figure 9). The two crack, two

PCE hollows, and one natural cavity roost were in Douglas-fir trees. Bark roosts occurred in all three tree species.

California bats primarily roosted in trees of intermediate decay stage, and only one tree was in the low decay stage category (Figure 8). One bark roost was in a low decay stage tree (decay stage 3), while all of the PCE hollow, crack, and natural hollow roosts as well as the remainder of the bark roosts were in intermediate decay stage (4 and 5) trees.

Of the six site characteristics originally included in the model, slope and canopy height explained significant proportions of the variation between roost trees and cavity trees from other areas of the same stand (Table 9). Roost trees tended to occur in areas with greater slope and a taller canopy than cavity trees from other areas of the same stand. The correct classification rate was 79.8%, and model fit was good ($P > 0.1$).

*Western Long-eared Bat Roost-Tree Preferences*

Relative to cavity trees at both geographic scales, western long-eared bats roosted significantly more often in trees in intermediate stages of decay (Table 8). Furthermore, western long-eared bat roost trees were less likely to be trembling aspen than cavity trees in the same patch (Table 8). The classification rates and model fit were good, but these numbers are deceiving, as the low sample size of roosts resulted in all roost trees being misclassified as random cavity trees. The Hosmer-Lemeshow Goodness-of-Fit statistic could also not be calculated properly with the small sample for roost trees, and does not adequately explain departures from model fit. Therefore, while it was clear that all western long-eared bats were indeed in intermediate decay stages (Figure 8) and never in trembling aspen trees (Figure 9), the significant difference with the sample of random cavity trees should be interpreted with caution. All bark roosts used by this species were located in lodgepole pine, western white pine, grand fir, Douglas-fir, and western larch trees (Figure 9). No site characteristics explained significant proportions of the variation between roost trees and cavity tree from other areas of the same stand (Table 9).

*Long-legged Bat Roost Trees*

The three roost trees used by long-legged bats qualitatively resembled those used by California and western long-eared bats. The trees were large in height and diameter (Table 4, Appendix 3), and the roosts were beneath loose bark. Two of the roosts were in decay stage 4 trees, one in a grand fir and the other in a Douglas-fir. The other roost was in a decay stage 5 western white pine tree.

*Available Tree Densities*

Based on plots established around roost trees and random cavity trees from other areas of the same stand, the overall density of all species of wildlife trees combined is 31 trees/ha (Table 10). However, this is likely an overestimate as plots had to contain at least one wildlife tree, and wildlife trees tend to be clumped in space (T-Square Method: Hine's Test Statistic for Randomness: $h_T = 1.80$, = aggregated distribution).

Trembling aspen cavity trees were found at the highest density in the POV, followed by Douglas-fir, grand fir, western white pine, lodgepole pine, and western red cedar cavity trees (Table 10). Low densities of ponderosa pine, western larch, western hemlock, and paper birch cavity trees were also present in the POV. No Douglas maple (*Acer glabrum*), Engelmann spruce (*Picea engalmannii*), or subalpine fir (*Abies lasiocarpa*) cavity trees were found. It should be noted that the tree species most commonly used by bat species (see above) were among the species occurring at the highest densities.

Non-cavity Douglas-fir wildlife trees ranked highest with respect to tree density, followed by grand fir, trembling aspen, paper birch, Douglas maple, western white pine, western red cedar, western larch, and lodgepole pine (Table 10). Engelmann spruce, ponderosa pine, subalpine fir, and western hemlock occurred at the lowest densities. While cavity and non-cavity trembling aspen, western white pine, and lodgepole pine trees occurred at similar densities, Douglas-fir, grand fir, paper birch, western red cedar, and western larch trees did not. The overall density of non-cavity wildlife trees was 62 trees/ha. In addition, live deciduous trees occurred at much lower densities than live conifers (Table 10).

*Group Composition and Stability*

*Residence Times and Roost-Switching Distances*

The mean roost residence time for individual big brown, silver-haired, California and western long-eared bats roosting in trees were 3.2 ± 1.29 (mean ± SD, $N$=22), 6.7 ± 8.60 days ($N$ =18), 2.2 ± 0.39 ($N$=6), and 3.2 ± 1.59 ($N$=3) days, respectively. Bats of all species switched roosts regardless of whether they were caring for non-volant young. Only one tree was found for each of three radio-tagged long-legged bats, but in each case the bat remained in the tree for only one day. However, one of these trees was used by the same bat, on two separate occasions, separated by 13 days. The average horizontal distance between subsequent roost trees used by the same bat varied over a relatively small range relative to the distances typically flown by foraging bats (big brown: 5 - 1598m, mean [± SD] 443 ± 340.5m, $N$=17; silver-haired: 105 - 941m, 311 ± 245.5m, $N$=10; California: 5 – 522m, 180 ± 151.0m, $N$=6; western long-eared: 257 - 845m, 406 ± 241.7m, $N$=8).

*Roost Tree Re-Use by Radio-Tagged Bats*

Bats used a limited number of trees in any particular area, as nine of the 24 big brown roost trees and three of the 14 silver-haired trees found in 1996 were reused in 1997. Furthermore, roost trees were re-used within years, as one silver-haired and nine big brown roost trees were used by at least two different individuals of the same species at different times, and three silver-haired and four big brown roost trees were used by the same individual at different times. One roost tree used by California bats in 1997 had been used by big brown bats in 1996. As more bats were radio-tagged, we found fewer and fewer new roost trees relative to the cumulative number of trees found (Figure 11). For big brown bats, in particular, the cumulative number of new trees appears to level off at 40-50 trees, suggesting that big brown bats utilize a small proportion of the available trees in any particular area (Figure 11, bottom).

*Capture of Social Groups at Roost Trees*

Bats were trapped at their roosts on six of 10 attempts on eight trees in 1996, three times in three attempts on three trees in 1997, and one attempt on one tree in 1998. One roost tree was trapped twice in 1996. Five complete silver-haired groups were captured, two in 1996 (9 and 12 bats), two in 1997 (19 and 11 bats), and one in 1998 (24 bats: 16 adults and 8 juveniles). Three partial big brown groups (8, 5, and 8 bats) were captured in 1996 and one partial group (18 bats) in 1997. All the bats captured at the roosts for both species were either adult females or juveniles of either sex. No adult males were captured. Pregnant, lactating, or postlactating bats were captured in all but one big brown colony. However, the proportion of captured individuals that were reproductive in each colony was always less than 50% in 1996 (range 25-50%, mean 39%). All adults in the colonies of both species captured in 1997-98 were reproductive, and 65% of the (11 of 17) females were lactating in the single big brown bat colony captured in 1997.

Five silver-haired bats, including two radio-tagged bats originally captured at Gerrard's Pond (Appendix 1, Figure 2) on 26 June 1996, were later recaptured on 22 July 1996, along with four other bats in a roost tree (SH01; see Figure 7) approximately 75m from the capture site. The radio-tagged individuals had used that particular roost during the entire intervening period.

A group of 12 silver-haired bats was captured in tree SH12 in 1996 (Table 11). In 1997, six banded individuals from SH12 were recaptured as part of a group of 19 individuals captured and radio-tagged in tree SH21 (Figures 7 and 12). One additional unbanded bat captured in SH21 was later determined to be genetically identical to a bat that had been captured in tree SH12 (see Vonhof 1999) and must have lost its band. Thus, from the original group of 12 bats caught in SH12, seven remained together between years (Table 11). In 1997, all of the individuals from SH21 were radio-tagged. All of the individuals remained together for 14 days, and moved between seven different roosts as a group. The size of the group remained constant until day 11, at which time group size increased, presumably because juveniles started to fly. Two of the seven trees used by this group had been used by the radio-tagged individual in 1996, and all trees were in the same forest patch as the trees used by the individual in 1996 (Figure 12).

Bats from SH12 and SH21 were recaptured again in 1998 in tree SH35 (Figures 7 and 12). Of the 16 adult bats captured in SH35, two had originally been captured together in tree SH12 in 1996, and three had been captured in both tree SH12 in 1996 and in tree SH21 in 1997 (Table 11). An additional eight bats had been captured together for the first time in tree SH21 in 1997. This group only contained three unbanded adult bats (Table 11). The entire group was refitted with radio-transmitters, and of the 10 trees used by this group, four had been used in 1996 and three in 1997 (Figure 12). As with the previous year, all of the radio-tagged individuals remained together as they moved between roost trees over a period of 6 days.

Because the bats captured in these three roosts interacted within and between years they were considered to belong to the same social group, with a combined group size of 27 individuals.

Another group of 11 silver-haired bats captured in 1997 in tree SH25, contained three previously captured bats, two captured in mistnets earlier in 1997 at 16 Mile Marsh, and one that had been radio-tagged in 1995. All bats were radio-tagged, and this group remained compositionally stable for the next 9 days. In 1997 the group used two of the three trees used by the bat in 1995, as well as four additional trees in the same forest patch (Figure 12).

Two big brown bats originally captured at 16 Mile Marsh on 23 May and 20 June 1996, were recaptured at tree roosts BB01 on 28 June 1996 and BB06 on 5 July 1996, respectively (see Figure 7 for location of capture and roost-sites). One individual captured in BB06 on 5 July was recaptured only 200m away in tree BB21 on 30 July 1996. One of the five big brown bats captured at the 16 Mile Marsh netting site in 1998 was originally captured at roost tree BB01 in 1996.

The big brown group captured in 1997 roosted in a tree also used in 1996 (BB13; Figure 7), and contained three banded individuals from 1996. These included the two radio-tagged individuals that had originally used the tree in 1996 (for 4 days), and a banded individual that had been captured 20m away in another roost tree in 1996 (BB21). One of the recaptured radio-tagged individuals from 1996 was refitted with a radio-transmitter, and three of the four trees it used in 1997 had been used by this same individual in 1996.

*Roost-Sites in Buildings*

Based on conversations with local landowners in 1996-97 a number of building roosts were identified. On 4 July 1997 an adult male Townsend's big-eared bat was captured in a small shed on Joan Smith's property (location 13 on Figure 2, see also Appendix 1), near the confluence of the Salmo and Pend d'Oreille Rivers. Colonies of little brown bats were present in the attic of the Gerrard house (UTMs 477780E, 5428120N, Zone 11, NAD83), near Nelway, and in the attic of the house on Stagleap Ranch, just north of the intersection of Highways 3 and 6 (UTMs 481000E, 5437600N, Zone 11, NAD83). A Townsend's big-eared bat was observed in the lower level of the latter house in July 1997 (B. Stedile pers. comm.).

*Mine and Cave Surveys*

Two mines were surveyed for bats on three different occasions in 1996. Nets were erected at the entrance of a mine in the Swift Creek watershed (location 14 on Figure 2, see also Appendix 1), on two occasions. On 7 June 1996 adult little brown, California, and western long-eared bats were captured attempting to enter the mine shortly after sunset. In addition, an adult male Townsend's big-eared bat was captured leaving the mine approximately 1.5 hours after local sunset. On 20 August 1996 a male big brown bat was captured attempting to enter the mine shortly after local sunset. The capture of a bat flying into the mine this late in the summer suggests the mine is being used as a hibernaculum, although this requires further confirmation. On both occasions several other bats of unknown species were observed flying around the nets, which were placed directly in front of the mine entrance.

On 24 July 1996 three natural caves and one abandoned mine on the south-facing slopes above Fort Sheppard Flats on the west side of the Columbia River were surveyed for bats. An adult male Townsend's big-eared bat was captured inside one of the caves (UTMs 454320E, 5430710N, Zone 11, NAD83). There was no evidence of bats in either of the other two caves or the abandoned mine.

## DISCUSSION

The POV supports a diverse and abundant bat fauna. Capture rates (mean number of bats per night) in other studies in British Columbia vary widely: 7.2 in the dry interior (Holroyd et al. 1994), 6.8 in the Liard Region (Bradbury et al. 1997), 5.5 in the West Shuswap (Firman et al. 1995), 1.9 in the Columbia Valley (Rasheed and Holroyd 1995), and 1.7 in the Fort Nelson Region (Vonhof et al. 1997). The mean capture rate of 6.7-7.0 bats per night in the POV in 1995-96 is relatively high, and second only to the rates in the southern Okanagan valley (Holroyd et al. 1994) and the Liard Region (Bradbury et al. 1997). Furthermore, in terms of bat species diversity, with nine species, the POV is second only to the southern Okanagan valley, which supports sixteen species (Holroyd et al. 1994). The number of species captured in other areas in British Columbia ranges from four species in the Fort Nelson/Liard region in northern B.C. (Wilkinson et al. 1995, Bradbury et al. 1997, Vonhof et al. 1997) to eight species in the West Arm Demonstration Forest (Vonhof 1995).

The warm, dry climate of the POV is ideal for reproductive female bats, as higher ambient temperatures result in higher roost temperatures, and gestation length in pregnant females is negatively related to roost temperature (Racey 1973, Racey and Swift 1981). Furthermore, higher seasonal temperatures result in increased numbers of reproductive females and numbers of young successfully fledged (Grindal et al. 1992, Lewis 1993). The presence of reproductive females of seven of the nine species, as well as the prevalence of female big brown bats relative to males, may be related to the warm climatic conditions in the POV. Furthermore, warmer climates may support larger numbers of insects, and females (and males) may also benefit from the abundance of prey in terms of reduced foraging costs. Males, on the other hand, have lower energetic costs than reproductive females and are able to take advantage of cooler habitats (Barclay 1991). We might expect males to roost in cooler areas where they can reduce thermoregulatory costs by entering torpor (Hamilton and Barclay 1994). However, because of the relatively high ambient temperatures, and presumably roost temperatures, males in the POV may be using passive warming as an alternative strategy to reduce energetic costs (e.g., Trune and Slobodchikoff 1976).

Between 1995-96 the number of individuals captured in mistnets increased for three species and remained relatively constant for another three. However, the number of males captured decreased and the number of females increased in 1996 for all of the species for which either sex was captured, with three exceptions. Furthermore, for species in which females were captured in both years, the number of reproductive females decreased, and, conversely, the number of nonreproductive females increased in 1996. These results suggest that although numbers of females increased, a smaller proportion of the populations of all species was reproductive in 1996 than in 1995. This may have resulted from the relatively long winter in 1995-96, in which cooler temperatures prevailed until the latter half of May. The long winter may have decreased overwinter survival of hibernating bats, which have strict energy budgets (e.g., Thomas et al. 1990). However, the earliest capture dates of pregnant and lactating female bats did not differ significantly between years, as would be expected if cooler temperatures in the early part of the season delayed or offset reproduction (e.g., Grindal et al. 1992, Lewis 1993). The reasons behind the differences in sex ratios of captured bats between years are unclear, but may be related to differential habitat use by the two sexes between years, influencing which sex was captured most often, or possibly differential overwinter survival between sexes, but we have no data to test either hypothesis. Few juveniles were captured during the studies, which is inconsistent with captures of reproductive females in seven of the 9 species present in the POV, but is likely due to the fact that mistnetting was terminated near the beginning of August in all years except 1994, before most juveniles were flying. A small number of juveniles (n=13) were captured during mistnetting in 1994, and juveniles were observed in cavities occupied by colonies of big brown and silver-haired bats that were captured using the funnel trap at roost-sites.

Of the species captured in all years of this study, the total number of individuals decreased substantially in 1997. The western portion of the valley was cut off from the eastern portion by spring road wash-outs in 1997, and therefore a number of sites, including the productive Waneta Reservoir and Harcourt Marsh sites, were not visited. A heavy emphasis was placed on netting at the 16 Mile Marsh site, as it had been the only consistently productive site in the eastern portion of the valley, and because it was common at this site to catch big brown, silver-haired, and California bats necessary for the roosting studies. However, capture success at this site was much lower in 1997. It was the fourth year in a row that this site had been sampled, and because the mistnets could only be placed in certain portions of the marsh, due to water depth, it is likely that the bats became used to mistnet placement and simply avoided them. Because fewer sites were sampled on fewer nights in 1997, it is difficult to compare capture success with other years.

The little brown bat (*M. lucifugus*) was by far the most abundant bat species in the POV in 1995-96. This bat is flexible in its roosting and foraging ecology (Fenton and Barclay 1980), and is capable of taking advantage of a wide variety of different habitats. In addition, because of their tendency to fly low over water while foraging (Fenton and Barclay 1980), little brown bats are one of the easiest species to capture in mistnets set low over still water. The tendency for captured individuals to emit loud vocalizations while in a mistnet also increases the probability of capturing this species, as nearby conspecifics are attracted to the source of the vocalizations. Because little brown bats are so easily captured, their abundance relative to other bat species may be overestimated (Rasheed and Holroyd 1995).

The capture of the Townsend's big-eared bat (*P. townsendii*) in 1995-97 is highly significant, as this species is provincially blue-listed. Townsend's big-eared bats generally roost in mines, caves, or buildings (Kunz and Martin 1982). The single male captured in 1995 was captured in a harp trap set on a road leading to one of the few buildings in the POV, and it is possible the bat was using the building as a night roost. One of the males captured in 1996 was caught as it was flying out of an abandoned mine through holes left in the brick wall used to seal the entrance, suggesting that it was roosting inside the mine. The second male was observed flying into a cave from the entrance area where it was roosting, and was subsequently caught inside the cave. The two Townsend's big-eared bats observed in 1997 were both found in buildings, which is consistent with the large building colonies found recently in the lower Columbia Valley (Grindal 1997). These results suggest that Townsend's big-eared bats in the study area may commonly roost in both abandoned mines or caves and buildings, but further surveys are required to determine the extent to which this is the case, and whether any female Townsend's big-eared bats are present in the area. Records of Townsend's big-eared bat are common in southern coastal areas and in the dry interior of British Columbia, and it has been captured in Creston (Nagorsen and Brigham 1993). These are the only records between Creston and the dry interior, and represent a minor range extension.

The capture of Yuma bats (*M. yumanensis*) in the POV also represents a minor range extension, as the only other record as far east in British Columbia was from Nelson (Nagorsen and Brigham 1993).

The presence of large numbers of relatively large-bodied bats, such as big brown bats and silver-haired bats, is surprising given their apparent low abundance in other regions of British Columbia (Nagorsen and Brigham 1993, Vonhof et al. 1997). The warm, dry climate in the POV and its potential influence on prey availability and roosting conditions for reproductive females may provide the necessary conditions for these bat species. In the southern Okanagan Valley, where similar climatic conditions prevail, large numbers of both of these bat species are captured as well (Holroyd et al. 1994). Alternatively, because these valleys are both relatively arid, and bats have a limited number of options in terms of places to come to drink, the high capture success of large-bodied bats in the POV and the Okanagan Valley may simply be an artifact of high netting effort in riparian areas, rather than being indicative of any real population trends.

*Roosting Ecology*

Wildlife trees with cavities generally differ from wildlife trees without cavities in the POV in a number of ways, including having larger DBH, lower percent bark remaining, and a greater tendency to be trembling aspen and emergent or canopy trees. The population of cavity trees is therefore easily distinguishable from the general population of wildlife trees, and the group of trees that are actually available to bats for roosting is a small subset of the wildlife tree resource in any given area. The fact that bats select certain trees from among an already distinct group of trees highlights the importance of these trees to bats, and the need to identify and properly manage bat roost trees. Furthermore, not all cavities that are present in an area will be available to bats, due to unfavourable structural or thermal characteristics of the roost, or the presence of other cavity-using species which may compete with bats for cavities, such as northern flying squirrels, red squirrels, deer mice, and both primary cavity excavating and secondary cavity using birds (e.g., Erskine and McLaren 1972, Stabb et al. 1989, Ingold 1994, Kurta and Foster 1995). Because of the small number of preferred cavity trees and the competition for them, roost-sites may be limiting for these and other forest-dwelling bat species in B.C. Thus it is vital to ensure a continuing supply of cavity trees with particular characteristics to meet the current and future roosting habitat requirements of forest-dwelling bats.

In general, big brown, silver-haired, and California bats roosted in trees that were either larger in diameter or taller than cavity trees at both geographic scales. Similarly, other studies have found that bats prefer tall trees (e.g., Crampton and Barclay 1998, Vonhof and Barclay 1996, Ormsbee and McComb 1998, Sedgeley and O'Donnell 1999), large diameter trees (e.g., Barclay et al. 1988, Lunney et al. 1988, Taylor and Savva 1988, Rabe et al. 1998), or both (e.g., Campbell et al. 1996, Sasse and Pekins 1996). Likewise, studies on cavity nesting birds have detected preferences for large diameter snags (Mannan et al. 1980, Harestad and Keisker 1989, Lundquist and Mariani 1991, Machmer and Steeger 1995, Machmer et al. 1995, Steeger and Machmer 1995) and for tall trees (Nilsson 1984, Raphael and White 1984, Rendell and Robertson 1989). With the exception of the comparison between silver-haired roost trees and cavity trees from the same forest patch, either tree height or DBH, or both, explained significant proportions of the variation between roost and cavity trees. In addition, tree height and DBH are generally positively correlated (e.g., Vonhof 1996, Vonhof and Barclay 1996), such that the tree height variable also includes information with respect to DBH, and vice versa. Thus, tree size may be the more appropriate factor selected by bats, rather than any particular measure of tree size.

Bats may select large trees for several possible reasons. The diameter of a tree may set an upper limit to the size of the colony of bats that can form in a particular cavity. This may be especially important for reproductive females, as colonial bats may experience significant thermal and energetic benefits by clustering (Trune and Slobodchikoff 1976, Kurta 1985). Colony sizes, particularly for big brown bats, were generally large (up to 61 individuals), and small trees could not support them. The potential size of cavities is extremely important around the time of parturition, as the number of individual bats using the same space increases dramatically when females begin to give birth. In birds, clutch size within cavity-nesting species increases with increasing cavity size (e.g., Rendell and Robertson 1989). The size of the cavity may limit the size of maternity colonies of bats in tree roosts, although colony size was not correlated with any measure of tree size for either bat species in this study. In addition, the larger a tree is at the time of death, the longer it will stand (Cline et al. 1980, Newton 1994), and the greater the time it will remain as a useful roost site to bats.

Measures of tree size are generally positively correlated with the measures of clutter around the roost tree (e.g., Vonhof 1996, Vonhof and Barclay 1996), such that large trees are relatively uncluttered, and therefore to receive the potential benefits of uncluttered trees, bats need only select large trees, or vice versa. Similar studies from in a variety of forest types have observed that bats prefer to roost in large, uncluttered trees (Campbell et al. 1996, Vonhof and Barclay 1996, Crampton and Barclay 1998, Ormsbee and McComb 1998, Rabe et al. 1998, Sedgeley and O'Donnell 1999).

Large, uncluttered trees may be exposed to more direct sunlight, which in turn may increase temperatures inside the roost cavity (e.g., Kurta et al. 1993*a,b*, Ormsbee and McComb 1998). High roost temperatures increase the rate of fetal and juvenile development in bats (Racey 1973; Racey and Swift 1981), and thus roosting in a cavity that promotes the maintenance of a high body temperature is an important consideration for female bats roosting in colder climates. Roosting in an uncluttered tree may also provide easier access to and from the roost. Flight is costly (Thomas and Suthers 1972), and a clear flight path in front of the roost entrance may result in energetic savings. Furthermore, the ease with which bats enter and leave their roost may influence the length of time they are exposed to aerial predators, and thus bats may select open trees which provide easy access. It is also likely that large, uncluttered trees stand out as landmarks to bats flying over the canopy surface, assisting in roost relocation.

Almost 80% of big brown bat roosts and over 60% of silver-haired bat roosts were in trembling aspen trees, and trees used by both species were significantly more likely to be trembling aspen than cavity trees. Big brown bat roost trees were less likely to be in intermedate stages of decay, and silver-haired bat roost trees were more likely to be in lower stages of decay than cavity trees. Furthermore, the preference of both species for trees with fewer limbs remaining and greater percent bark remaining is likely tied to this heavy use of trembling aspen by both species. The tree species and decay stage preferences of bats roosting in hollows are closely tied to the preferences of primary cavity excavators and to the dynamics of natural cavity formation (Vonhof and Barclay 1996). The majority of roosts used by both big brown and silver-haired bats were situated in hollows (natural or excavated) in predominantly live (decay stage 2) trees. Live trembling aspen trees over 40 years of age almost always harbour heart rot (Winternitz and Cahn 1983), and provide excellent conditions for cavity excavation by primary cavity excavators and natural cavity formation. These trees generally keep most of their bark and have fewer obstructions, in the form of limbs, than coniferous trees. Consequently, primary cavity excavators exhibit strong preferences for trembling aspen in many areas (Erskine and McLaren 1972, Winternitz and Cahn 1983, Harestad and Keisker 1989, Steeger et al. 1995), and trembling aspen trees likely provide the greatest number of suitable cavities for roosting bats. The high usage of trembling aspen trees by bats in this study is a testament to this fact.

The differences in preferred tree characteristics between smaller-bodied and larger-bodied bats in the same area likely result from differences in use of different cavity types. In contrast to silver-haired and big brown bats, > 60% of California bat roosts were in Douglas-fir, and all of the roost trees used by both California and western long-eared bats were in conifers. Both species of small-bodied bats preferentially roosted in trees in intermediate stages of decay, and California bats roosted in trees with significantly less bark remaining (and likely more cavities present) than the random sample of cavity trees. Smaller-bodied bats in the POV and in other areas primarily use roosts beneath loose bark (e.g., this study, Kurta et al. 1993*a*,*b*, Chung-MacCoubrey 1996, Sasse and Pekins 1996, Vonhof and Barclay 1996, Brigham et al. 1997, Rabe et al. 1998), except in areas where mainly hollows are available for roosting (Kalcounis and Hecker 1996, Vonhof and Wilkinson 1999). Large-bodied bats tend to roost in hollows when they are available (this study, Kalcounis and Brigham 1998), and thus there is a clear difference in how the two categories of bat species use forests as roosting habitat.

Although the tree species and decay stage preferences of hollow roosting bats may be tied to the preferences of PCEs and to the dynamics of natural cavity formation (Vonhof and Barclay 1996), those of bark-roosting bats likely depend more on how bark decays on different tree species over time. It is no surprise that small-bodied bats in this and other studies (see above) typically use trees in intermediate decay stages and tree species such as Douglas-fir, western white pine, and grand fir. These are generally the only trees which provide suitable bark cavities for bats, in the form of sheets of exfoliating bark which remain attached at the top (this study, Vonhof and Barclay 1996, Brigham et al. 1997), with the possible exceptions of lodgepole pine and ponderosa pine. However, western white pine, in particular, is only abundant at lower elevations in the Tillicum Creek watershed, and higher up on the ridges both California bats and western-long-eared bats tended to use either Douglas-fir or lodgepole pine. These tree species generally provide relatively fewer and smaller bark cavities than western white pine or grand fir, but are more abundant, and Douglas-fir also provides cavities in the form of cracks, and PCE hollows (Steeger and Hitchcock 1998). While ponderosa pine is relatively rare in the POV, it is heavily used by bats in other regions (Brigham 1991, Betts 1998, Campbell et al. 1996, Mattson et al. 1996, Brigham et al. 1997, Rabe et al. 1998) and may provide important roosting habitat for bats where it is available.

The preference of California bats for roosts in Douglas-fir in the POV is surprising, as in other areas this species is rarely used, even though it is the most abundant species of wildlife tree (Vonhof and Barclay 1996, Brigham et al. 1997). However, root rot centres containing large numbers of standing dead Douglas-fir, and to a lesser extent lodgepole pine and grand fir trees, are common on the ridge between Tillicum Creek and Limpid Creek, and the majority of roosts used by both bat species were situated within these root rot centres. Given that root rot areas are often targeted for timber removal in an attempt to eliminate or slow the spread of root rot fungi, the value of these root rot centres to bats, and other wildlife tree using species (Steeger and Machmer 1995, Steeger and Hitchcock 1998), must not be ignored, as they provide large numbers of suitable roosting, nesting, and foraging trees. Interestingly, the characteristics of trees containing bark roosts of big brown and silver-haired bats were virtually identical to those of trees used by the smaller bat species, and in fact one western white pine tree was used by both big brown bats and California bats in different years, suggesting that the requirements of bark-roosting bats are consistent across species.

Big brown bats preferred tall roost trees situated in patches of forest with greater vertical structure and fewer coniferous trees relative to randomly-available cavity trees at the level of the stand. This was likely associated with their tendency to roost in forest patches containing a relatively large component of mature aspen. In these patches the aspen trees are often mixed with coniferous trees, leading to greater vertical heterogeneity and a more broken canopy. Big brown bats may benefit by roosting in patches with large components of aspen through increased exposure of the roost to sunlight (see above) and greater ease of access to and from the roost. Furthermore, trembling aspen trees are more likely than other tree species to contain cavities and provide a greater number of potential roost sites in a localized area.

The tall, large diameter roosts used by California bats were situated in patches of forest with greater slope and taller canopy than cavity trees in other areas of the same stand. Large trees and a tall canopy are characteristics normally associated with older stands (Cline et al. 1980), which tend to have greater tree spacing and more canopy gaps (Franklin et al. 1981). Roosting in tall, uncluttered trees on steep slopes provides easier access to and from the roost, and facilitates roost relocation as the trees stand out as landmarks to bats flying over the canopy surface. The reasons for the use of trees in patches with shallower slopes by silver-haired bats is unclear, but they are highly maneuverable flyers (Kunz 1982a), and are perhaps better able to make use of roosts where flight in the forest is required.

*Roost Fidelity*

Both big brown and silver-haired bats switched roosts frequently, with big brown bats moving to a new roost every 3.2 days, and silver-haired bats every 6.6 days on average. Frequent switching between alternate roost sites by tree or foliage roosting bats has been observed for a number of temperate insectivorous bat species (Brigham 1991, Kurta et al. 1993*a*,*b*, Crampton and Barclay 1998, Kalcounis and Hecker 1996, Kurta et al. 1996, Mattson et al. 1996, Sasse and Pekins 1996, Vonhof and Barclay 1996, Brigham et al. 1997, Callahan et al. 1997, Ormsbee and McComb 1998, Rabe et al. 1998). A number of explanations have been proposed to explain this behaviour (see Lewis 1995 for review). Frequent roost switching may be a strategy to minimize the risk of predation (Fenton 1983, Fenton et al. 1994), by decreasing the chances of the roost-site being discovered by repeated observation or through the build up of a strong odor in the roost. Alternatively, bats may switch roosts frequently to minimize parasite loads by interrupting parasite life cycles (Lewis 1996), to minimize commuting distance if bats change their foraging areas (Kunz 1982b), or to take advantage of different microclimates or structural conditions offered by different trees at different times of the year (Humphrey et al. 1977, but see Lewis 1996). Recent work has shown roost-switching may also be important in maintaining social relationships, and that the functional social unit may not be bats that are together on any one night, but rather a network of groups that are connected with one another by individual roost changes (Rieger 1996, Callahan et al. 1997). The benefits of remaining site-faithful, such as familiarity with high quality roosts (Brigham and Fenton 1986) and maintaining social relationships within a colony (Morrison 1980) must trade-off with the potential benefits of roost-switching. The tendency for bats in this and other studies (see Lewis 1995) to switch roosts even when they have non-volant young is surprising, given the risk of predation on both mother and offspring while moving between roost-sites and the time and energetic costs of searching for a new roost-site, particularly while carrying offspring in flight (Lewis 1995, 1996). Clearly, the benefits of regular roost switching must outweigh these potential costs.

The distance between subsequent roost trees was relatively small compared to the distances generally covered each night by foraging bats (> 10km, big brown bats; Wilkinson and Barclay 1997), with species means ranging from 180-443m. Roost switching distances of other species of bats generally fall into this range (e.g., Morrison 1980, Lunney et al. 1988, Taylor and Savva 1988, Vonhof and Barclay 1996), but may extend to well over three kilometres (e.g., Crampton and Barclay 1998). Although the distance between subsequent roost trees used by the same individual averaged just over 400m for big brown and 300m silver-haired bats in this study, as bats continued to switch roosts they would often use more than one tree in the same patch of forest. The distance between different roost trees in the same aspen patch was often very small (<20m), and occasionally the same roost tree would be used by different individuals at different times, or by the same individual more than once. These results reinforce the importance of aspen trees to large-bodied bats, and suggest that when searching for new roosts these bats need only look for patches of aspen, as they are likely to provide several alternate roost-sites. Similarly, California and western long-eared bats often used a number of Douglas-fir, grand fir, and western white pine trees in the same root-rot or white pine blister rust centre. Having several roost sites within a small area, and being able to reliably find them in a particular forest type (i.e., aspen patches) may minimize the costs of switching roosts, as search and travel times will be relatively low, and individuals need not explore unfamiliar areas.

The short distances between subsequent roost trees suggested that bats exhibit fidelity to a particular group of trees or area of forest rather than to any one particular tree (Brigham 1991, Lunney et al. 1995, Vonhof and Barclay 1996, Kalcounis and Brigham 1998), and that bats switch between roosts within this restricted area. However, for forest-dwelling bats, roost tree reuse has only been observed within years (e.g., Kurta et al. 1996; see Gerell and Lundberg 1985, Park et al. 1998 for bat box re-use between years). In this study, both silver-haired and big brown bats commonly reused tree roosts within and between years, such that fewer and fewer new roosts were found as the study progressed. Thus, forest-dwelling bats do not continually use new roost sites as they move around, but rather they use a limited number of roost trees in a given area. Furthermore, the groups of silver-haired bats that had been radio-tagged were compositionally stable within years, and banding returns between years showed that groups of females were returning as a group to the same patch of forest and using the same roost trees between years. Evidence for big brown bats is weaker, but follows the same pattern, with at least some individuals returning to the same roost trees and patches of forest between years. Clearly, this has important implications for the management of bat roosting habitat, as the trees used as roosts provide important habitat to the same bats over multiple years, and groups of bats roost in a very specific subset of trees.

## MANAGEMENT RECOMMENDATIONS

The POV supports an exceptionally diverse and abundant bat community. With reproductive populations of at least seven species and the presence of one blue-listed species, this region ranks second in British Columbia (surpassed only by parts of the Okanagan Valley) in bat species richness. Although little is known with respect to the ecological roles of insectivorous bats in temperate ecosystems, they are thought to play a vital role in the control of forest insect pests and in nutrient deposition and cycling within ecosystems (review in Machmer and Steeger 1995). The bat community present in the valley should therefore be viewed as a valuable, and to some extent, unexplored resource worthy of management attention and conservation.

Current and future resource development in the POV may potentially have an impact on the local bat fauna. The implications of existing resource uses are discussed below, and preliminary management recommendations for the conservation and enhancement of the bat community are provided. It should be noted that these recommendations are limited by information gaps on the local habitat requirements of some of the rarer and more difficult to study species, such as the Townsend's big-eared bat.

The quantity and quality of bat roosting habitat may also be impacted by hydroelectric developments in the POV. Although no additional impoundments are planned for the study area, the upgrade of the Seven Mile Generating Station and the expansion of the Waneta Plant will result in increased water level fluctuations in the Seven Mile Reservoir (at least until the Seven Mile and Waneta Reservoirs are in hydraulic balance). These further modifications to riparian habitat are expected to result in a decline in aquatic insect productivity in the valley (Pandion Ecological Research Ltd. 1994) and could therefore negatively affect bat (and other) species that utilize hatches of aquatic insects.

The Seven Mile upgrade, the Waneta expansion project, and the other hydroelectric power developments proposed for the area (e.g., Hugh Keenlyside Dam turbine installation, Border Dam, Murphy Creek Dam) will necessitate the clearing of large areas of forest cover for power line establishment. This will result in further fragmentation of forested habitat in the area around the Selkirk Substation and in surrounding areas tied to it by power lines. These habitat modifications are expected to directly impact tree-roosting bats and other forest-dwelling species. Power lines are often developed with little consideration of the kinds of forest that are removed, and many candidate roost trees will be directly eliminated by the clearing of power line swaths. In areas adjacent to the power lines, changes to forest structure (e.g., shifts in tree and shrub species composition) and microclimate may alter their suitability as roosting habitat. Edge creation may also lead to increased predation (as a result of greater access to roost trees and commuting bats) or localized increases in competition for existing tree cavities.

Some of these impacts may be offset by systematically retaining wildlife trees along the forested edge of established power lines. Trees in this area would normally be cut down in accordance with Worker's Compensation Board (WCB) and B.C. Hydro safety regulations. However, new wildlife/danger tree assessment procedures provide guidelines for retaining safe trees (i.e. trees that are sound or are leaning away from the work areas and are therefore not hazardous) in such scenarios. Wildlife trees should be assessed along power line boundaries in accordance with WCB safety regulations and all safe and sound trees should be retained. Special attention should be given to trees with excavated or natural cavities, trees of large size (DBH and height), and tree species of high wildlife habitat value (e.g., trembling aspen, grand fir, ponderosa pine, western white pine, Douglas-fir).

Forest-dwelling bats roost in trees of comparatively large size in hollow, crack or loose bark cavities. These features tend to be more common in older forests, which contain a greater abundance of large snags in a variety of decay classes (Cline et al. 1980, Rosenberg et al. 1988, Ohmann et al. 1994) and are characterized by reduced tree densities, more canopy gaps and less clutter (Franklin et al. 1981). Thomas (1988) and Crampton and Barclay (1998) found that bat activity was high in old-aged forest stands relative to younger stands immediately after sunset, suggesting that older stands were more important than other stand ages in terms of roosting opportunities for bats, and a number of studies have found that roost trees tend to be found in mature forest stands (Betts 1998, Ormsbee and McComb 1998, Vonhof and Wilkinson 1999). Contiguous stands consisting of older forest age classes are the ones targeted in timber harvesting operations, and forest clearcutting with snag removal in areas such as the Nine Mile Valley and the south side of the reservoir and more recently in the Tillicum Creek drainage, has removed a significant proportion of the available wildlife tree habitat. As a consequence, managed second growth stands are beginning to dominate in many areas. Relative to older forests, these stands are dense (due in part to fire suppression activities), and they have a reduced availability of wildlife trees. However, such forests may provide features similar to older forests if stands are spaced and if trees with suitable characteristics (large size, particular tree species, range of decay classes, excavated or natural cavities, loose bark, etc.) are retained.

Selective harvesting systems may be a more suitable approach than clearcutting to integrate forestry and bat habitat conservation. Cavity trees occur at relatively low densities in the study area, and careful attention must be paid to preserving this resource. Prescriptions which involve selective removal of understory trees while maintaining veteran and dominant trees (e.g., diameter limit cut) could reduce the level of clutter in dense second growth stands while preserving the largest and most valuable wildlife trees, and maintaining some degree of canopy cover and associated microclimate. Periodic low intensity burning in these selectively harvested stands would help maintain more open habitat over time. Other management techniques (e.g., tree topping with a feller buncher, tree girdling) could accelerate green tree decomposition and increase wildlife tree recruitment rates in forested areas, thereby enhancing habitat for all wildlife tree-using species, but these techniques are relatively labour intensive. However, cavity trees used by bats were most commonly live (decay stage 2), and a management process that retains a significant component of large trees, live and dead, will be the most useful in terms of maintaining bat roosting habitat in the long term.

Leaving relatively large patches of trembling aspen trees, which bats (this study, Crampton and Barclay 1998, Kalcounis and Hecker 1996, Kalcounis and Brigham 1998) and primary cavity excavators (e.g., Erskine and McLaren 1972, Winternitz and Cahn 1983, Harestad and Keisker 1989) strongly prefer, should be a management priority. The density of trembling aspen trees in the POV is relatively low, and thus areas that contain this species should be carefully managed. Bats in this study switched roosts regularly, and alternate roost trees were located within a relatively small area. Furthermore, bats appeared to move between several aspen patches, often using several trees within the same patch. Thus, in order to maintain bat roosting habitat, stands containing relatively large components of aspen (i.e., at least several aspen patches) should be protected, or at the very least patches of mature aspen should be included as part of wildlife tree patches in stands slated for timber removal. Protecting stands containing patches of trembling aspen will promote natural cavity formation and meet the requirements of primary cavity excavators, and thus likely provide the necessary range and number of suitable cavities to meet the needs of forest-dwelling bats.

Seven of the 92 big brown and silver-haired bat roosts found in this study were located in aspen trees retained in clearcuts, an additional nine roosts were situated in aspen trees on the edge of a clearcut or road, and approximately 30 trees were retained trees in second growth stands harvested in the last 80 years. This suggests that retaining large aspen trees in or on the edge of cutblocks may be a reasonable strategy to maintain at least some bat roosting habitat. Large aspen trees (large diameter or height) should be retained whenever possible within cutblocks, and wildlife tree patches should incorporate larger aspen trees or patches of aspen, regardless of whether they are situated in or along the edge of the cutblock. However, it is unlikely that retaining small numbers of trees in an open cutblock will provide the range or number of alternative trees necessary to meet the needs of bats that switch roosts regularly, as the majority of observed roosts were situated within forest stands, rather than in open areas. Thus, retaining large aspen trees in clearcuts should be used only to supplement management strategies that maintain bat roosting habitat within forest stands, and excessive habitat fragmentation or isolation of suitable wildlife tree patches should be avoided. Maintaining areas of contiguous forest with an abundance of potential alternative roost trees would likely meet the habitat needs of the two bat species investigated in this study, as well as other forest-dwelling bat species.

Unlike big brown and silver-haired bats, which tended to roost in cavities in aspen trees, all smaller-bodied bats roosted beneath loose bark in conifer snags in intermediate stages of decay. In order to meet the requirements of bats utilizing these alternate tree species and roost types, stands containing mixtures of live and dead-standing grand fir, western white pine, lodgepole pine, and Douglas-fir should also be maintained. Forest stands in riparian areas at lower elevations in the Tillicum Creek drainage contain a large component of standing dead western white pine, the east and west faces of the ridge between Tillicum Creek and Limpid Creek (see Figure 2) have extensive root rot centres, with large components of dead standing Douglas-fir and grand fir, while the south face has extensive patches of large aspen. These areas contain high densities of roost sites that should be protected from forest harvesting, potentially through the establishment of forest or ecological reserves. This would maintain roosting habitat for virtually all bat species in the POV. If timber harvesting does take place in these areas, wildlife trees of these species must be protected in wildlife tree patches. While maintaining patches of forest infected with root rot may seem at odds with current forestry practices, this process can easily be incorporated into existing forest management initiatives (Hope and McComb 1994, Steeger and Hitchcock 1998). Retaining wildlife trees and establishing wildlife tree patches are encouraged in the Forest Practices Code Biodiversity Handbook. Retaining patches of forest as "no work zones" will provide a more realistic distribution of snags and wildlife trees, while at the same time protecting forest workers from snag-related hazards and increasing the efficiency of logging operations, than single-tree retention (Hope and McComb 1994, Steeger and Hitchcock 1998). If wildlife tree patches that include areas of root rot, which are rich with cavity trees suitable for bats are planted with root rot resistant tree species, such as western larch or ponderosa pine, the spread of root rot should be minimized.

Because bats are secondary cavity-users, the sample of random trees in this study was limited to wildlife trees with cavities, and the tree and site characteristics of cavity trees differed significantly from wildlife trees without cavities. Bats must then select among the reduced subset of cavity trees when choosing a roost-site. It must be realized that cavity trees are a critically important subset of the wildlife tree component in forests, because they are essential for any secondary cavity-using species. Most management initiatives in B.C. do not take into account whether wildlife trees have cavities or not (e.g., in wildlife tree patches), and this may result in an overestimate of protected habitat, because not all protected wildlife trees will be suitable for cavity-using wildlife. The trees that the bats do use as roost-sites are made that much more important by the fact that individuals and groups return to the same patches of forest to use the same roost trees year after year. The loss of these trees may have serious consequences for the bats that use them.

Currently, populations of silver-haired and big brown bats in the POV are genetically diverse, with high levels of heterozygosity and no indication of significant inbreeding (Vonhof

1999). However, because of the importance of particular trees to entire groups of bats, and because of the genetic structure of social groups, bats are highly susceptible to habitat loss due to forestry or hydroelectric developments. Genetic diversity today is no guarantee against future loss of diversity in unprotected forests. Individuals (and groups) regularly moved between roost-sites, and over the course of a summer they may use upwards of 15-20 roosts trees located in a relatively small patch of forest (≤10ha). The group of bats using these trees are stable, are composed largely of females and their offspring or full siblings, and these groups may be genetically distinct from one another. One large or several small clearcuts in a restricted area may remove all of the roost trees used by a group in a particular area, and if logging takes place during the summer when the adult bats and their non-volant young are present, an entire set of genotypes could be lost from the population. Extensive logging over many years in any one area could have serious consequences for bat populations, both in terms of numbers of individuals as well as genetic diversity within populations. Harvesting during the winter would avoid the direct loss of individuals during logging operations, but it is unclear whether bats can adjust to large-scale habitat loss and find suitable habitat in other areas upon returning from hibernation or migration. It is thus vital that appropriate actions be taken to identify and protect cavity trees in areas that will be logged, and to conserve mature stands, which contain the sizes and types of cavity trees necessary to meet the needs of forest-dwelling bats.

Recent clearcutting in the Tillicum Creek watershed in the summer of 1998 is demonstrative of the problems faced in adequately modifying forest harvesting practices to take into account the needs of forest-dwelling bats. Five clearcuts were established over a 3 month period during the summer, when the bats were reproductive and non-volant juveniles were likely present within bat roosts. The clearcuts were intermediate to large in size (15-35ha) and closely spaced, with several clearcuts ≤ 200m apart, and thus a considerable proportion of forested habitat was removed in a relatively small area. Several wildlife tree patches were established within or along the edge of each clearcut, however, none of these patches contained any wildlife trees, and all of the large diameter live trees had been selectively removed, based on the presence of freshly cut, large stumps within these patches, leaving only trees <30cm in DBH. Two silver-haired bat roost trees, which were marked with wildlife tree signs and could have been included in wildlife tree patches, were felled, one within the clearcut and one as a danger tree along the boundary of the same clearcut. To support these clearcuts, extensive road development took place, including a major roadway leading to Fruitvale. This road system not only removed large amounts of trees, but also opened the forest to local firewood cutters. Nine species of bats occur in the POV, and all but one of these species utilize tree roosts to some degree. Based on the patterns of roost switching, roost reuse, and genetic structure of bat groups, these clearcuts and associated development may have resulted in the loss of several genetically distinct groups of bats of each species, either directly during logging operations or indirectly through the loss of their roosting habitat. If we broaden our perspective to encompass all forested ecosystems in B.C., we can see that current logging practices may severely impact populations of forest-dwelling bats. However, as discussed above, modifications which will decrease the impact of logging practices or even enhance bat roosting habitat are possible. Below are listed specific recommendations for the conservation and management of bat roosting habitat:

1. In areas with active logging, potential bat roost trees should be identified, and protected within wildlife tree patches or by avoiding them altogether. Potential roost trees may be easily identified on the basis of large diameter or height, the presence of cavities or loose bark, and suitable tree species (trembling aspen, Douglas-fir, western white pine, ponderosa

pine, and grand fir). Protecting patches of live trembling aspen trees or root-rot centres rich in Douglas-fir, grand fir, and lodgepole pine will provide the greatest number of cavities over the longest time, as these species are the most common species of cavity trees. Live trembling aspen trees are more likely to remain standing for longer periods, but for bark-roosting bats, snags in decay stages 4-6 generally provide the greatest numbers of cavities.

2. Forest patches with large numbers of suitable cavity trees should be protected to maintain bat roosting habitat. While these stands will most often consist of mature forest, which are the ones targeted by harvesting operations, they also encompass patches of trembling aspen trees, bark beetle outbreak areas, and root rot or white pine blister rust centres, which are not of high forestry value. These areas are normally designated as salvage logging sites with reduced stumpage fees, at the expense of large quantities of high quality habitat for bats and other wildlife tree using species.
3. Wildlife tree patches must contain trees of large size to be effective. While WCB regulations require that all danger trees be felled, not all wildlife trees are danger trees. Suitable wildlife trees should be assessed as to whether they can be retained in wildlife tree patches or along cutblock margins, and large live trees must be retained within wildlife tree patches to ensure a future supply of wildlife habitat.
4. Group selection or other selective logging practices which decrease the volume cut and increase the retention of trees should be encouraged. Prescriptions which involve selective removal of understory trees while maintaining veteran and dominant trees (e.g., diameter limit cut) could reduce the level of clutter in dense second growth stands while preserving the largest and most valuable wildlife trees, and maintaining some degree of canopy cover and associated microclimate. This strategy would provide greater numbers of large trees for

future wildlife tree recruitment and more favourable structural conditions (greater tree spacing, uneven age classes leading to a more broken canopy, etc.). Furthermore, it would reduce the likelihood of removing all of the roost trees used by social groups of bats, and could be used to promote the protection of identified roost trees, or at the very least potential roost trees.

5. Live trembling aspen trees should be retained within and along the margins of cutblocks to provide potential roost-sites for large-bodied bats.
6. The establishment of more than one clearcut at the same time in any particular forest stand should be avoided to minimize the likelihood of removing all suitable trees used by a group of bats.
7. Logging operations should be avoided during the time that bats are reproducing (last two weeks of June and first three weeks of July, for most species; see also Nagorsen and Brigham 1993) to avoid the direct loss of reproductive females and non-volant juveniles.
8. Wildlife tree signs should be applied to valuable wildlife trees (i.e. active roost or nest trees, trees of large size with excavated or natural cavities) along roadsides and in other highly accessible areas, and to all roost trees, to reduce the impact of firewood cutting. Signage which requests the public to refrain from cutting large size trees (i.e. >40cm DBH) with features of value to wildlife (e.g., excavated or natural cavities, loose bark, conks, etc.) should be posted at focal points in the valley (recreation sites, bridges, Seven Mile Dam, etc.). Additional signage which points out the abundant and diverse bat community in the valley and basic aspects of their biology would be an important and valuable means of educating the public about bats and their habitat needs.

## RECOMMENDATIONS FOR FUTURE RESEARCH

### 1. Surveys of bats in the POV and surrounding areas.

Regular monitoring of bat populations in the POV will provide necessary information on population fluctuations of the various bat species between years. It is also the only way to determine whether a significant population of Townsend's big-eared bat is present in the valley, and whether other blue- or red-listed species are present. Consideration should be given to extending these surveys into the Columbia River Valley, extending from the U.S. border north past Trail. This valley is more arid, and the slopes are rockier and more sparsely forested than the POV. The Columbia River Valley may be more likely to support blue- and red-listed species such as fringed bats (*M. thysanodes*), Townsend's big-eared bats, western small-footed bats (*M. ciliolabrum*), and possibly (but unlikely) spotted bats (*Euderma maculatum*) or pallid bats (*Antrozous pallidus*), which are generally found in more arid ecosystems. The fact that a Townsend's big-eared bat roost was located in less than three hours searching in the Fort Sheppard's Flats area lends support to this recommendation.

### 2. Surveys for hibernation sites.

Little information is available on the whereabouts of bat hibernacula in British Columbia (Nagorsen and Brigham 1993). Canadian bats spend up to eight months in their hibernacula each year and the conditions within these hibernacula must fit exact criteria for the bats to survive through the winter (Thomas et al. 1990). Hibernating bats are susceptible to disturbance (Thomas 1995), and protection of hibernation sites is essential. The POV has a rich mining history and hundreds of abandoned mines are scattered in the POV and surrounding valleys. Some of these addits or tunnels may provide suitable habitat for roosting or hibernating bats, and, indeed, of six mines and caves surveyed in this study, two were found to contain bats, both of which were the blue-listed Townsend's big-eared bat. Conducting bat surveys at abandoned mines scattered throughout the POV, Columbia River Valley and the Salmo Valley would be a reasonable first approach in investigating possible local bat hibernacula. Surveys conducted at mine entrances using broadband bat detectors (e.g., Anabat Detector Systems) should be initiated in the fall when bats are entering and swarming around their hibernacula. Any hibernacula reported by members of the general public or as a result of surveys should receive appropriate protection, in the form of gating and appropriate signage.

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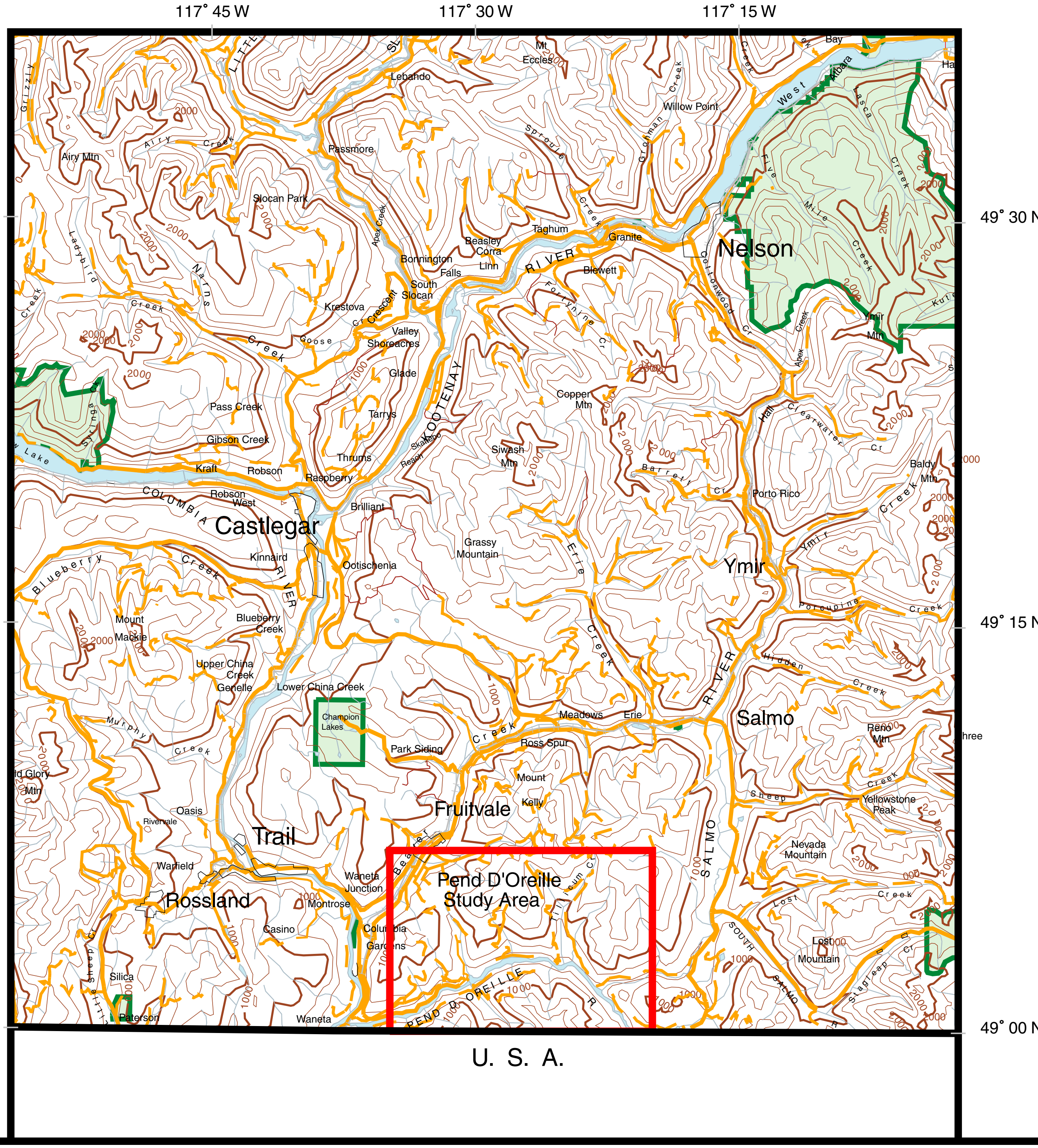


Figure 1. The Pend D'Oreille Valley (POV) study area

0 10 20 30 40 50 km

Scale: 1:400,000 - Map Projection: UTM Zone 11 - Datum: NAD 83

Columbia Basin Fish and Wildlife Compensation Program -- December 10, 2000

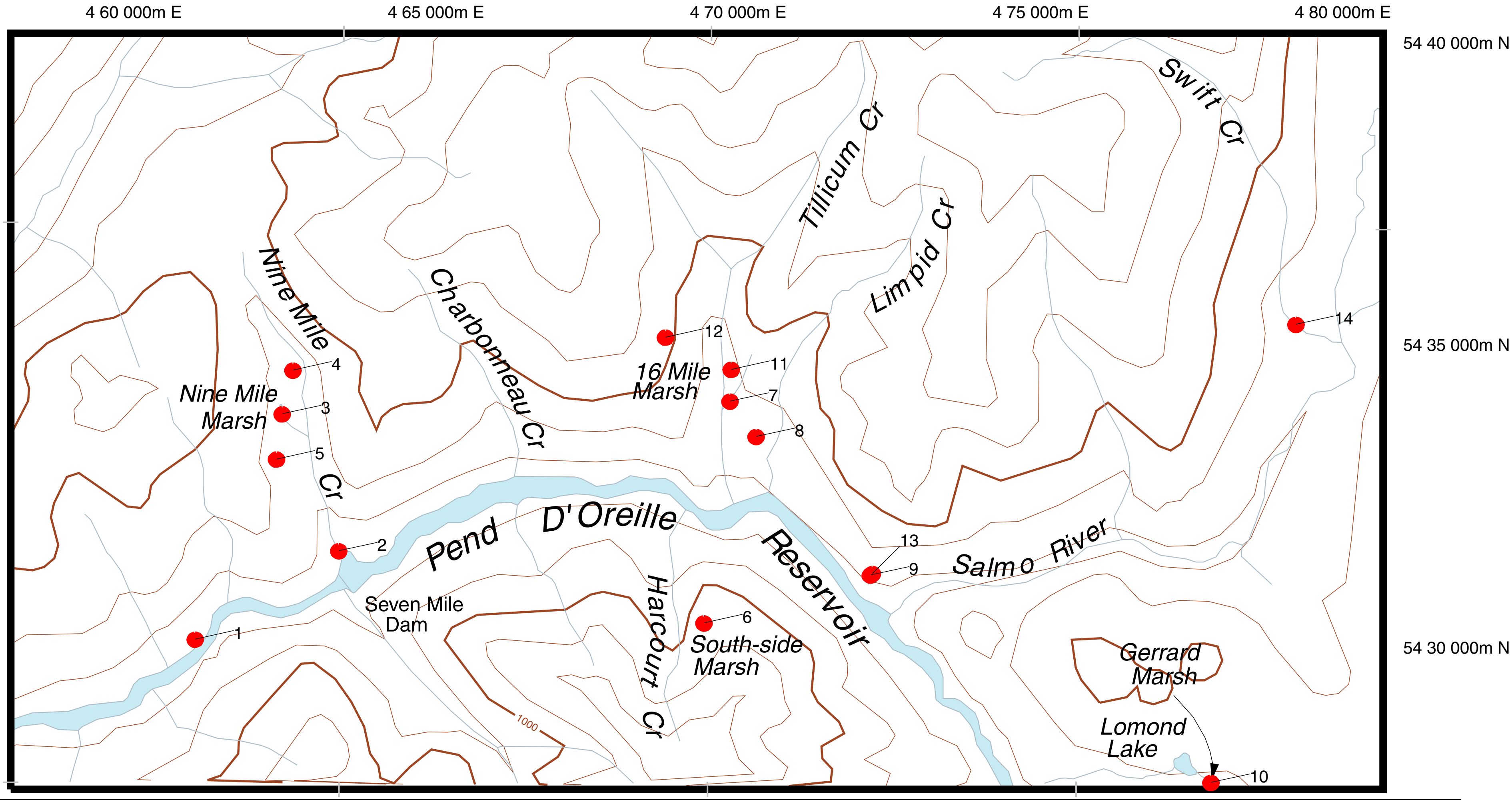


Figure 2. Netting sites in the P0V study area

● Netting and/or Harp-trapping Site - refer to Appendix 1

0 5 10 15 km

Scale: 1:100,000 - Map Projection: UTM Zone 11 - Datum: NAD 83

Columbia Basin Fish and Wildlife Compensation Program GIS -- December 10, 2000

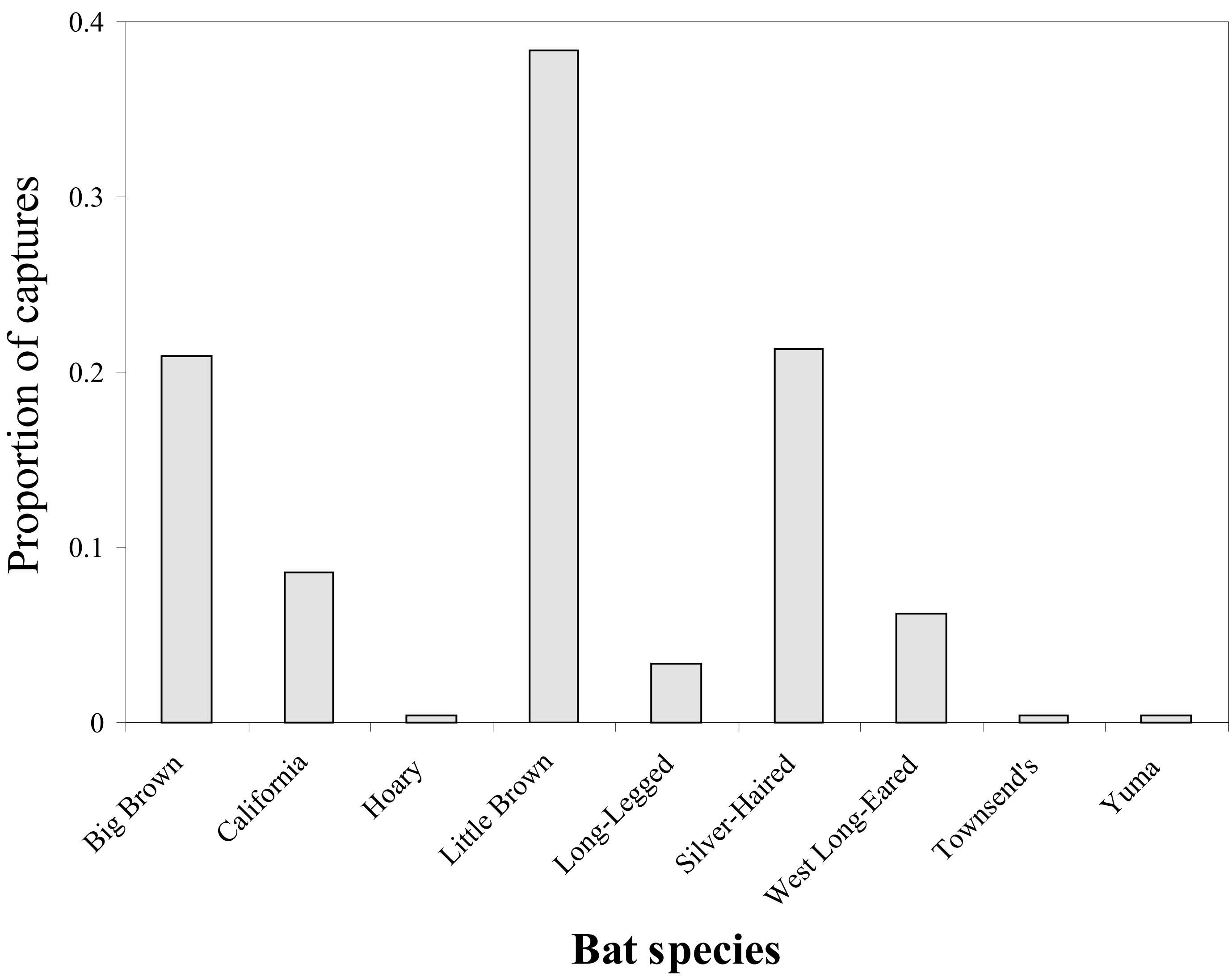


Figure 3. Proportion of total number of bats captured in 1994-98 represented by each bat species.

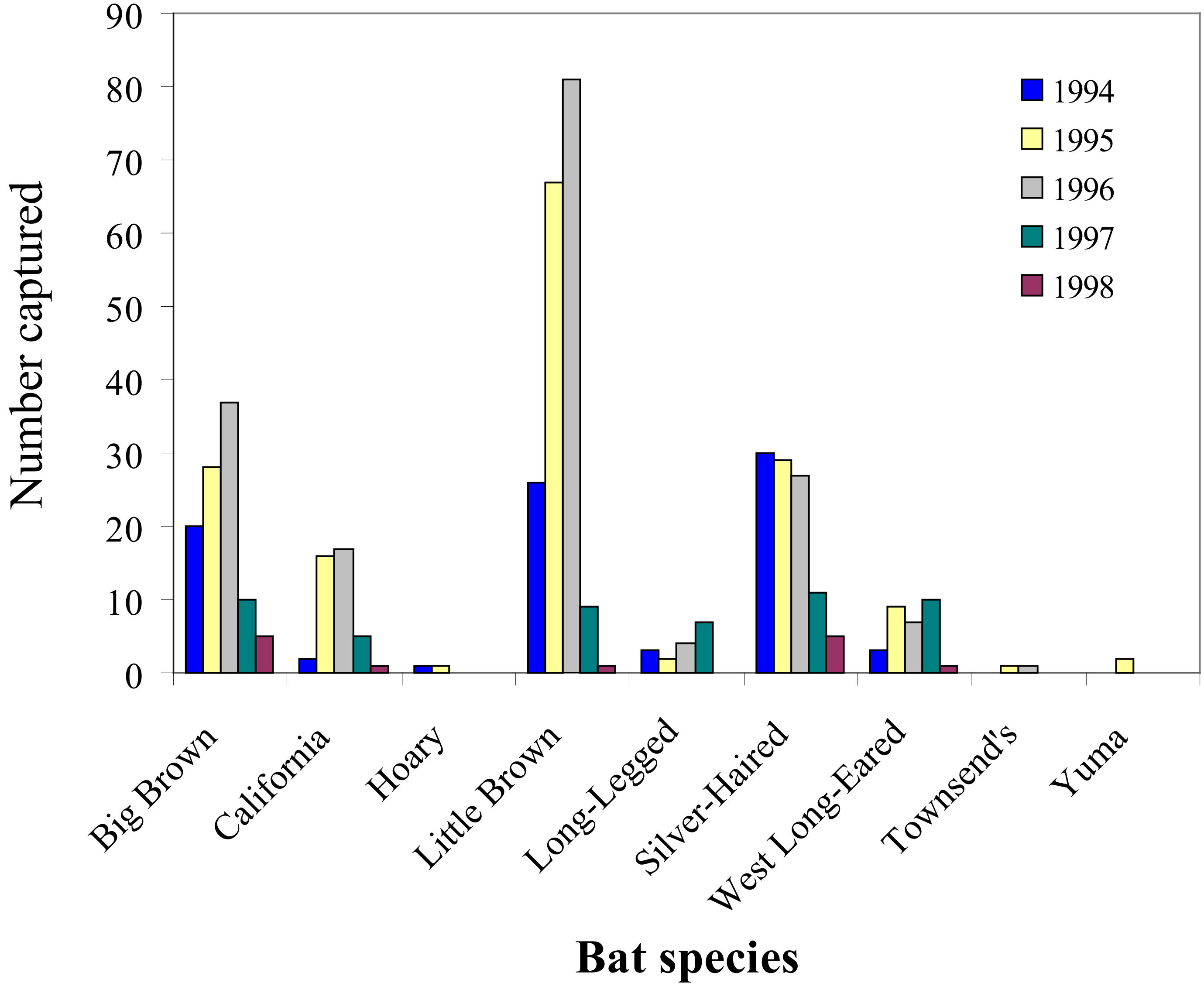


Figure 4. Number of bats of each species captured in 1994-98.

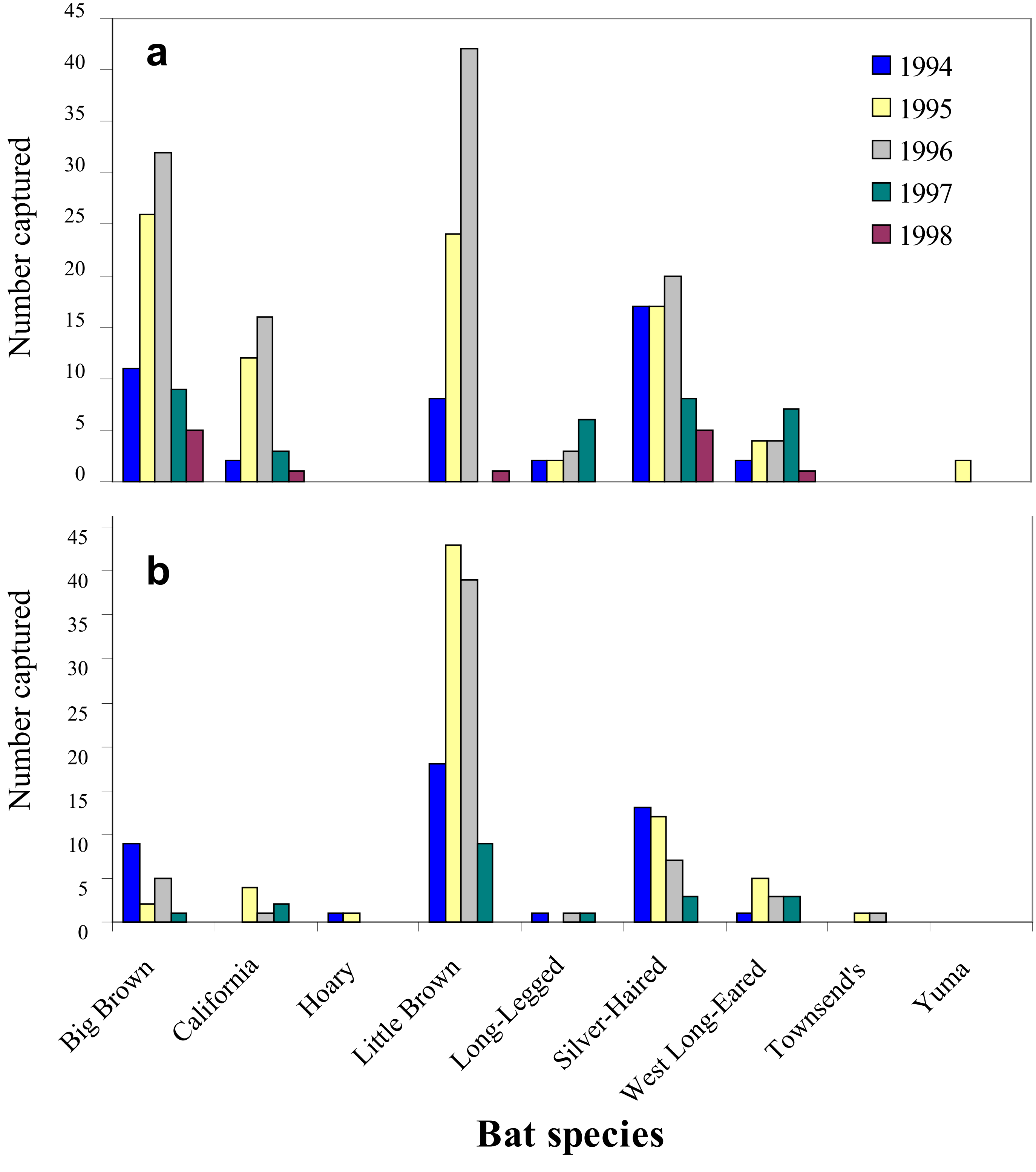


Figure 5. Number of female (a) and male (b) bats of each species captured in 1994-98.

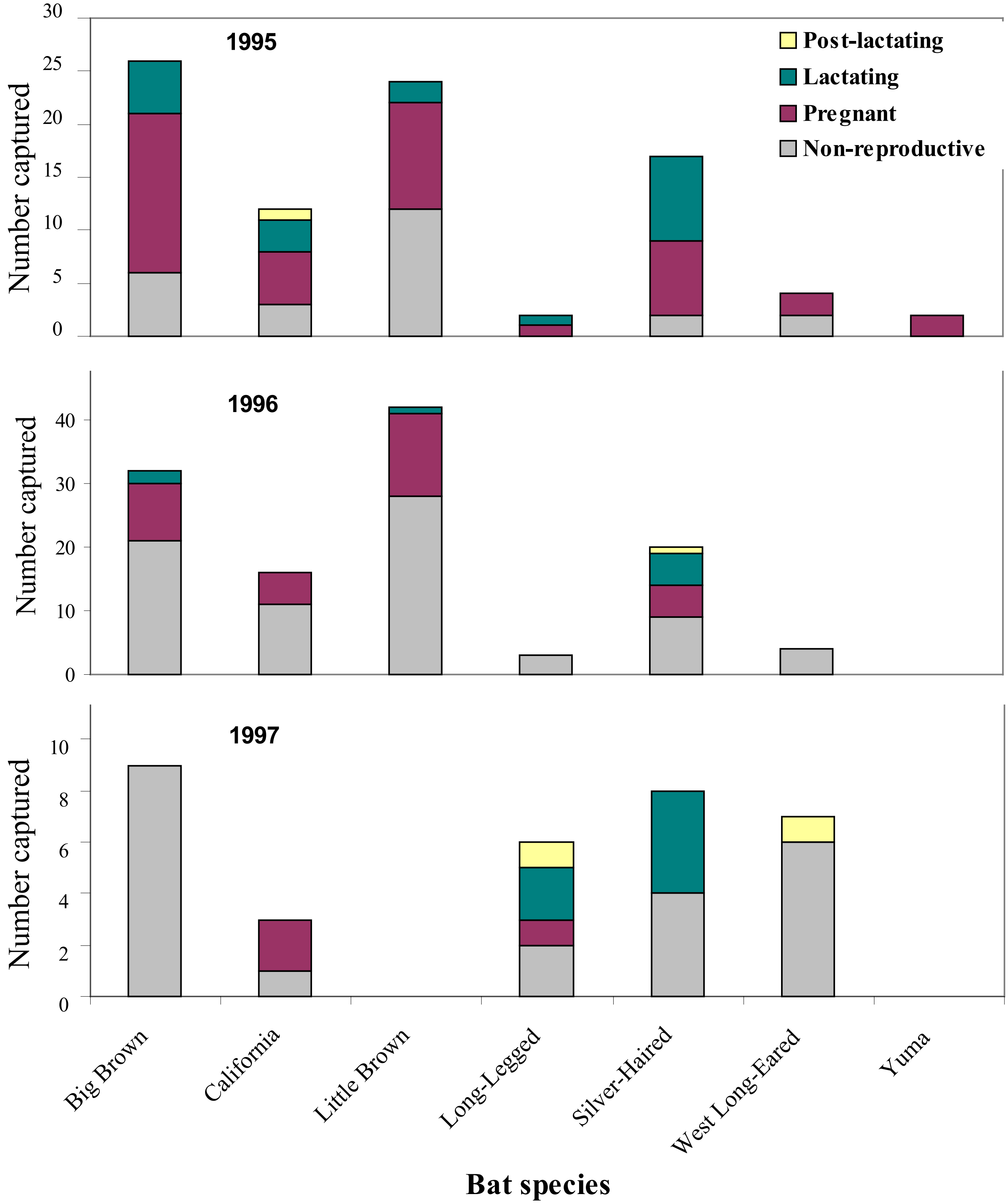


Figure 6. Number of female bats of each species captured in 1995-97, indicating reproductive condition.

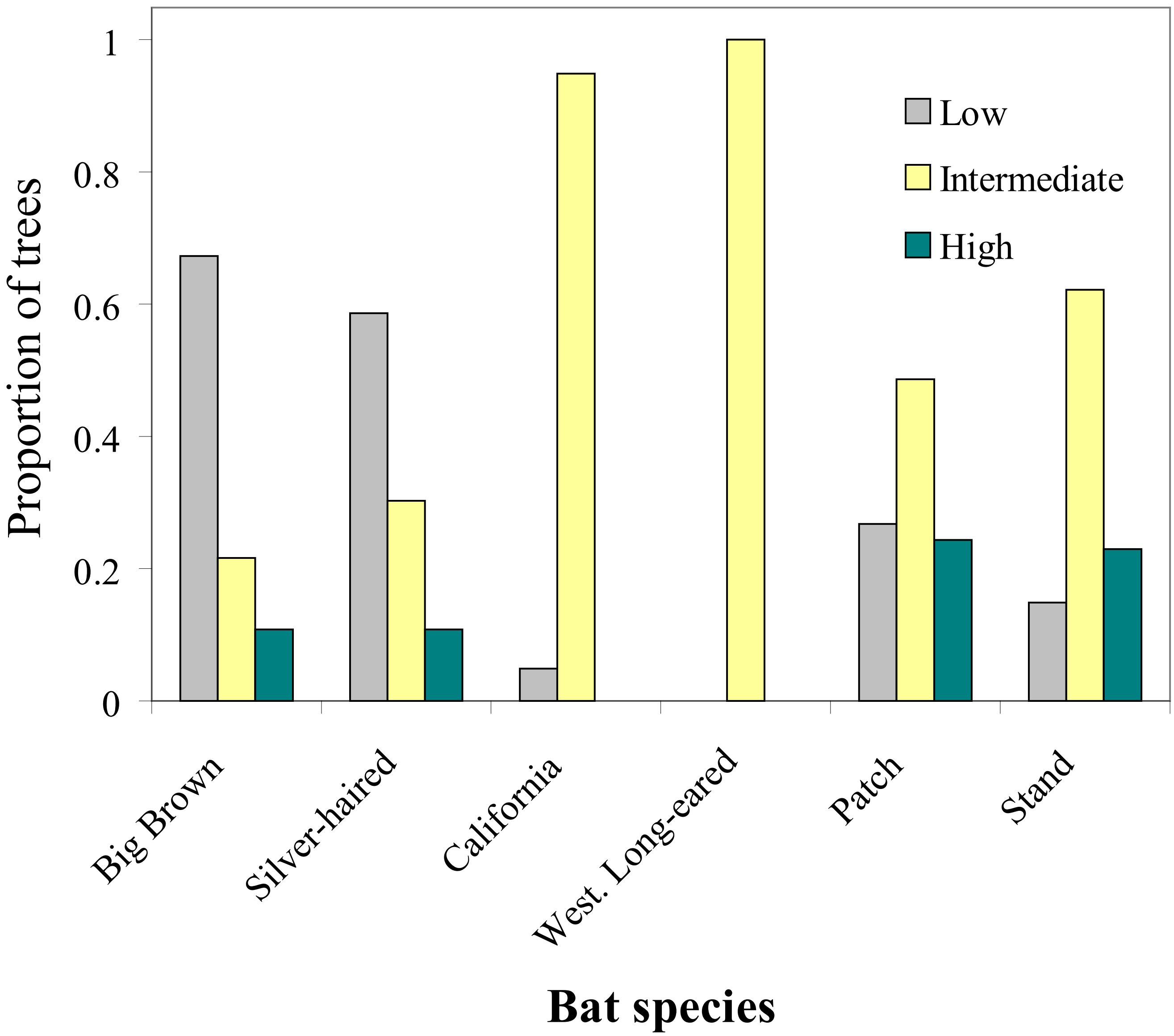


Figure 8. The proportion of big brown, silver-haired, California, and western long-eared bat roost trees, and cavity trees from the level of the patch and stand, in each of the three stages of decay.

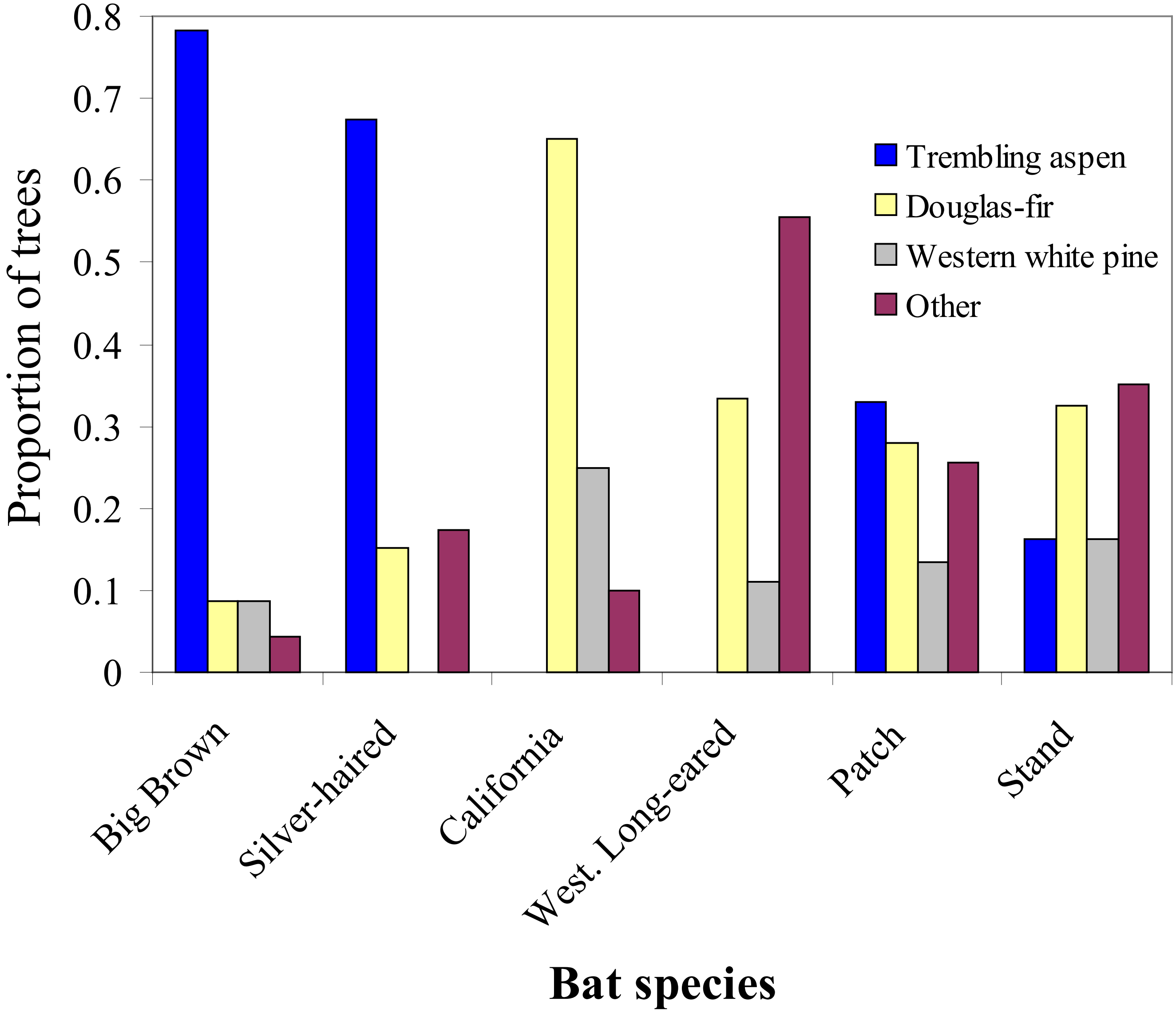


Figure 9. The proportion of bat roost trees, and cavity trees from the level of the patch and stand in each of the three tree species most commonly used in the POV. Tree species that accounted for less than 15% of roosts for any one bat species are grouped into the other category, including grand fir, lodgepole pine, yellow pine, western larch, western red cedar, western hemlock, and paper birch.

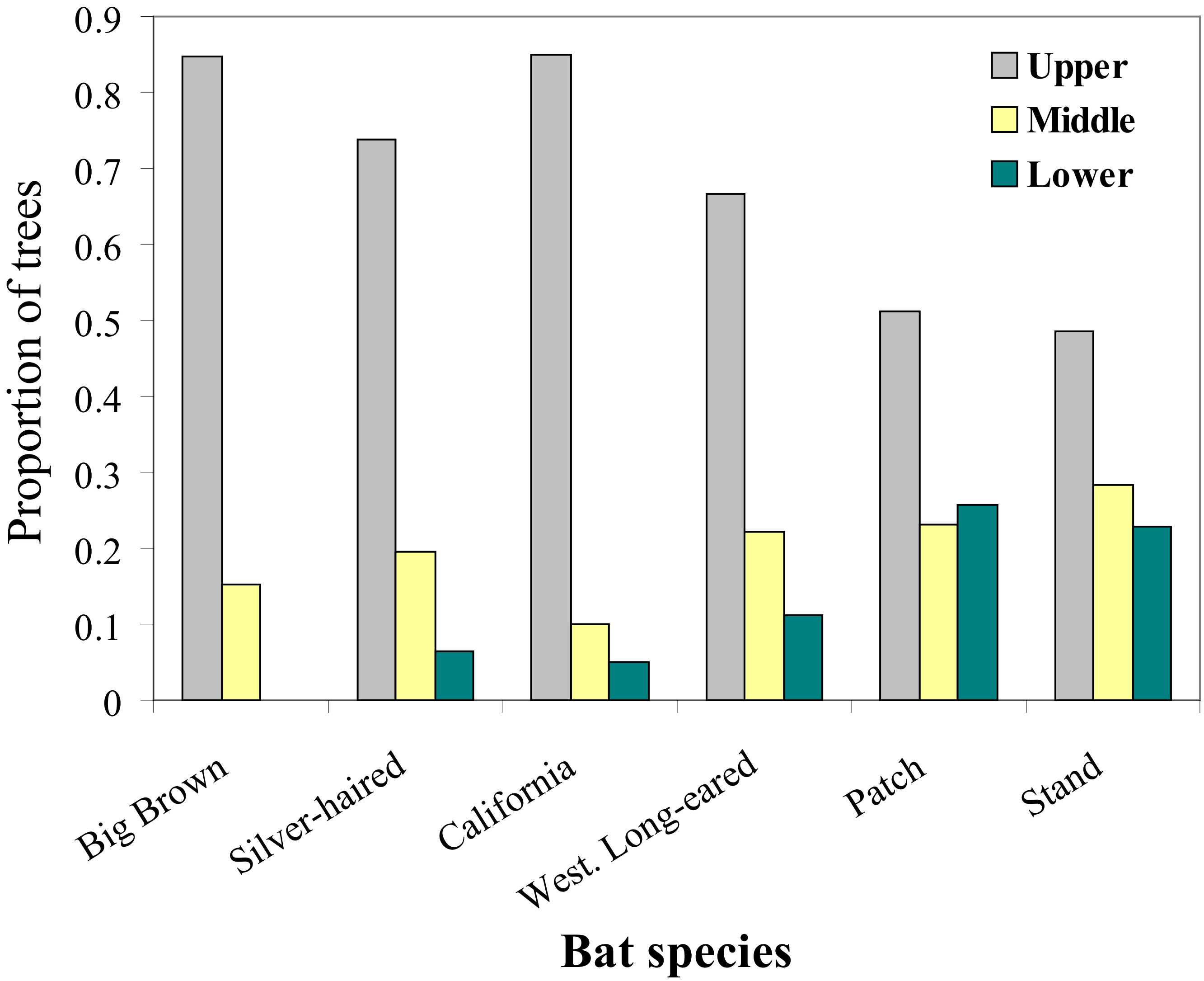


Figure 10. The proportion of big brown, silver-haired, California, and western long-eared bat roost trees, and cavity trees from the level of the patch and stand, in each of the three tree layers.

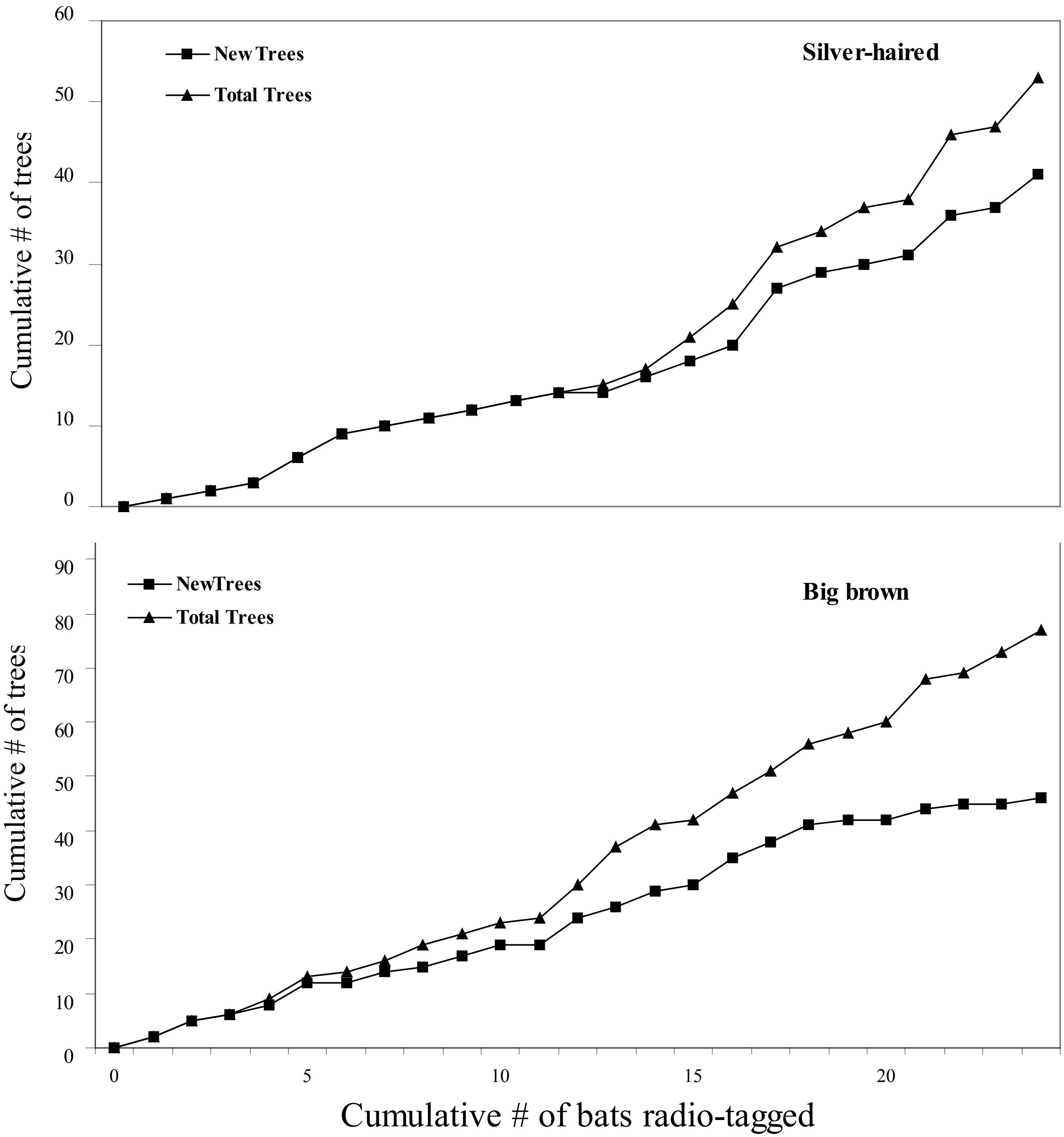


Figure 11. The cumulative number of new trees found relative to the cumulative total trees (new and reused) found as more bats were radio-tagged for silver-haired bats (top) and big brown bats (bottom).

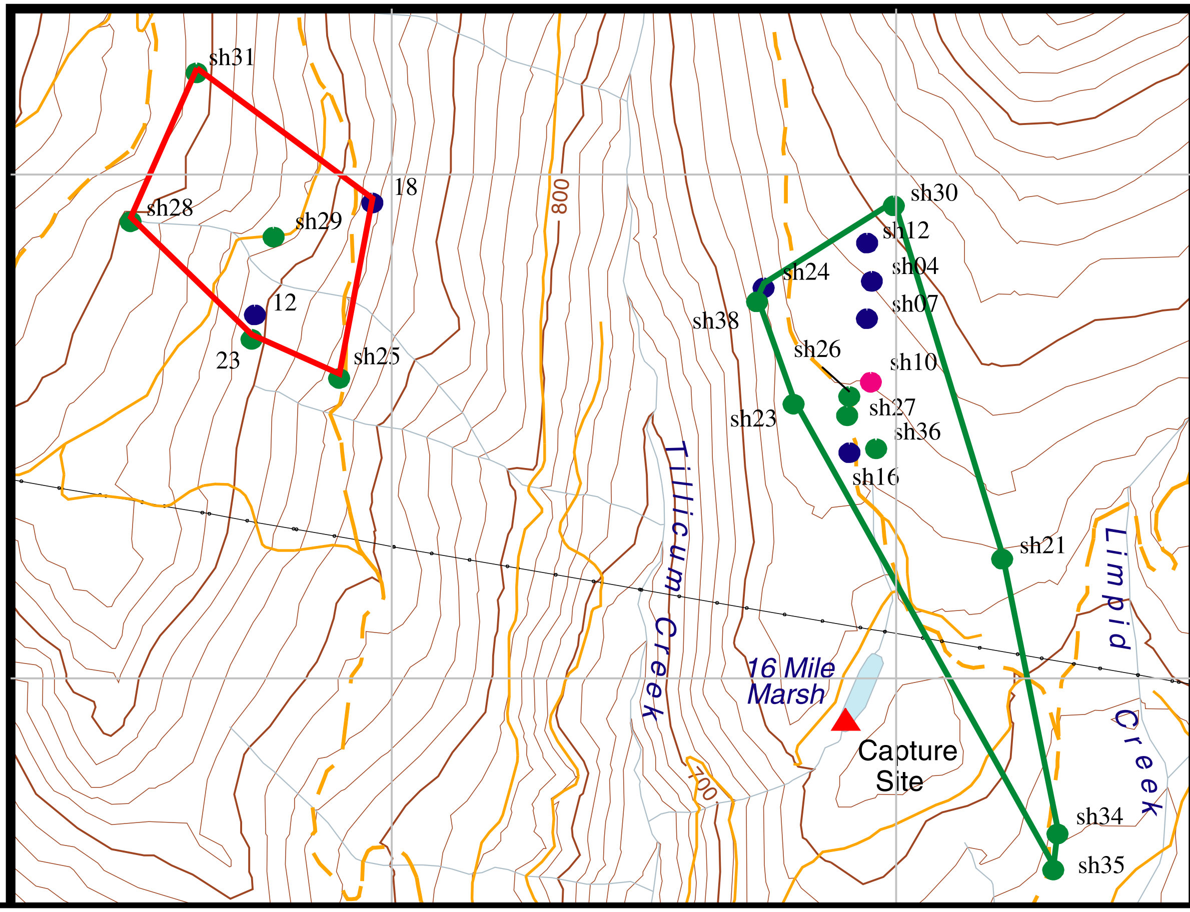


Figure 12. Roost trees in the POV used by silver-haired bat groups sh25 and sh12

Bat Group Home Ranges

sh25 - 16.17 ha    sh12 - 26.74 ha

Roost Trees: Number of Years Used

1    2    3

0    1    2    3 km

Scale 1:15000 - Projection UTM Zone 11 - Datum NAD 83 - Contour Interval 20m
Columbia Basin Fish and Wildlife Compensation Program GIS -- December 10, 2000

Table 1. Tree and site characteristics measured for roost and cavity trees.

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<u>Tree Characteristics:</u>

Categorical:

- Tree Species
- Decay Stage
- Tree Layer
- Top Condition (Present vs. Broken)

Continuous:

- Tree Height
- Diameter at Breast Height (DBH)
- Number of Limbs Remaining
- Percent Bark Remaining
- Distance to Nearest Wildlife Tree
- Distance to Nearest Neighbouring Tree
- Height of Nearest Neighbouring Tree
- Distance to Nearest Tree of Same or Greater Height
- Height of Nearest Tree of Same or Greater Height

<u>Site Characteristics:</u>

- Slope
- Canopy Height
- Percent Canopy Closure
- Number of Canopy Layers
- Number of Wildlife Trees (in the 0.1ha plot around the tree)
- Number of Deciduous Trees (in the 0.1ha plot around the tree)
- Number of Coniferous Trees (in the 0.1ha plot around the tree)

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Table 2. Netting and harp trapping sites in the POV where each species of bat was captured during the summers of 1994-98. Site numbers correspond with numbers in Figure 2 and those listed in Appendix 1.

| Bat Species | Sites Captured At |
|---|---|
| Big brown | 3, 6, 7, 14 |
| California | 3, 6, 7, 8, 11 |
| Hoary | 3 |
| Little brown | 1, 2, 3, 6, 7, 10, 11 |
| Long-legged | 7, 8, 11 |
| Silver-haired | 3, 6, 7, 10 |
| Townsend's big-eared | 8, 13, 14 |
| Western long-eared | 3, 6, 7, 11 |
| Yuma | 1 |

Table 3. Earliest capture dates of reproductive females of the various bat species captured in the POV during the summers of 1995-97. 1994 and 1998 are excluded because surveys took place for brief periods only. Blanks indicate missing values.

| | Pregnant | | | Lactating | | |
|---|---|---|---|---|---|---|
| Bat Species | 1995 | 1996 | 1997 | 1995 | 1996 | 1997 |
| Big brown | June 16 | July 1 | | July 17 | July 23 | |
| California | July 3 | July 8 | July 7 | | July 28 | |
| Hoary | | | | | | |
| Little brown | June 30 | July 1 | | July 19 | July 20 | |
| Long-legged | July 15 | | July 22 | July 28 | | August 1 |
| Silver-haired | July 6 | June 26 | | July 19 | July 21 | July 16 |
| Townsend's big-eared | | | | | | |
| Western long-eared | June 30 | | | | | |
| Yuma | July 4 | | | | | |

Table 4. Means and SD's for tree characteristics of silver-haired (*N* = 46), big brown (*N* = 46) California (*N* = 20), western long-eared (*N* = 9), and long-legged (*N* = 3) bat roost trees.

| | Silver-haired | | Big Brown | | California | | Western Long-eared | | Long-legged | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Diameter at Breast Height (cm) | 40.0 | 13.43 | 49.0 | 15.60 | 56 | 14.2 | 38 | 12.8 | 52 | 17.5 |
| Tree Height (m) | 23.7 | 8.36 | 29.4 | 9.04 | 29 | 6.7 | 25 | 9.8 | 32 | 4.0 |
| Tree Height Relative to Canopy Height (m) | -2.4 | 8.76 | 1.6 | 9.17 | -0.2 | 5.55 | -2.8 | 7.35 | 0.4 | 2.72 |
| Percent Bark Remaining | 93 | 17.6 | 90 | 23.3 | 70 | 28.0 | 87 | 16.0 | 62 | 29.3 |
| Distance to Nearest Neighbouring Tree (m) | 2.2 | 1.60 | 2.3 | 1.80 | 2.1 | 1.71 | 2.5 | 1.45 | 3.3 | 1.57 |
| Height of Nearest Neighbouring Tree (m) | 19 | 8.5 | 20 | 8.5 | 16 | 8.3 | 22 | 10.8 | 18 | 10.6 |
| Angle between Roost and Nearest Neighbouring Tree | 9.0 | 9.19 | 7.8 | 7.67 | 8.3 | 7.18 | 8.9 | 9.10 | 15.8 | 16.12 |
| Distance to Nearest Tree of Same or Greater Height (m) | 7.3 | 5.74 | 9.0 | 8.01 | 6.6 | 3.86 | 7.6 | 4.30 | 7.8 | 7.23 |
| Height of Nearest Tree of Same or Greater Height (m) | 23 | 7.4 | 25 | 6.5 | 26 | 8.1 | 27 | 7.8 | 31 | 2.2 |
| Angle between Roost and Nearest Tree of Same or Greater Height | 18.3 | 13.44 | 19.1 | 16.46 | 14.7 | 8.24 | 16.8 | 11.29 | 13.4 | 12.00 |
| Distance to Nearest Wildlife Tree | 6.4 | 4.83 | 5.9 | 4.20 | 5.8 | 4.56 | 4.1 | 3.24 | 9.0 | 5.99 |

Table 5. Means and SD's for site characteristics of silver-haired ($N = 46$), big brown ($N = 46$) California ($N = 20$), western long-eared ($N = 9$), and long-legged ($N = 3$) bat roost trees. The number of wildlife trees includes both cavity and non-cavity wildlife trees.

| | Silver-haired | | Big Brown | | California | | Western Long-eared | | Long-legged | |
|---|---|---|---|---|---|---|---|---|---|---|
| Variable | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| Slope | 14 | 9.2 | 16 | 8.7 | 23 | 9.1 | 13 | 9.4 | 15 | 2.3 |
| Percent Canopy Closure | 42 | 28.1 | 38 | 23.2 | 35 | 26.9 | 40 | 25.1 | 47 | 19.5 |
| Canopy Height (m) | 26 | 5.3 | 28 | 5.0 | 30 | 5.2 | 28 | 8.1 | 32 | 1.4 |
| Number of Canopy Layers | 2.2 | 0.54 | 2.4 | 0.58 | 2.3 | 0.57 | 2.6 | 0.53 | 2 | 0 |
| Deciduous Tree Density (#/ha) | 11 | 9.0 | 14 | 10.5 | 11 | 13.1 | 7 | 6.1 | 1 | 6.7 |
| Coniferous Tree Density (#/ha) | 23 | 18.6 | 16 | 12.3 | 20 | 14.1 | 18 | 9.5 | 10 | 5.7 |
| Wildlife Tree Density (#/ha) | 7 | 7.4 | 8 | 5.6 | 7 | 3.7 | 7 | 3.5 | 7 | 5.3 |

Table 6. The number of roosts used by each bat species in different types of cavities.

| Cavity Type | Silver-Haired | Big Brown | California | Western Long-eared | **Total** |
|---|---|---|---|---|---|
| Natural hollow | 12 | 15 | 1 | 0 | **28** |
| PCE hollow | 27 | 16 | 2 | 0 | **45** |
| Loose bark | 4 | 8 | 15 | 9 | **36** |
| Crack | 3 | 4 | 2 | 0 | **9** |
| Unknown | 0 | 3 | 0 | 0 | **3** |
| **Total** | **46** | **46** | **20** | **9** | **121** |

Table 7. Summary of multiple logistic regression analysis comparing wildlife trees with cavities and trees without cavities. The –2 log-likelihood value is measures the change in the ability of the model to explain the data if the variable is removed, a higher number indicating an increased importance of the variable in explaining the difference between groups. A positive slope indicates that an increase in the independent variable results in an increased likelihood of belonging to the group of cavity trees. Overall, 72.9% of trees were correctly classified.

| Variable | -2 Log-Likelihood | Slope |
|---|---|---|
| Percent Bark Remaining | 33.94*** | -0.03 |
| DBH | 21.51*** | 0.05 |
| Trembling Aspen | 19.58*** | 0.82 |
| Upper Tree Layer | 5.53* | 0.39 |
| Intercept | | 1.24 |

* $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

Table 8. Variables that significantly discriminated between roost and random cavity trees at the level of the patch and stand for four species of bats, based on stepwise logistic regression. Numbers are regression coefficients (slopes), and asterisks indicate levels of significance [a]. A positive slope indicates that an increase in the independent variable results in an increased likelihood of belonging to the group of roost trees. For the Hosmer-Lemeshow Goodness-of-Fit test, a non-significant result indicates good fit. The overall percent correctly classified is the number of roost and random trees correctly classified by the logistic regression analysis.

| | Silver-Haired | | Big Brown | | California | | Western Long-eared | |
|---|---|---|---|---|---|---|---|---|
| Variable | Patch | Stand | Patch | Stand | Patch | Stand | Patch | Stand |
| Aspen | | 0.94** | 1.69*** | 2.37*** | | | -1.38* | |
| Douglas-fir | | | | | | 2.87*** | | |
| Western White Pine | | | | | | | | |
| Low Decay Stage | 1.22*** | 1.61*** | | | | | | |
| Intermediate Decay Stage | | | -1.02* | | 2.78*** | | 7.51** | 7.96** |
| High Tree Layer | | | | | | | | |
| Middle Tree Layer | | | 1.87** | | | | | |
| Top Present | | | | | | | | |
| Tree Height (m) | | | 0.20*** | 0.18*** | 0.09* | 0.18*** | | |
| Diameter at Breast Height (cm) | | 0.06** | | 0.13*** | 0.06** | | | |
| Percent Bark Remaining | | | | 0.06* | | -0.03* | | |
| Number of Limbs Remaining | -0.04*** | -0.07*** | | -0.07*** | | | | |
| Angle Between Roost and Nearest Neighbouring Tree | | | | | | | | |
| Angle Between Roost and Nearest Tree of Same or Greater Height | | | | | | | | |
| Distance to Nearest Wildlife Tree | | -0.12** | | -0.10* | | | | |
| Intercept | -0.14 $^{ns}$ | -0.96 $^{ns}$ | -6.71*** | -13.89*** | -8.93*** | -4.37** | -9.64 $^{ns}$ | -9.52 $^{ns}$ |
| Hosmer-Lemeshow Goodness-of-Fit | 3.80 $^{ns}$ | 3.32 $^{ns}$ | 6.05 $^{ns}$ | 5.28 $^{ns}$ | 12.52 $^{ns}$ | 4.49 $^{ns}$ | 0.14 $^{ns}$ | 0.01 $^{ns}$ |
| Overall Percent Correctly Classified | 70.9 | 76.9 | 80.3 | 91.5 | 86.0 | 88.9 | 90.0 | 88.8 |

[a] ns = not significant, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

Table 9. Site characteristics that significantly discriminated between roost and random cavity trees at the level of the stand for four species of bats, based on stepwise logistic regression. Numbers are regression coefficients (slopes), and asterisks indicate levels of significance [a]. A positive slope indicates that an increase in the independent variable results in an increased likelihood of belonging to the group of roost trees. For the Hosmer-Lemeshow Goodness-of-Fit test test a non-significant result indicates good fit. The overall percent correctly classified is the number of roost and random trees correctly classified by the logistic regression analysis.

| | Silver-Haired | Big Brown | California | Western Long-eared |
|---|---|---|---|---|
| Slope | -0.05* | | 0.06* | |
| Canopy Height (m) | | | 0.11* | |
| Number of Canopy Layers | | 0.86** | | |
| Number of Deciduous Trees | | | | |
| Number of Coniferous Trees | | -0.04** | | |
| Number of Wildlife Trees | | | | |
| Intercept | 0.24 $^{ns}$ | -1.69* | -5.48*** | |
| Hosmer-Lemeshow Goodness-of-Fit | 11.68 $^{ns}$ | 4.97 $^{ns}$ | 13.29 $^{ns}$ | |
| Overall Percent Correctly Classified | 66.4 | 68.1 | 79.8 | |

[a] ns = not significant, * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

Table 10. Densities of the various species of cavity and non-cavity wildlife trees, and live coniferous and deciduous trees in the POV. Based on 288 and 198 plots for non-cavity and cavity trees, respectively. Cavity tree densities are based on plots done in 1996-97 only.

| | Cavity Trees (# / ha) | | Non-Cavity Trees (# / ha) | |
|---|---|---|---|---|
| Tree Species | mean | SD | mean | SD |
| Douglas-fir | 7.9 | 14.01 | 22.8 | 32.66 |
| Douglas maple | 0 | 0 | 4.9 | 16.00 |
| Engelmann spruce | 0 | 0 | 0.1 | 0.80 |
| Grand fir | 5.3 | 26.52 | 8.0 | 25.60 |
| Lodgepole pine | 2.1 | 7.58 | 2.3 | 13.92 |
| Paper birch | 0.4 | 1.97 | 6.0 | 12.0 |
| Ponderosa Pine | 0.3 | 1.87 | 0.2 | 1.75 |
| Trembling aspen | 9.2 | 19.55 | 7.9 | 18.00 |
| Subalpine fir | 0 | 0 | 0.4 | 5.50 |
| Western red cedar | 1.1 | 4.25 | 3.0 | 9.80 |
| Western Hemlock | 0.3 | 2.45 | 0.5 | 2.79 |
| Western larch | 0.8 | 4.83 | 2.5 | 10.47 |
| Western white pine | 3.7 | 9.82 | 3.4 | 9.30 |
| Total Available Trees | 31.0 | 35.64 | 62.0 | 54.88 |
| Live Conifers | 229 | 197.0 | | |
| Live Deciduous | 110 | 115.2 | | |

Table 11. Long-term stability in the SH12 social group of silver-haired bats. Data are the number of bats captured each year for the first time (first diagonal, bold) later recaptured as part of the same social group in subsequent years. Total group sizes are provided for comparison. Tree locations are found in Figures 7 and 12.

| Year First Captured: | Tree Captured In: SH12 (1996) | SH21 (1997) | SH35 (1998) |
|---|---|---|---|
| 1996 | **12** | 7 | 5 |
| 1997 | | **12** | 8 |
| 1998 | | | **3** |
| Total # of Bats in Group | 12 | 19 | 16 |

Appendix 1. Location of the netting and harp-trapping sites in the POV.

| # | Name | Years Used | Location | UTM Easting | UTM Northing |
|---|---|---|---|---|---|
| 1 | Waneta Reservoir | 95-96 | Main valley | 461053.53 | 5429983 |
| 2 | Seven Mile Reservoir | 94-95 | Main valley | 463195.72 | 5431474.5 |
| 3 | Handley Marsh | 94-95 | 9 mile valley | 462493.16 | 5433709.5 |
| 4 | Substation Marsh | 95 | 9 Mile valley | 462670.09 | 5434432.5 |
| 5 | Clearcut | 95 | 9 Mile valley | 462398.94 | 5432961.5 |
| 6 | Harcourt Marsh | 95-96 | South Side | 469469.69 | 5430252 |
| 7 | 16 Mile Marsh | 94-98 | Tillicum Creek valley | 469900.38 | 5433919 |
| 8 | 16 Mile Road by cabin | 94-97 | Tillicum Creek valley | 470331.97 | 5433334.5 |
| 9 | Joan Smith's Pond | 96 | Salmo River valley | 472222.13 | 5431043 |
| 10 | Gerrard's Pond | 96-97 | Nelway | 477854.34 | 5427614 |
| 11 | 16 Mile Road above marsh | 97 | Tillicum Creek valley | 469920.78 | 5434445.5 |
| 12 | 15 Mile Road | 97 | Tillicum Creek valley | 468834.06 | 5434978 |
| 13 | Joan Smith's Shed | 97 | Salmo River valley | 472254.78 | 5431068.5 |
| 14 | Maloney's Mine | 96 | Salmo River valley | 479260.84 | 5435188.5 |

Appendix 2. Capture data for all bats captured in the POV between 1994-98. Table is sorted in descending order by bat species, age, sex, year, and reproductive condition. Netted: netted=0 refers to bats captured at their roost site, 1=bats captured in mistnets or harp traps while flying. Sex: f=female, m=male. RC: l=lactating, p=pregnant, pl=post-lactating, nr=non-reproductive, sc=scrotal, et=enlarged testes, set=slightly enlarged testes. Age: a=adult, j=juvenile. Only big brown and silver-haired bats were banded. Location numbers refer to Figure 2 and Appendix 1. Locations of tree roost-sites are found in Figure 7. Blanks indicate missing values.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96 | 6 | 28 | 96-05 | 0 | Big Brown | f | nr | a | | | 9104 | Tree 96-BB-01 | |
| 96 | 7 | 29 | 96-202 | 0 | Big Brown | f | nr | a | 16.75 | 49.1 | 9189 | Tree 96-BB-01 | |
| 96 | 7 | 29 | 96-204 | 0 | Big Brown | f | nr | a | 16 | 45.96 | 9187 | Tree 96-BB-01 | |
| 96 | 6 | 28 | 96-90 | 0 | Big Brown | f | nr | a | 15.75 | 47.1 | 9136 | Tree 96-BB-01 | |
| 96 | 6 | 28 | 96-91 | 0 | Big Brown | f | nr | a | 15 | 46.67 | 9135 | Tree 96-BB-01 | |
| 96 | 6 | 28 | 96-92 | 0 | Big Brown | f | nr | a | 16.25 | 47.77 | 9134 | Tree 96-BB-01 | |
| 96 | 7 | 29 | 96-203 | 0 | Big Brown | f | pl | a | 18.5 | 49.8 | 9186 | Tree 96-BB-01 | |
| 96 | 7 | 29 | 96-205 | 0 | Big Brown | f | pl | a | 18 | 48.6 | 9188 | Tree 96-BB-01 | |
| 96 | 7 | 5 | 96-110 | 0 | Big Brown | f | nr | a | 17 | 48.9 | 9150 | Tree 96-BB-06 | |
| 96 | 7 | 5 | 96-111 | 0 | Big Brown | f | nr | a | 15.7 | 48.37 | 9151 | Tree 96-BB-06 | |
| 96 | 7 | 5 | 96-112 | 0 | Big Brown | f | nr | a | 17.75 | 48.8 | 9158 | Tree 96-BB-06 | |
| 96 | 7 | 5 | 96-113 | 0 | Big Brown | f | nr | a | 21.5 | 53.03 | 9153 | Tree 96-BB-06 | |
| 96 | 7 | 5 | 96-52 | 0 | Big Brown | f | nr | a | 15 | 46.4 | 9124 | Tree 96-BB-06 | |
| 96 | 7 | 5 | 96-114 | 0 | Big Brown | f | p | a | 19 | 46.4 | 9152 | Tree 96-BB-06 | |
| 96 | 7 | 5 | 96-115 | 0 | Big Brown | f | p | a | 18.5 | 49.2 | 9156 | Tree 96-BB-06 | |
| 96 | 7 | 5 | 96-116 | 0 | Big Brown | f | p | a | 19.5 | 48 | 9157 | Tree 96-BB-06 | |
| 97 | 7 | 31 | 96-96 | 0 | Big Brown | f | l | a | 17 | 48.1 | 9139 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 96-98 | 0 | Big Brown | f | l | a | 18.75 | 49.4 | 9138 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-68 | 0 | Big Brown | f | l | a | 16.75 | 46.6 | 9241 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-69 | 0 | Big Brown | f | l | a | 17 | 47.9 | 9242 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-70 | 0 | Big Brown | f | l | a | 17.5 | 48.5 | 9243 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-72 | 0 | Big Brown | f | l | a | 16 | 47.2 | 9245 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-74 | 0 | Big Brown | f | l | a | 16.5 | 45.4 | 9246 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-76 | 0 | Big Brown | f | l | a | 18.25 | 49 | 9249 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-78 | 0 | Big Brown | f | l | a | 16.5 | 49 | 9251 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-80 | 0 | Big Brown | f | l | a | 17 | 47.2 | 9253 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-81 | 0 | Big Brown | f | l | a | 16.75 | 47.5 | 9254 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 96-207 | 0 | Big Brown | f | nr | a | 16.75 | 48.4 | 9191 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-71 | 0 | Big Brown | f | nr | a | 14.5 | 47.2 | 9244 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-75 | 0 | Big Brown | f | nr | a | 16.5 | 49.8 | 9248 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-77 | 0 | Big Brown | f | nr | a | 16.25 | 48.5 | 9250 | Tree 96-BB-13 | |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 97 | 7 | 31 | 97-79 | 0 | Big Brown | f | nr | a | 16 | 48.7 | 9252 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-82 | 0 | Big Brown | f | nr | a | 15.75 | 49.7 | 9255 | Tree 96-BB-13 | |
| 97 | 7 | 31 | 97-73 | 0 | Big Brown | m | | j | 11 | 43.8 | | Tree 96-BB-13 | |
| 96 | 7 | 30 | 96-207 | 0 | Big Brown | f | nr | a | 15.5 | 48.83 | 9191 | Tree 96-BB-21 | |
| 96 | 7 | 30 | 96-208 | 0 | Big Brown | f | nr | a | 19.25 | 49.73 | 9193 | Tree 96-BB-21 | |
| 96 | 7 | 30 | 96-209 | 0 | Big Brown | f | nr | a | 18.25 | 48.93 | 9196 | Tree 96-BB-21 | |
| 96 | 7 | 30 | 96-114 | 0 | Big Brown | f | pl | a | 18 | | 9152 | Tree 96-BB-21 | |
| 96 | 7 | 30 | 96-206 | 0 | Big Brown | f | pl | a | 18 | 47.9 | 9190 | Tree 96-BB-21 | |
| 94 | 7 | 13 | 94-23 | 1 | Big Brown | f | l | a | 17.8 | 50 | | 16 Mile Marsh | 7 |
| 94 | 7 | 17 | 94-36 | 1 | Big Brown | f | l | a | 18.2 | 47.6 | | Handley Marsh | 3 |
| 94 | 7 | 17 | 94-39 | 1 | Big Brown | f | l | a | 22.9 | 48.6 | | Handley Marsh | 3 |
| 94 | 7 | 17 | 94-40 | 1 | Big Brown | f | l | a | 20.2 | 48.43 | | Handley Marsh | 3 |
| 94 | 7 | 17 | 94-42 | 1 | Big Brown | f | l | a | 17.5 | 50 | | Handley Marsh | 3 |
| 94 | 7 | 17 | 94-43 | 1 | Big Brown | f | l | a | 19 | 47.2 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-79 | 1 | Big Brown | f | l | a | 18.5 | 42.2 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-83 | 1 | Big Brown | f | l | a | 21.25 | 47.25 | | Handley Marsh | 3 |
| 94 | 7 | 13 | 94-26 | 1 | Big Brown | f | nr | a | 10.4 | 36.6 | | 16 Mile Marsh | 7 |
| 94 | 7 | 29 | 94-84 | 1 | Big Brown | f | p | a | 22.25 | 49.8 | | Handley Marsh | 3 |
| 95 | 7 | 17 | 95-98 | 1 | Big Brown | f | l | a | 17.25 | 46.1 | | Handley Marsh | 3 |
| 95 | 7 | 19 | 95-113 | 1 | Big Brown | f | l | a | 17.75 | 46.4 | | 16 Mile Marsh | 7 |
| 95 | 7 | 19 | 95-114 | 1 | Big Brown | f | l | a | 20.5 | 48.6 | | 16 Mile Marsh | 7 |
| 95 | 7 | 19 | 95-119 | 1 | Big Brown | f | l | a | 15.75 | 46.6 | | 16 Mile Marsh | 7 |
| 95 | 7 | 25 | 95-133 | 1 | Big Brown | f | l | a | 19.75 | 47.3 | | Handley Marsh | 3 |
| 95 | 6 | 16 | 95-04 | 1 | Big Brown | f | nr | a | 14 | 48.9 | | 16 Mile Marsh | 7 |
| 95 | 6 | 26 | 95-11 | 1 | Big Brown | f | nr | a | 15.5 | 49.07 | | Handley Marsh | 3 |
| 95 | 7 | 17 | 95-100 | 1 | Big Brown | f | nr | a | 17.75 | 48.03 | | Handley Marsh | 3 |
| 95 | 7 | 17 | 95-103 | 1 | Big Brown | f | nr | a | 17.25 | 45.9 | | Handley Marsh | 3 |
| 95 | 7 | 19 | 95-125 | 1 | Big Brown | f | nr | a | 17.25 | 46.73 | | 16 Mile Marsh | 7 |
| 95 | 7 | 24 | 95-132 | 1 | Big Brown | f | nr | a | 24 | 47.6 | | 16 Mile Marsh | 7 |
| 95 | 6 | 16 | 95-08 | 1 | Big Brown | f | p | a | 23 | 48.36 | | 16 Mile Marsh | 7 |
| 95 | 6 | 26 | 95-10 | 1 | Big Brown | f | p | a | 29.5 | 50.06 | | Handley Marsh | 3 |
| 95 | 6 | 26 | 95-12 | 1 | Big Brown | f | p | a | 20.75 | 48.47 | | Handley Marsh | 3 |
| 95 | 6 | 30 | 95-22 | 1 | Big Brown | f | p | a | 24.75 | 50.53 | | 16 Mile Marsh | 7 |
| 95 | 6 | 30 | 95-23 | 1 | Big Brown | f | p | a | | 50.57 | | 16 Mile Marsh | 7 |
| 95 | 6 | 30 | 95-24 | 1 | Big Brown | f | p | a | 26 | 49.43 | | 16 Mile Marsh | 7 |

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95 | 7 | 9 | 95-53 | 1 | Big Brown | f | p | a | 23.75 | 48.53 | | Handley Marsh | 3 |
| 95 | 7 | 9 | 95-55 | 1 | Big Brown | f | p | a | 23.25 | 49.17 | | Handley Marsh | 3 |
| 95 | 7 | 14 | 95-60 | 1 | Big Brown | f | p | a | 23 | 45.4 | | 16 Mile Marsh | 7 |
| 95 | 7 | 14 | 95-65 | 1 | Big Brown | f | p | a | 22.25 | 47.03 | | 16 Mile Marsh | 7 |
| 95 | 7 | 14 | 95-66 | 1 | Big Brown | f | p | a | 20.75 | 38.6 | | 16 Mile Marsh | 7 |
| 95 | 7 | 17 | 95-101 | 1 | Big Brown | f | p | a | 20.75 | 46.9 | | Handley Marsh | 3 |
| 95 | 7 | 17 | 95-102 | 1 | Big Brown | f | p | a | 20.75 | 49.13 | | Handley Marsh | 3 |
| 95 | 7 | 17 | 95-99 | 1 | Big Brown | f | p | a | 18 | 47.5 | | Handley Marsh | 3 |
| 95 | 7 | 24 | 95-131 | 1 | Big Brown | f | p | a | 21.25 | 47.8 | | 16 Mile Marsh | 7 |
| 96 | 7 | 23 | 96-182 | 1 | Big Brown | f | l | a | 24.5 | 49.5 | 9167 | 16 Mile Marsh | 7 |
| 96 | 7 | 23 | 96-186 | 1 | Big Brown | f | l | a | 23.5 | 48.37 | 9171 | 16 Mile Marsh | 7 |
| 96 | 5 | 23 | 96-01 | 1 | Big Brown | f | nr | a | 15.75 | 48.6 | 9102 | 16 Mile Marsh | 7 |
| 96 | 5 | 23 | 96-02 | 1 | Big Brown | f | nr | a | 16 | 47.57 | 9129 | 16 Mile Marsh | 7 |
| 96 | 5 | 23 | 96-03 | 1 | Big Brown | f | nr | a | 16.5 | 46.6 | 9197 | 16 Mile Marsh | 7 |
| 96 | 5 | 23 | 96-04 | 1 | Big Brown | f | nr | a | 16.5 | 49.63 | 9106 | 16 Mile Marsh | 7 |
| 96 | 5 | 23 | 96-05 | 1 | Big Brown | f | nr | a | 17 | 48.67 | 9104 | 16 Mile Marsh | 7 |
| 96 | 5 | 23 | 96-06 | 1 | Big Brown | f | nr | a | | 47.07 | 9107 | 16 Mile Marsh | 7 |
| 96 | 5 | 23 | 96-07 | 1 | Big Brown | f | nr | a | 16.5 | 48.4 | 9108 | 16 Mile Marsh | 7 |
| 96 | 5 | 23 | 96-08 | 1 | Big Brown | f | nr | a | 16.5 | 59.8 | 9109 | 16 Mile Marsh | 7 |
| 96 | 5 | 23 | 96-09 | 1 | Big Brown | f | nr | a | 13.5 | 50.13 | 9110 | 16 Mile Marsh | 7 |
| 96 | 6 | 2 | 96-14 | 1 | Big Brown | f | nr | a | 20.75 | 49.53 | 9113 | 16 Mile Marsh | 7 |
| 96 | 6 | 2 | 96-15 | 1 | Big Brown | f | nr | a | 18.75 | 48.1 | 9111 | 16 Mile Marsh | 7 |
| 96 | 6 | 2 | 96-16 | 1 | Big Brown | f | nr | a | 20 | 47.7 | 9112 | 16 Mile Marsh | 7 |
| 96 | 6 | 2 | 96-17 | 1 | Big Brown | f | nr | a | 17.5 | 48.13 | | 16 Mile Marsh | 7 |
| 96 | 6 | 2 | 96-19 | 1 | Big Brown | f | nr | a | 16.75 | 50.3 | 9115 | 16 Mile Marsh | 7 |
| 96 | 6 | 2 | 96-20 | 1 | Big Brown | f | nr | a | 20 | 46.56 | 9114 | 16 Mile Marsh | 7 |
| 96 | 6 | 10 | 96-29 | 1 | Big Brown | f | nr | a | 19.5 | 48.9 | 9105 | 16 Mile Marsh | 7 |
| 96 | 6 | 10 | 96-34 | 1 | Big Brown | f | nr | a | 18.75 | 50.6 | 9128 | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-48 | 1 | Big Brown | f | nr | a | | 45.2 | 9199 | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-52 | 1 | Big Brown | f | nr | a | 15 | 46.4 | 9124 | 16 Mile Marsh | 7 |
| 96 | 7 | 21 | 96-174 | 1 | Big Brown | f | nr | a | 15.5 | 49.17 | 9163 | Harcourt Marsh | 6 |
| 96 | 7 | 21 | 96-175 | 1 | Big Brown | f | nr | a | 20 | 47.5 | 9162 | Harcourt Marsh | 6 |
| 96 | 7 | 1 | 96-100 | 1 | Big Brown | f | p | a | 20 | 49.75 | 9141 | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-102 | 1 | Big Brown | f | p | a | 17.75 | | 9142 | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-103 | 1 | Big Brown | f | p | a | 17.75 | 45.7 | 9143 | 16 Mile Marsh | 7 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96 | 7 | 1 | 96-104 | 1 | Big Brown | f | p | a | 19 | 47.37 | 9144 | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-107 | 1 | Big Brown | f | p | a | 20.25 | 50 | 9147 | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-108 | 1 | Big Brown | f | p | a | 21.25 | 48.05 | 9148 | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-109 | 1 | Big Brown | f | p | a | 19 | 47.17 | 9149 | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-96 | 1 | Big Brown | f | p | a | 21.5 | 48.2 | 9139 | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-98 | 1 | Big Brown | f | p | a | 23 | 49.77 | 9138 | 16 Mile Marsh | 7 |
| 97 | 6 | 6 | 97-03 | 1 | Big Brown | f | nr | a | 14 | 47.5 | 9204 | 16 Mile Marsh | 7 |
| 97 | 6 | 6 | 97-04 | 1 | Big Brown | f | nr | a | 15 | 47.1 | 9202 | 16 Mile Marsh | 7 |
| 97 | 6 | 6 | 97-07 | 1 | Big Brown | f | nr | a | 16 | 40.45 | 9205 | 16 Mile Marsh | 7 |
| 97 | 6 | 9 | 97-09 | 1 | Big Brown | f | nr | a | 15.75 | 46.05 | 9208 | 16 Mile Marsh | 7 |
| 97 | 6 | 9 | 97-14 | 1 | Big Brown | f | nr | a | 17.75 | 47.1 | 9209 | 16 Mile Marsh | 7 |
| 97 | 6 | 14 | 96-202 | 1 | Big Brown | f | nr | a | 17.5 | 48.9 | 9189 | 16 Mile Marsh | 7 |
| 97 | 6 | 14 | 97-19 | 1 | Big Brown | f | nr | a | 18 | 48.3 | 9213 | 16 Mile Marsh | 7 |
| 97 | 7 | 4 | 97-21 | 1 | Big Brown | f | nr | a | 14.75 | 48.2 | 9214 | 16 Mile Marsh | 7 |
| 97 | 7 | 16 | 97-39 | 1 | Big Brown | f | nr | a | 15.75 | 48 | 9218 | 16 Mile Marsh | 7 |
| 98 | 7 | 17 | 96-204 | 1 | Big Brown | f | l | a | 18.3 | 49.1 | 9187 | 16 Mile Marsh | 7 |
| 98 | 7 | 17 | 98-01 | 1 | Big Brown | f | l | a | 17.4 | 48.6 | | 16 Mile Marsh | 7 |
| 98 | 7 | 17 | 98-04 | 1 | Big Brown | f | l | a | 21.8 | 50 | | 16 Mile Marsh | 7 |
| 98 | 7 | 17 | 98-02 | 1 | Big Brown | f | nr | a | 18.7 | 48.4 | | 16 Mile Marsh | 7 |
| 98 | 7 | 17 | 98-03 | 1 | Big Brown | f | nr | a | 20.2 | 48 | | 16 Mile Marsh | 7 |
| 94 | 7 | 17 | 94-38 | 1 | Big Brown | m | et | a | 14.5 | 44.23 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-99 | 1 | Big Brown | m | | a | 21.25 | 44.62 | | Handley Marsh | 3 |
| 94 | 8 | 4 | 94-117 | 1 | Big Brown | m | | a | 21.25 | 48.63 | | 16 Mile Marsh | 7 |
| 94 | 8 | 4 | 94-118 | 1 | Big Brown | m | | a | 19 | 48.28 | | 16 Mile Marsh | 7 |
| 94 | 8 | 4 | 94-119 | 1 | Big Brown | m | | a | 18.25 | 45.25 | | 16 Mile Marsh | 7 |
| 94 | 8 | 4 | 94-121 | 1 | Big Brown | m | | a | 21.5 | 47.92 | | 16 Mile Marsh | 7 |
| 95 | 7 | 9 | 95-52 | 1 | Big Brown | m | sc | a | 20 | 49.9 | | Handley Marsh | 3 |
| 95 | 7 | 9 | 95-44 | 1 | Big Brown | m | | a | 17.5 | 46.1 | | Handley Marsh | 3 |
| 96 | 6 | 2 | 96-22 | 1 | Big Brown | m | | a | 16.25 | 44.69 | 9116 | 16 Mile Marsh | 7 |
| 96 | 6 | 14 | 96-35 | 1 | Big Brown | m | | a | 16.9 | 48.85 | 9101 | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-105 | 1 | Big Brown | m | | a | 15.25 | 45.97 | 9145 | 16 Mile Marsh | 7 |
| 96 | 8 | 9 | 96-211 | 1 | Big Brown | m | | a | 27.25 | 48.1 | | 16 Mile Marsh | 7 |
| 96 | 8 | 22 | 96-212 | 1 | Big Brown | m | | a | | | 9195 | Maloney's mine | 14 |
| 97 | 6 | 14 | 97-17 | 1 | Big Brown | m | nr | a | 15 | 47 | 9212 | 16 Mile Marsh | 7 |
| 94 | 7 | 29 | 94-92 | 1 | Big Brown | f | | j | 13.5 | 35.8 | | Handley Marsh | 3 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 94 | 7 | 29 | 94-93 | 1 | Big Brown | m | | j | 15.75 | 46.87 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-95 | 1 | Big Brown | m | | j | 13.25 | 44.43 | | Handley Marsh | 3 |
| 94 | 8 | 4 | 94-109 | 1 | Big Brown | m | | j | 10.5 | 44.1 | | 16 Mile Marsh | 7 |
| 94 | 7 | 14 | 94-28 | 1 | California | f | p | a | 5 | 33 | | 16 Mile Road near cabin | 8 |
| 94 | 7 | 14 | 94-30 | 1 | California | f | p | a | 5.3 | 32.6 | | 16 Mile Road near cabin | 8 |
| 95 | 7 | 28 | 95-138 | 1 | California | f | l | a | 5 | 32.7 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-151 | 1 | California | f | l | a | 5.5 | 33.57 | | 16 Mile Road Above Marsh | 11 |
| 95 | 7 | 28 | 95-152 | 1 | California | f | l | a | 5.25 | 33.17 | | 16 Mile Road Above Marsh | 11 |
| 95 | 7 | 14 | 95-64 | 1 | California | f | nr | a | 5 | 33.6 | | 16 Mile Marsh | 7 |
| 95 | 7 | 19 | 95-117 | 1 | California | f | nr | a | 5 | 33.33 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-146 | 1 | California | f | nr | a | 5.25 | 32.63 | | 16 Mile Marsh | 7 |
| 95 | 7 | 3 | 95-27 | 1 | California | f | p | a | 6.25 | 33.23 | | 16 Mile Marsh | 7 |
| 95 | 7 | 9 | 95-49 | 1 | California | f | p | a | 5.5 | 32.87 | | Handley Marsh | 3 |
| 95 | 7 | 10 | 95-57 | 1 | California | f | p | a | 5.75 | 32.7 | | 16 Mile Road near cabin | 8 |
| 95 | 7 | 16 | 95-72 | 1 | California | f | p | a | 6.25 | 33.87 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-96 | 1 | California | f | p | a | 6.5 | 33.5 | | 16 Mile Road near cabin | 8 |
| 95 | 7 | 28 | 95-150 | 1 | California | f | pl | a | 5.25 | 32 | | 16 Mile Road Above Marsh | 11 |
| 96 | 5 | 28 | 96-11 | 1 | California | f | nr | a | 4.25 | 33.43 | | 16 Mile Road near cabin | 8 |
| 96 | 5 | 28 | 96-12 | 1 | California | f | nr | a | 4.4 | 33.1 | | 16 Mile Road near cabin | 8 |
| 96 | 6 | 2 | 96-21 | 1 | California | f | nr | a | 4.75 | 30.9 | | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-40 | 1 | California | f | nr | a | 4.5 | 32.03 | | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-42 | 1 | California | f | nr | a | 4.5 | 31.7 | | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-43 | 1 | California | f | nr | a | 5 | 32.77 | | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-101 | 1 | California | f | nr | a | 5.5 | 34.33 | | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-94 | 1 | California | f | nr | a | 5.75 | 34.17 | | 16 Mile Marsh | 7 |
| 96 | 7 | 5 | 96-117 | 1 | California | f | nr | a | 4.75 | 33.67 | | 16 Mile Marsh | 7 |
| 96 | 7 | 23 | 96-184 | 1 | California | f | nr | a | 4.75 | 3.3 | | 16 Mile Marsh | 7 |
| 96 | 7 | 23 | 96-190 | 1 | California | f | nr | a | 5 | 32.57 | | 16 Mile Marsh | 7 |
| 96 | 7 | 8 | 96-123 | 1 | California | f | p | a | 4.75 | 31.13 | | 16 Mile Road Above Marsh | 11 |
| 96 | 7 | 8 | 96-124 | 1 | California | f | p | a | 5.25 | 32.12 | | 16 Mile Road Above Marsh | 11 |
| 96 | 7 | 8 | 96-126 | 1 | California | f | p | a | 5.25 | 33.27 | | 16 Mile Road near cabin | 8 |
| 96 | 7 | 21 | 96-176 | 1 | California | f | p | a | 6.5 | 32.87 | | Harcourt Marsh | 6 |
| 96 | 7 | 23 | 96-181 | 1 | California | f | p | a | 5.5 | 32.67 | | 16 Mile Marsh | 7 |
| 97 | 6 | 6 | 97-01 | 1 | California | f | nr | a | 5 | 34.8 | | 16 Mile Marsh | 7 |
| 97 | 7 | 7 | 97-31 | 1 | California | f | p | a | 5.5 | 32.6 | | 16 Mile Marsh | 7 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 97 | 7 | 16 | 97-40 | 1 | California | f | p | a | 5.75 | 32.1 | | 16 Mile Marsh | 7 |
| 98 | 7 | 21 | 98-08 | 1 | California | f | l | a | | 34.1 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-154 | 1 | California | m | sc | a | 5.25 | 32.07 | | 16 Mile Road Above Marsh | 11 |
| 95 | 6 | 30 | 95-16 | 1 | California | m | | a | 5.25 | 33 | | 16 Mile Marsh | 7 |
| 95 | 7 | 19 | 95-129 | 1 | California | m | | a | 5 | 33 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-153 | 1 | California | m | | a | 4.5 | 32.3 | | 16 Mile Road Above Marsh | 11 |
| 96 | 7 | 8 | 96-125 | 1 | California | m | | a | 5 | 33.2 | | 16 Mile Road Above Marsh | 11 |
| 97 | 6 | 6 | 97-02 | 1 | California | m | | a | 4.5 | 32.3 | | 16 Mile Marsh | 7 |
| 97 | 6 | 9 | 97-12 | 1 | California | m | | a | 4.5 | 30.8 | | 16 Mile Marsh | 7 |
| 94 | 7 | 29 | 94-100 | 1 | Hoary | m | | a | 22.5 | 50.07 | | Handley Marsh | 3 |
| 95 | 7 | 25 | 95-137 | 1 | Hoary | m | | a | 33.25 | 54.4 | | Handley Marsh | 3 |
| 94 | 7 | 13 | 94-05 | 1 | Little Brown | f | nr | a | 6 | 36.6 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-13 | 1 | Little Brown | f | nr | a | 7 | 35.5 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-14 | 1 | Little Brown | f | nr | a | 6.8 | 36 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-21 | 1 | Little Brown | f | nr | a | 6 | 35.76 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-22 | 1 | Little Brown | f | nr | a | 6.8 | 36.3 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-25 | 1 | Little Brown | f | nr | a | 6.2 | 36.8 | | 16 Mile Marsh | 7 |
| 94 | 7 | 15 | 94-34 | 1 | Little Brown | f | nr | a | 6.3 | 36.2 | | Seven-Mile Reservoir | 2 |
| 94 | 7 | 29 | 94-85 | 1 | Little Brown | f | pl | a | 6.5 | 36.5 | | Handley Marsh | 3 |
| 95 | 7 | 19 | 95-112 | 1 | Little Brown | f | l | a | 7.25 | 35.33 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-141 | 1 | Little Brown | f | l | a | 7.25 | 35.3 | | 16 Mile Marsh | 7 |
| 95 | 7 | 16 | 95-74 | 1 | Little Brown | f | nr | a | 7.75 | 36.47 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-76 | 1 | Little Brown | f | nr | a | 7 | 36.3 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-84 | 1 | Little Brown | f | nr | a | 7 | 37.17 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-88 | 1 | Little Brown | f | nr | a | 6.5 | 37.57 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-89 | 1 | Little Brown | f | nr | a | 6 | 36.8 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-91 | 1 | Little Brown | f | nr | a | 6 | 34.1 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-92 | 1 | Little Brown | f | nr | a | 6.75 | 37.63 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-95 | 1 | Little Brown | f | nr | a | 6.5 | 36.63 | | Waneta Reservoir | 1 |
| 95 | 7 | 17 | 95-106 | 1 | Little Brown | f | nr | a | 7.25 | 37.1 | | Handley Marsh | 3 |
| 95 | 7 | 19 | 95-121 | 1 | Little Brown | f | nr | a | 6.5 | 34.33 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-147 | 1 | Little Brown | f | nr | a | 6.25 | 34.83 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-148 | 1 | Little Brown | f | nr | a | 7.25 | 38 | | 16 Mile Marsh | 7 |
| 95 | 6 | 30 | 95-19 | 1 | Little Brown | f | p | a | 7.25 | 36.77 | | 16 Mile Marsh | 7 |
| 95 | 7 | 4 | 95-30 | 1 | Little Brown | f | p | a | 7.5 | 35.97 | | Waneta Reservoir | 1 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95 | 7 | 4 | 95-32 | 1 | Little Brown | f | p | a | 6.25 | 35.97 | | Waneta Reservoir | 1 |
| 95 | 7 | 4 | 95-34 | 1 | Little Brown | f | p | a | 6.25 | 37.23 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-73 | 1 | Little Brown | f | p | a | 8.75 | 35.53 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-75 | 1 | Little Brown | f | p | a | 8.75 | 37.53 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-79 | 1 | Little Brown | f | p | a | 7.5 | 35.83 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-85 | 1 | Little Brown | f | p | a | 8.75 | 35.63 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-86 | 1 | Little Brown | f | p | a | 9.5 | 35.87 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-90 | 1 | Little Brown | f | p | a | 8 | 37.5 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-148 | 1 | Little Brown | f | l | a | 7 | 35.1 | | Waneta Reservoir | 1 |
| 96 | 5 | 26 | 96-10 | 1 | Little Brown | f | nr | a | 5.5 | 35.05 | | Gerrard's pond | 10 |
| 96 | 6 | 20 | 96-39 | 1 | Little Brown | f | nr | a | 5.5 | 37.63 | | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-46 | 1 | Little Brown | f | nr | a | 6 | 35.87 | | 16 Mile Marsh | 7 |
| 96 | 6 | 26 | 96-64 | 1 | Little Brown | f | nr | a | 5.5 | 36.7 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-66 | 1 | Little Brown | f | nr | a | 6.5 | 34.73 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-67 | 1 | Little Brown | f | nr | a | 5.25 | 35 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-74 | 1 | Little Brown | f | nr | a | 6.5 | 36.16 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-81 | 1 | Little Brown | f | nr | a | 7.5 | 34.83 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-82 | 1 | Little Brown | f | nr | a | 5 | 34.88 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-85 | 1 | Little Brown | f | nr | a | 5 | 34.87 | | Gerrard's pond | 10 |
| 96 | 7 | 8 | 96-127 | 1 | Little Brown | f | nr | a | 5.75 | 37.33 | | 16 Mile Road near cabin | 8 |
| 96 | 7 | 10 | 96-128 | 1 | Little Brown | f | nr | a | 6.25 | 36.13 | | Gerrard's Pond | 10 |
| 96 | 7 | 10 | 96-129 | 1 | Little Brown | f | nr | a | 6 | 35.67 | | Gerrard's Pond | 10 |
| 96 | 7 | 10 | 96-131 | 1 | Little Brown | f | nr | a | 5.5 | 35.8 | | Gerrard's Pond | 10 |
| 96 | 7 | 20 | 96-134 | 1 | Little Brown | f | nr | a | 7.25 | 36.5 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-135 | 1 | Little Brown | f | nr | a | 7.75 | 36.1 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-137 | 1 | Little Brown | f | nr | a | 8.5 | 35.2 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-139 | 1 | Little Brown | f | nr | a | 6.5 | 36.9 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-141 | 1 | Little Brown | f | nr | a | 6.5 | 34.4 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-142 | 1 | Little Brown | f | nr | a | 6.75 | 37.5 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-143 | 1 | Little Brown | f | nr | a | 7 | 35.3 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-151 | 1 | Little Brown | f | nr | a | 6 | 36.5 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-153 | 1 | Little Brown | f | nr | a | 7.5 | 37.1 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-155 | 1 | Little Brown | f | nr | a | 5.75 | 37.5 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-160 | 1 | Little Brown | f | nr | a | 6.5 | 36.6 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-162 | 1 | Little Brown | f | nr | a | 7.75 | 37.9 | | Waneta Reservoir | 1 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96 | 6 | 26 | 96-61 | 1 | Little Brown | f | p | a | 6.25 | 34.6 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-63 | 1 | Little Brown | f | p | a | 5.75 | 34.4 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-65 | 1 | Little Brown | f | p | a | 6 | 32.9 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-76 | 1 | Little Brown | f | p | a | 6.5 | 34.6 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-84 | 1 | Little Brown | f | p | a | 7.5 | 34.2 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-86 | 1 | Little Brown | f | p | a | 7.5 | 34.3 | | Gerrard's pond | 10 |
| 96 | 7 | 1 | 96-106 | 1 | Little Brown | f | p | a | 6 | 35.67 | | 16 Mile Marsh | 7 |
| 96 | 7 | 10 | 96-133 | 1 | Little Brown | f | p | a | 6 | 37.12 | | Gerrard's Pond | 10 |
| 96 | 7 | 20 | 96-138 | 1 | Little Brown | f | p | a | 9.75 | 37.5 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-140 | 1 | Little Brown | f | p | a | 8.25 | 35.2 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-146 | 1 | Little Brown | f | p | a | 8.75 | 37.5 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-152 | 1 | Little Brown | f | p | a | 8.5 | 35.6 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-167 | 1 | Little Brown | f | p | a | 7.5 | 37.7 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-149 | 1 | Little Brown | f | | a | 7 | 36.3 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-150 | 1 | Little Brown | f | | a | 7 | 34.9 | | Waneta Reservoir | 1 |
| 98 | 7 | 20 | 98-06 | 1 | Little Brown | f | nr | a | 6.1 | 36.8 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-09 | 1 | Little Brown | m | 1et | a | 6.3 | 36.8 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-03 | 1 | Little Brown | m | et | a | 6.4 | 35.4 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-04 | 1 | Little Brown | m | et | a | 5.3 | 35.89 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-06 | 1 | Little Brown | m | et | a | 6.3 | 35.9 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-07 | 1 | Little Brown | m | et | a | 6.6 | 37.3 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-08 | 1 | Little Brown | m | et | a | 6.4 | 36.8 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-10 | 1 | Little Brown | m | et | a | 6.8 | 36 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-11 | 1 | Little Brown | m | et | a | 6.6 | 36.4 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-12 | 1 | Little Brown | m | et | a | 6 | 36 | | 16 Mile Marsh | 7 |
| 94 | 7 | 15 | 94-33 | 1 | Little Brown | m | et | a | 6.6 | 34.7 | | Seven-Mile Reservoir | 2 |
| 94 | 7 | 13 | 94-17 | 1 | Little Brown | m | set | a | 6.5 | 35.23 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-01 | 1 | Little Brown | m | | a | 7 | 37.56 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-02 | 1 | Little Brown | m | | a | 7.1 | 36.56 | | 16 Mile Marsh | 7 |
| 94 | 7 | 29 | 94-80 | 1 | Little Brown | m | | a | 6.5 | 39.62 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-86 | 1 | Little Brown | m | | a | 6 | 34.7 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-94 | 1 | Little Brown | m | | a | 6.25 | 36.32 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-97 | 1 | Little Brown | m | | a | 7.5 | 36.73 | | Handley Marsh | 3 |
| 95 | 7 | 3 | 95-28 | 1 | Little Brown | m | sc | a | 5.5 | 36.23 | | 16 Mile Marsh | 7 |
| 95 | 7 | 19 | 95-126 | 1 | Little Brown | m | sc | a | 7.75 | 35.27 | | 16 Mile Marsh | 7 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95 | 6 | 15 | 95-01 | 1 | Little Brown | m | | a | 5 | 34.4 | | Handley Marsh | 3 |
| 95 | 6 | 16 | 95-02 | 1 | Little Brown | m | | a | 5.25 | 37.4 | | 16 Mile Marsh | 7 |
| 95 | 6 | 16 | 95-03 | 1 | Little Brown | m | | a | 5.75 | 36.7 | | 16 Mile Marsh | 7 |
| 95 | 6 | 16 | 95-06 | 1 | Little Brown | m | | a | 5.5 | 36.07 | | 16 Mile Marsh | 7 |
| 95 | 6 | 16 | 95-07 | 1 | Little Brown | m | | a | 4.75 | 36.53 | | 16 Mile Marsh | 7 |
| 95 | 6 | 29 | 95-14 | 1 | Little Brown | m | | a | 5.75 | 34.23 | | Handley Marsh | 3 |
| 95 | 6 | 30 | 95-15 | 1 | Little Brown | m | | a | 4.25 | 35.1 | | 16 Mile Marsh | 7 |
| 95 | 6 | 30 | 95-17 | 1 | Little Brown | m | | a | 5.25 | 36.13 | | 16 Mile Marsh | 7 |
| 95 | 6 | 30 | 95-18 | 1 | Little Brown | m | | a | 5.25 | 35.43 | | 16 Mile Marsh | 7 |
| 95 | 6 | 30 | 95-20 | 1 | Little Brown | m | | a | 6.25 | 35.13 | | 16 Mile Marsh | 7 |
| 95 | 7 | 3 | 95-29 | 1 | Little Brown | m | | a | 5.75 | 35.83 | | 16 Mile Marsh | 7 |
| 95 | 7 | 4 | 95-33 | 1 | Little Brown | m | | a | 6.25 | 35.13 | | Waneta Reservoir | 1 |
| 95 | 7 | 9 | 95-40 | 1 | Little Brown | m | | a | 6.25 | 35.9 | | Handley Marsh | 3 |
| 95 | 7 | 9 | 95-41 | 1 | Little Brown | m | | a | 7.25 | 35.43 | | Handley Marsh | 3 |
| 95 | 7 | 9 | 95-42 | 1 | Little Brown | m | | a | 7 | 34.97 | | Handley Marsh | 3 |
| 95 | 7 | 9 | 95-43 | 1 | Little Brown | m | | a | 6.75 | 35.6 | | Handley Marsh | 3 |
| 95 | 7 | 9 | 95-47 | 1 | Little Brown | m | | a | 6.5 | 36.43 | | Handley Marsh | 3 |
| 95 | 7 | 9 | 95-48 | 1 | Little Brown | m | | a | 6.25 | 34.67 | | Handley Marsh | 3 |
| 95 | 7 | 11 | 95-59 | 1 | Little Brown | m | | a | 7.5 | 38.57 | | Harcourt Marsh | 3 |
| 95 | 7 | 14 | 95-62 | 1 | Little Brown | m | | a | 5.5 | 34.97 | | 16 Mile Marsh | 7 |
| 95 | 7 | 14 | 95-63 | 1 | Little Brown | m | | a | 7.75 | 38.17 | | 16 Mile Marsh | 7 |
| 95 | 7 | 14 | 95-67 | 1 | Little Brown | m | | a | 7.75 | 36.6 | | 16 Mile Marsh | 7 |
| 95 | 7 | 15 | 95-69 | 1 | Little Brown | m | | a | 6.5 | 35.13 | | 16 Mile Road Above Marsh | 11 |
| 95 | 7 | 15 | 95-70 | 1 | Little Brown | m | | a | 6.25 | 35.33 | | 16 Mile Road Above Marsh | 11 |
| 95 | 7 | 16 | 95-77 | 1 | Little Brown | m | | a | 6.25 | 35.03 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-78 | 1 | Little Brown | m | | a | 7.25 | 35.97 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-80 | 1 | Little Brown | m | | a | 6.5 | 35.47 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-81 | 1 | Little Brown | m | | a | 6.75 | 34.8 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-82 | 1 | Little Brown | m | | a | 6.25 | 35.9 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-83 | 1 | Little Brown | m | | a | 6.5 | 35.5 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-87 | 1 | Little Brown | m | | a | 7.5 | 36.93 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-93 | 1 | Little Brown | m | | a | 6.75 | 36.93 | | Waneta Reservoir | 1 |
| 95 | 7 | 16 | 95-94 | 1 | Little Brown | m | | a | 7 | 35.07 | | Waneta Reservoir | 1 |
| 95 | 7 | 17 | 95-109 | 1 | Little Brown | m | | a | 6.5 | 35.4 | | Handley Marsh | 3 |
| 95 | 7 | 19 | 95-120 | 1 | Little Brown | m | | a | 6.5 | 36.3 | | 16 Mile Marsh | 7 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95 | 7 | 19 | 95-122 | 1 | Little Brown | m | | a | 6.75 | 36.07 | | 16 Mile Marsh | 7 |
| 95 | 7 | 19 | 95-123 | 1 | Little Brown | m | | a | 7 | 37.13 | | 16 Mile Marsh | 7 |
| 95 | 7 | 19 | 95-124 | 1 | Little Brown | m | | a | 6.75 | 34.57 | | 16 Mile Marsh | 7 |
| 95 | 7 | 25 | 95-134 | 1 | Little Brown | m | | a | 6.75 | 35.23 | | Handley Marsh | 3 |
| 95 | 7 | 25 | 95-135 | 1 | Little Brown | m | | a | 6.25 | 36.47 | | Handley Marsh | 3 |
| 95 | 7 | 28 | 95-149 | 1 | Little Brown | m | | a | 7 | 35.57 | | 16 Mile Road Above Marsh | 11 |
| 96 | 6 | 10 | 96-31 | 1 | Little Brown | m | | a | 6 | 36.8 | | 16 Mile Marsh | 7 |
| 96 | 6 | 10 | 96-33 | 1 | Little Brown | m | | a | 5.5 | 35.9 | | 16 Mile Marsh | 7 |
| 96 | 6 | 19 | 96-37 | 1 | Little Brown | m | | a | 5.59 | 35.1 | | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-41 | 1 | Little Brown | m | | a | 5 | 35 | | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-44 | 1 | Little Brown | m | | a | 5 | 36.07 | | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-45 | 1 | Little Brown | m | | a | 6.5 | 37.37 | | 16 Mile Marsh | 7 |
| 96 | 6 | 26 | 96-62 | 1 | Little Brown | m | | a | 5.5 | | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-68 | 1 | Little Brown | m | | a | 5.5 | 36.53 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-69 | 1 | Little Brown | m | | a | 5 | 35.53 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-70 | 1 | Little Brown | m | | a | 5.25 | 34.56 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-71 | 1 | Little Brown | m | | a | 5.5 | 35 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-72 | 1 | Little Brown | m | | a | 5 | 34.33 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-83 | 1 | Little Brown | m | | a | 5.25 | 36.23 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-88 | 1 | Little Brown | m | | a | 6.25 | 34.38 | | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-89 | 1 | Little Brown | m | | a | 6 | 34.07 | | Gerrard's pond | 10 |
| 96 | 7 | 1 | 96-93 | 1 | Little Brown | m | | a | 6.25 | 35.17 | | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-97 | 1 | Little Brown | m | | a | 5.75 | 35.87 | | 16 Mile Marsh | 7 |
| 96 | 7 | 1 | 96-99 | 1 | Little Brown | m | | a | | 34.17 | | 16 Mile Marsh | 7 |
| 96 | 7 | 6 | 96-119 | 1 | Little Brown | m | | a | 5 | 36.53 | | 16 Mile Marsh | 7 |
| 96 | 7 | 6 | 96-120 | 1 | Little Brown | m | | a | 5.25 | 35.73 | | 16 Mile Marsh | 7 |
| 96 | 7 | 6 | 96-121 | 1 | Little Brown | m | | a | 5.25 | 36.5 | | 16 Mile Marsh | 7 |
| 96 | 7 | 6 | 96-122 | 1 | Little Brown | m | | a | 5.75 | 36.37 | | 16 Mile Marsh | 7 |
| 96 | 7 | 10 | 96-130 | 1 | Little Brown | m | | a | 7.5 | 38.87 | | Gerrard's Pond | 10 |
| 96 | 7 | 20 | 96-136 | 1 | Little Brown | m | | a | 6.5 | 35.1 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-144 | 1 | Little Brown | m | | a | 6.25 | 37.1 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-145 | 1 | Little Brown | m | | a | 6 | 36.7 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-147 | 1 | Little Brown | m | | a | 7.25 | 37 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-154 | 1 | Little Brown | m | | a | 6.5 | 35.1 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-156 | 1 | Little Brown | m | | a | 6.75 | 36.3 | | Waneta Reservoir | 1 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96 | 7 | 20 | 96-157 | 1 | Little Brown | m | | a | 6.5 | 36 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-158 | 1 | Little Brown | m | | a | 6.25 | 34.8 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-159 | 1 | Little Brown | m | | a | 6.5 | 34.4 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-161 | 1 | Little Brown | m | | a | 7.25 | 36.2 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-163 | 1 | Little Brown | m | | a | 6 | 34.8 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-164 | 1 | Little Brown | m | | a | 6.25 | 36.8 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-165 | 1 | Little Brown | m | | a | 6.75 | 35.1 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-166 | 1 | Little Brown | m | | a | 6.5 | 37.1 | | Waneta Reservoir | 1 |
| 96 | 7 | 20 | 96-168 | 1 | Little Brown | m | | a | 6.25 | 36.8 | | Waneta Reservoir | 1 |
| 96 | 8 | 9 | 96-210 | 1 | Little Brown | m | | a | 7.75 | 35.9 | | 16 Mile Marsh | 7 |
| 97 | 7 | 4 | 97-22 | 1 | Little Brown | m | | a | 6 | 35.2 | | 16 Mile Marsh | 7 |
| 97 | 7 | 4 | 97-23 | 1 | Little Brown | m | | a | 6 | 35.1 | | 16 Mile Marsh | 7 |
| 97 | 7 | 4 | 97-24 | 1 | Little Brown | m | | a | 5.75 | 36.2 | | 16 Mile Marsh | 7 |
| 97 | 7 | 4 | 97-25 | 1 | Little Brown | m | | a | 6 | 36.2 | | 16 Mile Marsh | 7 |
| 97 | 7 | 4 | 97-26 | 1 | Little Brown | m | | a | 5.75 | 34.9 | | 16 Mile Marsh | 7 |
| 97 | 7 | 4 | 97-27 | 1 | Little Brown | m | | a | 6.5 | 36.8 | | 16 Mile Marsh | 7 |
| 97 | 7 | 4 | 97-28 | 1 | Little Brown | m | | a | 6.25 | 35.8 | | 16 Mile Marsh | 7 |
| 97 | 7 | 12 | 97-35 | 1 | Little Brown | m | | a | 6.25 | 36.42 | | 16 Mile Marsh | 7 |
| 97 | 7 | 13 | 97-36 | 1 | Little Brown | m | | a | 5.75 | 34.5 | | Gerrard's Pond | 10 |
| 94 | 7 | 15 | 94-32 | 1 | Little Brown | m | | j | 5.8 | 35.1 | | Seven-Mile Reservoir | 2 |
| 94 | 7 | 13 | 94-15 | 1 | Long-Legged | f | nr | a | 7.3 | 39.33 | | 16 Mile Marsh | 7 |
| 94 | 7 | 14 | 94-31 | 1 | Long-Legged | f | nr | a | 6.8 | 40 | | 16 Mile Road near cabin | 8 |
| 95 | 7 | 28 | 95-139 | 1 | Long-Legged | f | l | a | 7.75 | 39.5 | | 16 Mile Marsh | 7 |
| 95 | 7 | 15 | 95-71 | 1 | Long-Legged | f | p | a | 8 | 39.03 | | 16 Mile Road Above Marsh | 11 |
| 96 | 5 | 31 | 96-13 | 1 | Long-Legged | f | nr | a | 6.75 | 39 | | 16 Mile Road near cabin | 8 |
| 96 | 6 | 2 | 96-18 | 1 | Long-Legged | f | nr | a | 5.25 | 37.9 | | 16 Mile Marsh | 7 |
| 96 | 6 | 10 | 96-30 | 1 | Long-Legged | f | nr | a | 7.5 | 39.3 | | 16 Mile Marsh | 7 |
| 97 | 8 | 1 | 97-84 | 1 | Long-Legged | f | l | a | 9 | 40.2 | | 16 Mile Marsh | 7 |
| 97 | 8 | 7 | 97-88 | 1 | Long-Legged | f | l | a | 8.5 | 38.75 | | 16 Mile Road near cabin | 8 |
| 97 | 6 | 6 | 97-08 | 1 | Long-Legged | f | nr | a | 7 | 39.5 | | 16 Mile Marsh | 7 |
| 97 | 6 | 9 | 97-11 | 1 | Long-Legged | f | nr | a | 6.5 | 39.3 | | 16 Mile Marsh | 7 |
| 97 | 7 | 22 | 97-58 | 1 | Long-Legged | f | p | a | 8 | 39.3 | | 16 Mile Road Above Marsh | 11 |
| 97 | 8 | 7 | 97-87 | 1 | Long-Legged | f | pl | a | 8.25 | 37.4 | | 16 Mile Road near cabin | 8 |
| 94 | 7 | 14 | 94-29 | 1 | Long-Legged | m | | a | 6.9 | 39 | | 16 Mile Road near cabin | 8 |
| 96 | 7 | 5 | 96-118 | 1 | Long-Legged | m | | a | 5.75 | 38.83 | | 16 Mile Marsh | 7 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 97 | 7 | 16 | 97-52 | 1 | Long-Legged | m | | a | 7 | 39.05 | | 16 Mile Marsh | 7 |
| 96 | 7 | 22 | 96-177 | 0 | Silver-Haired | f | l | a | 11.25 | 42.9 | 9170 | Tree 96-SH-01 | |
| 96 | 7 | 22 | 96-179 | 0 | Silver-Haired | f | l | a | 10.5 | 38.6 | 9166 | Tree 96-SH-01 | |
| 96 | 7 | 22 | 96-60 | 0 | Silver-Haired | f | l | a | 10.25 | | 9125 | Tree 96-SH-01 | |
| 96 | 7 | 22 | 96-73 | 0 | Silver-Haired | f | l | a | 11 | 42.53 | 9126 | Tree 96-SH-01 | |
| 96 | 7 | 22 | 96-178 | 0 | Silver-Haired | f | nr | a | 14 | 42.2 | 9165 | Tree 96-SH-01 | |
| 96 | 7 | 22 | 96-180 | 0 | Silver-Haired | f | nr | a | 11 | 41.2 | 9164 | Tree 96-SH-01 | |
| 96 | 7 | 22 | 96-77 | 0 | Silver-Haired | f | nr | a | 13.5 | 43.37 | 9127 | Tree 96-SH-01 | |
| 96 | 7 | 22 | 96-78 | 0 | Silver-Haired | f | nr | a | 12.25 | | 9128 | Tree 96-SH-01 | |
| 96 | 7 | 22 | 96-80 | 0 | Silver-Haired | f | nr | a | 11.75 | | 9132 | Tree 96-SH-01 | |
| 96 | 7 | 28 | 96-192 | 0 | Silver-Haired | f | l | a | 10.75 | | 9176 | Tree 96-SH-12 | |
| 96 | 7 | 28 | 96-198 | 0 | Silver-Haired | f | l | a | 11.25 | | 9175 | Tree 96-SH-12 | |
| 96 | 7 | 28 | 96-183 | 0 | Silver-Haired | f | nr | a | 10.5 | | 9168 | Tree 96-SH-12 | |
| 96 | 7 | 28 | 96-191 | 0 | Silver-Haired | f | nr | a | 11.5 | | 9177 | Tree 96-SH-12 | |
| 96 | 7 | 28 | 96-193 | 0 | Silver-Haired | f | nr | a | 11 | | 9180 | Tree 96-SH-12 | |
| 96 | 7 | 28 | 96-194 | 0 | Silver-Haired | f | nr | a | 13 | | 9183 | Tree 96-SH-12 | |
| 96 | 7 | 28 | 96-195 | 0 | Silver-Haired | f | nr | a | 10.5 | | 9184 | Tree 96-SH-12 | |
| 96 | 7 | 28 | 96-196 | 0 | Silver-Haired | f | nr | a | 10 | | 9181 | Tree 96-SH-12 | |
| 96 | 7 | 28 | 96-197 | 0 | Silver-Haired | f | nr | a | 11.5 | | 9179 | Tree 96-SH-12 | |
| 96 | 7 | 28 | 96-199 | 0 | Silver-Haired | f | nr | a | 11.5 | | 9182 | Tree 96-SH-12 | |
| 96 | 7 | 28 | 96-201 | 0 | Silver-Haired | f | nr | a | 11.5 | | 9185 | Tree 96-SH-12 | |
| 96 | 7 | 28 | 96-200 | 0 | Silver-Haired | f | pl | a | 10.5 | | 9178 | Tree 96-SH-12 | |
| 97 | 7 | 18 | 96-191 | 0 | Silver-Haired | f | l | a | 10.8 | 40.8 | 9177 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 96-193 | 0 | Silver-Haired | f | l | a | 10 | 41.2 | 9180 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 96-194 | 0 | Silver-Haired | f | l | a | 9.5 | 40.8 | 9183 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 96-197 | 0 | Silver-Haired | f | l | a | 11.2 | 42.9 | 9179 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 96-200 | 0 | Silver-Haired | f | l | a | 10.2 | 42 | 9178 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 96-201 | 0 | Silver-Haired | f | l | a | 10.8 | 40.6 | 9185 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-10 | 0 | Silver-Haired | f | l | a | 12.3 | 43.3 | 9207 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-37 | 0 | Silver-Haired | f | l | a | | 42 | 9216 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-41 | 0 | Silver-Haired | f | l | a | 10.5 | 40.4 | 9219 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-43 | 0 | Silver-Haired | f | l | a | 11 | 42.2 | 9222 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-44 | 0 | Silver-Haired | f | l | a | 11 | 41.6 | 9227 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-45 | 0 | Silver-Haired | f | l | a | 10.6 | 41.1 | 9223 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-46 | 0 | Silver-Haired | f | l | a | 10.9 | 41.9 | 9225 | Tree 97-SH-21 | |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 97 | 7 | 18 | 97-47 | 0 | Silver-Haired | f | l | a | 10.7 | 40.9 | 9224 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-48 | 0 | Silver-Haired | f | l | a | 10.7 | 40.5 | 9221 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-49 | 0 | Silver-Haired | f | l | a | 11.1 | 40.5 | 9226 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-50 | 0 | Silver-Haired | f | l | a | 9.8 | 41.1 | 9232 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-51 | 0 | Silver-Haired | f | l | a | 11.1 | 41.4 | 9230 | Tree 97-SH-21 | |
| 97 | 7 | 18 | 97-42 | 0 | Silver-Haired | f | nr | a | 11.4 | 41.5 | 9220 | Tree 97-SH-21 | |
| 97 | 7 | 27 | 97-05 | 0 | Silver-Haired | f | l | a | 10.75 | 40.9 | 9206 | Tree 97-SH-25 | |
| 97 | 7 | 27 | 97-55 | 0 | Silver-Haired | f | l | a | 9.3 | 41.9 | 9228 | Tree 97-SH-25 | |
| 97 | 7 | 27 | 97-59 | 0 | Silver-Haired | f | l | a | 12 | 42 | 9234 | Tree 97-SH-25 | |
| 97 | 7 | 27 | 97-60 | 0 | Silver-Haired | f | l | a | 9.5 | 40.6 | 9231 | Tree 97-SH-25 | |
| 97 | 7 | 27 | 97-61 | 0 | Silver-Haired | f | l | a | 13 | 41 | 9236 | Tree 97-SH-25 | |
| 97 | 7 | 27 | 97-62 | 0 | Silver-Haired | f | l | a | 10.5 | 40.5 | 9233 | Tree 97-SH-25 | |
| 97 | 7 | 27 | 97-63 | 0 | Silver-Haired | f | l | a | 10 | 41.3 | 9235 | Tree 97-SH-25 | |
| 97 | 7 | 27 | 97-64 | 0 | Silver-Haired | f | l | a | 11 | 41.1 | 9239 | Tree 97-SH-25 | |
| 97 | 7 | 27 | 97-65 | 0 | Silver-Haired | f | l | a | 10.5 | 41.15 | 9237 | Tree 97-SH-25 | |
| 97 | 7 | 27 | 97-66 | 0 | Silver-Haired | f | l | a | 11.5 | 40 | 9238 | Tree 97-SH-25 | |
| 97 | 7 | 27 | 97-67 | 0 | Silver-Haired | f | l | a | | 40.65 | 9240 | Tree 97-SH-25 | |
| 98 | 7 | 23 | 96-192 | 0 | Silver-Haired | f | l | a | 11.5 | 40.8 | 9176 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 96-198 | 0 | Silver-Haired | f | l | a | 11 | 39 | 9175 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 96-201 | 0 | Silver-Haired | f | l | a | 10.75 | 40.7 | 9185 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 97-10 | 0 | Silver-Haired | f | l | a | 11.5 | 43.2 | 9207 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 97-37 | 0 | Silver-Haired | f | l | a | 11.5 | 41.4 | 9216 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 97-42 | 0 | Silver-Haired | f | l | a | 10.5 | 41.7 | 9220 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 97-44 | 0 | Silver-Haired | f | l | a | 10 | 41.7 | 9227 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 97-45 | 0 | Silver-Haired | f | l | a | | | 9223 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 97-47 | 0 | Silver-Haired | f | l | a | 10.5 | 41.5 | 9224 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 97-48 | 0 | Silver-Haired | f | l | a | 10.5 | 40.6 | 9221 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 97-50 | 0 | Silver-Haired | f | l | a | 11.25 | 40.9 | 9232 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 97-51 | 0 | Silver-Haired | f | l | a | | | 9230 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 98-10 | 0 | Silver-Haired | f | l | a | 10 | 40.1 | A0083 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 98-17 | 0 | Silver-Haired | f | l | a | 11 | 41.3 | A0084 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 98-20 | 0 | Silver-Haired | f | l | a | 8.5 | 40.9 | A0085 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 96-200 | 0 | Silver-Haired | f | p | a | 17.5 | 41.9 | 9178 | Tree 98-SH-35 | |
| 98 | 7 | 23 | 98-11 | 0 | Silver-Haired | f | | j | 8 | 38.5 | | Tree 98-SH-35 | |
| 98 | 7 | 23 | 98-12 | 0 | Silver-Haired | f | | j | 8.25 | 40.1 | | Tree 98-SH-35 | |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 98 | 7 | 23 | 98-13 | 0 | Silver-Haired | m | | j | 8 | 41.5 | | Tree 98-SH-35 | |
| 98 | 7 | 23 | 98-14 | 0 | Silver-Haired | f | | j | 8 | 40.5 | | Tree 98-SH-35 | |
| 98 | 7 | 23 | 98-15 | 0 | Silver-Haired | m | | j | 8.5 | 41.9 | | Tree 98-SH-35 | |
| 98 | 7 | 23 | 98-16 | 0 | Silver-Haired | f | | j | 8.25 | 39.8 | | Tree 98-SH-35 | |
| 98 | 7 | 23 | 98-18 | 0 | Silver-Haired | f | | j | 7.75 | 39.6 | | Tree 98-SH-35 | |
| 98 | 7 | 23 | 98-19 | 0 | Silver-Haired | m | | j | 7.75 | 38 | | Tree 98-SH-35 | |
| 94 | 7 | 13 | 94-19 | 1 | Silver-Haired | f | l | a | 12.8 | 42.6 | | 16 Mile Marsh | 7 |
| 94 | 7 | 17 | 94-37 | 1 | Silver-Haired | f | l | a | 12 | 42.6 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-81 | 1 | Silver-Haired | f | l | a | 13.25 | 41.2 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-82 | 1 | Silver-Haired | f | l | a | 14.25 | 41.1 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-89 | 1 | Silver-Haired | f | l | a | 14 | 40.8 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-98 | 1 | Silver-Haired | f | l | a | 14 | 41.88 | | Handley Marsh | 3 |
| 94 | 7 | 13 | 94-20 | 1 | Silver-Haired | f | nr | a | 13.7 | 41.2 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-24 | 1 | Silver-Haired | f | nr | a | 12.1 | 41.96 | | 16 Mile Marsh | 7 |
| 94 | 7 | 17 | 94-35 | 1 | Silver-Haired | f | nr | a | 11.3 | 41 | | Handley Marsh | 3 |
| 94 | 7 | 17 | 94-45 | 1 | Silver-Haired | f | nr | a | 12.3 | 39.2 | | Handley Marsh | 3 |
| 94 | 7 | 17 | 94-46 | 1 | Silver-Haired | f | nr | a | 12.6 | 42.2 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-91 | 1 | Silver-Haired | f | pl | a | 11 | 41.47 | | Handley Marsh | 3 |
| 94 | 8 | 4 | 94-112 | 1 | Silver-Haired | f | pl | a | 13.25 | 43.26 | | 16 Mile Marsh | 7 |
| 95 | 7 | 19 | 95-111 | 1 | Silver-Haired | f | l | a | | 42.43 | | 16 Mile Marsh | 7 |
| 95 | 7 | 19 | 95-115 | 1 | Silver-Haired | f | l | a | 10.75 | 40.17 | | 16 Mile Marsh | 7 |
| 95 | 7 | 19 | 95-116 | 1 | Silver-Haired | f | l | a | 12 | 41.83 | | 16 Mile Marsh | 7 |
| 95 | 7 | 24 | 95-130 | 1 | Silver-Haired | f | l | a | 12.75 | 40.03 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-140 | 1 | Silver-Haired | f | l | a | 12.25 | 41.2 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-142 | 1 | Silver-Haired | f | l | a | 12.5 | 41.07 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-143 | 1 | Silver-Haired | f | l | a | 14.75 | 43.2 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-144 | 1 | Silver-Haired | f | l | a | 12.5 | 41.93 | | 16 Mile Marsh | 7 |
| 95 | 7 | 9 | 95-45 | 1 | Silver-Haired | f | nr | a | 9.25 | 40.6 | | Handley Marsh | 3 |
| 95 | 7 | 9 | 95-56 | 1 | Silver-Haired | f | nr | a | 12.25 | 43.2 | | Handley Marsh | 3 |
| 95 | 7 | 6 | 95-36 | 1 | Silver-Haired | f | p | a | 11.75 | 42.53 | | Harcourt Marsh | 6 |
| 95 | 7 | 6 | 95-38 | 1 | Silver-Haired | f | p | a | 13.75 | 42.6 | | Harcourt Marsh | 6 |
| 95 | 7 | 6 | 95-39 | 1 | Silver-Haired | f | p | a | 13.25 | 42.03 | | Harcourt Marsh | 6 |
| 95 | 7 | 9 | 95-50 | 1 | Silver-Haired | f | p | a | 13 | 48.7 | | Handley Marsh | 3 |
| 95 | 7 | 9 | 95-51 | 1 | Silver-Haired | f | p | a | 13.25 | 39.83 | | Handley Marsh | 3 |
| 95 | 7 | 11 | 95-58 | 1 | Silver-Haired | f | p | a | 12.25 | 40.07 | | Harcourt Marsh | 6 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95 | 7 | 14 | 95-68 | 1 | Silver-Haired | f | p | a | 14.75 | 41.83 | | 16 Mile Marsh | 7 |
| 96 | 7 | 21 | 96-169 | 1 | Silver-Haired | f | l | a | 14.5 | 41.8 | 9155 | Harcourt Marsh | 6 |
| 96 | 7 | 21 | 96-170 | 1 | Silver-Haired | f | l | a | 13.5 | 41.4 | | Harcourt Marsh | 6 |
| 96 | 7 | 23 | 96-187 | 1 | Silver-Haired | f | l | a | 16.25 | 43.7 | | 16 Mile Marsh | 7 |
| 96 | 7 | 23 | 96-188 | 1 | Silver-Haired | f | l | a | 15.25 | 42.6 | 9174 | 16 Mile Marsh | 7 |
| 96 | 7 | 23 | 96-38 | 1 | Silver-Haired | f | l | a | 13.25 | 41.73 | 9123 | 16 Mile Marsh | 7 |
| 96 | 6 | 6 | 96-25 | 1 | Silver-Haired | f | nr | a | 10.25 | 40.1 | 9118 | Harcourt Marsh | 6 |
| 96 | 6 | 6 | 96-27 | 1 | Silver-Haired | f | nr | a | 10 | 37.95 | 9120 | Harcourt Marsh | 6 |
| 96 | 6 | 10 | 96-32 | 1 | Silver-Haired | f | nr | a | 9 | 41 | 9122 | 16 Mile Marsh | 7 |
| 96 | 6 | 19 | 96-38 | 1 | Silver-Haired | f | nr | a | 12.75 | 41.73 | 9123 | 16 Mile Marsh | 7 |
| 96 | 6 | 26 | 96-79 | 1 | Silver-Haired | f | nr | a | 10.5 | 39.53 | 9131 | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-80 | 1 | Silver-Haired | f | nr | a | 11.25 | 40.43 | 9132 | Gerrard's pond | 10 |
| 96 | 7 | 23 | 96-183 | 1 | Silver-Haired | f | nr | a | 11.5 | 40.53 | 9168 | 16 Mile Marsh | 7 |
| 96 | 7 | 23 | 96-185 | 1 | Silver-Haired | f | nr | a | 12.75 | 41.17 | 9173 | 16 Mile Marsh | 7 |
| 96 | 7 | 23 | 96-189 | 1 | Silver-Haired | f | nr | a | 12.25 | 40.53 | 9172 | 16 Mile Marsh | 7 |
| 96 | 6 | 26 | 96-60 | 1 | Silver-Haired | f | p | a | 10.5 | 41.7 | 9125 | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-73 | 1 | Silver-Haired | f | p | a | 15.25 | 42.53 | 9126 | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-75 | 1 | Silver-Haired | f | p | a | 13 | 42.53 | . | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-77 | 1 | Silver-Haired | f | p | a | 13.5 | 43.37 | 9127 | Gerrard's pond | 10 |
| 96 | 6 | 26 | 96-78 | 1 | Silver-Haired | f | p | a | 12.5 | 42.37 | 9128 | Gerrard's pond | 10 |
| 96 | 8 | 9 | 96-192 | 1 | Silver-Haired | f | pl | a | 13.25 | | 9176 | 16 Mile Marsh | 7 |
| 97 | 7 | 16 | 97-37 | 1 | Silver-Haired | f | l | a | 11.25 | 41.04 | 9216 | 16 Mile Marsh | 7 |
| 97 | 7 | 16 | 97-38 | 1 | Silver-Haired | f | l | a | 14.75 | 42.9 | 9217 | 16 Mile Marsh | 7 |
| 97 | 7 | 22 | 97-55 | 1 | Silver-Haired | f | l | a | 12.7 | 42 | 9228 | 16 Mile Marsh | 7 |
| 97 | 8 | 1 | 97-85 | 1 | Silver-Haired | f | l | a | 13.5 | 40.2 | 9256 | 16 Mile Marsh | 7 |
| 97 | 6 | 6 | 97-05 | 1 | Silver-Haired | f | nr | a | 9.25 | 40.75 | 9206 | 16 Mile Marsh | 7 |
| 97 | 6 | 6 | 97-06 | 1 | Silver-Haired | f | nr | a | 10.25 | 39.3 | 9203 | 16 Mile Marsh | 7 |
| 97 | 6 | 9 | 97-10 | 1 | Silver-Haired | f | nr | a | 11 | 43.2 | 9207 | 16 Mile Marsh | 7 |
| 97 | 7 | 7 | 97-30 | 1 | Silver-Haired | f | nr | a | 9.5 | 40.6 | 9215 | 16 Mile Marsh | 7 |
| 98 | 7 | 17 | 97-44 | 1 | Silver-Haired | f | l | a | 13.7 | 41.7 | 9227 | 16 Mile Marsh | 7 |
| 98 | 7 | 17 | 97-51 | 1 | Silver-Haired | f | l | a | 12.5 | 41.3 | 9230 | 16 Mile Marsh | 7 |
| 98 | 7 | 17 | 98-05 | 1 | Silver-Haired | f | l | a | 12.2 | 39.9 | A0082 | 16 Mile Marsh | 7 |
| 98 | 7 | 20 | 97-45 | 1 | Silver-Haired | f | l | a | 12.9 | 41.3 | 9223 | 16 Mile Marsh | 7 |
| 98 | 7 | 21 | 98-09 | 1 | Silver-Haired | f | l | a | | 41.2 | | 16 Mile Marsh | 7 |
| 94 | 7 | 17 | 94-41 | 1 | Silver-Haired | m | et | a | 9.9 | 43.1 | | Handley Marsh | 3 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 94 | 7 | 17 | 94-44 | 1 | Silver-Haired | m | et | a | 11.8 | 40.5 | | Handley Marsh | 3 |
| 94 | 7 | 17 | 94-47 | 1 | Silver-Haired | m | et | a | 10.7 | 41 | | Handley Marsh | 3 |
| 94 | 7 | 17 | 94-48 | 1 | Silver-Haired | m | et | a | 13 | 40.3 | | Handley Marsh | 3 |
| 94 | 7 | 13 | 94-27 | 1 | Silver-Haired | m | | a | 10.5 | 41.6 | | 16 Mile Marsh | 7 |
| 94 | 7 | 29 | 94-88 | 1 | Silver-Haired | m | | a | 12.5 | 43.07 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-90 | 1 | Silver-Haired | m | | a | 11.25 | 39.73 | | Handley Marsh | 3 |
| 94 | 7 | 29 | 94-96 | 1 | Silver-Haired | m | | a | 11.75 | 40.77 | | Handley Marsh | 3 |
| 94 | 8 | 4 | 94-110 | 1 | Silver-Haired | m | | a | 15.25 | 40.31 | | 16 Mile Marsh | 7 |
| 95 | 7 | 17 | 95-104 | 1 | Silver-Haired | m | sc | a | 10.5 | 42.63 | | Handley Marsh | 3 |
| 95 | 7 | 17 | 95-105 | 1 | Silver-Haired | m | sc | a | 10.75 | 10.93 | | Handley Marsh | 3 |
| 95 | 7 | 17 | 95-107 | 1 | Silver-Haired | m | sc | a | 9.75 | 41.7 | | Handley Marsh | 3 |
| 95 | 7 | 17 | 95-108 | 1 | Silver-Haired | m | sc | a | 9.25 | 38.37 | | Handley Marsh | 3 |
| 95 | 7 | 17 | 95-110 | 1 | Silver-Haired | m | sc | a | 11.75 | 40.53 | | Handley Marsh | 3 |
| 95 | 7 | 19 | 95-127 | 1 | Silver-Haired | m | sc | a | 11.5 | 40.9 | | 16 Mile Marsh | 7 |
| 95 | 7 | 9 | 95-46 | 1 | Silver-Haired | m | | a | 11.25 | 42.77 | | Handley Marsh | 3 |
| 95 | 7 | 9 | 95-54 | 1 | Silver-Haired | m | | a | 11.5 | 41 | | Handley Marsh | 3 |
| 95 | 7 | 19 | 95-128 | 1 | Silver-Haired | m | | a | 12 | 40.27 | | 16 Mile Marsh | 7 |
| 95 | 7 | 25 | 95-136 | 1 | Silver-Haired | m | | a | 10.75 | 41.13 | | Handley Marsh | 3 |
| 95 | 7 | 28 | 95-145 | 1 | Silver-Haired | m | | a | 11.5 | 41.4 | | 16 Mile Marsh | 7 |
| 95 | 7 | 28 | 95-155 | 1 | Silver-Haired | m | | a | 11.25 | 41.17 | | 16 Mile Marsh | 7 |
| 96 | 6 | 6 | 96-24 | 1 | Silver-Haired | m | | a | 9 | 40.67 | 9117 | Harcourt Marsh | 6 |
| 96 | 6 | 6 | 96-26 | 1 | Silver-Haired | m | | a | 8.75 | 42.27 | 9119 | Harcourt Marsh | 6 |
| 96 | 6 | 20 | 96-50 | 1 | Silver-Haired | m | | a | 9.5 | 41.75 | 9130 | 16 Mile Marsh | 7 |
| 96 | 6 | 26 | 96-87 | 1 | Silver-Haired | m | | a | 9 | 41.22 | | Gerrard's pond | 10 |
| 96 | 7 | 1 | 96-95 | 1 | Silver-Haired | m | | a | 9.5 | 40.73 | 9140 | 16 Mile Marsh | 7 |
| 96 | 7 | 10 | 96-132 | 1 | Silver-Haired | m | | a | 10 | 41.57 | 9159 | Gerrard's Pond | 10 |
| 96 | 7 | 21 | 96-171 | 1 | Silver-Haired | m | | a | 12.75 | 41.76 | 9161 | Harcourt Marsh | 6 |
| 97 | 6 | 14 | 97-18 | 1 | Silver-Haired | m | nr | a | 9 | 42.6 | 9210 | 16 Mile Marsh | 7 |
| 97 | 6 | 14 | 97-15 | 1 | Silver-Haired | m | sc | a | 9 | 41.6 | 9211 | 16 Mile Marsh | 7 |
| 97 | 7 | 22 | 97-56 | 1 | Silver-Haired | m | | a | 12.5 | 41.1 | 9229 | 16 Mile Marsh | 7 |
| 94 | 7 | 29 | 94-101 | 1 | Silver-Haired | m | | j | 10 | 41.85 | | Handley Marsh | 3 |
| 94 | 8 | 4 | 94-108 | 1 | Silver-Haired | m | | j | 10.5 | 40.17 | | 16 Mile Marsh | 7 |
| 94 | 8 | 4 | 94-111 | 1 | Silver-Haired | f | | j | 7.25 | 38.25 | | 16 Mile Marsh | 7 |
| 94 | 8 | 4 | 94-113 | 1 | Silver-Haired | f | | j | 10.5 | 40.98 | | 16 Mile Marsh | 7 |
| 94 | 8 | 4 | 94-114 | 1 | Silver-Haired | m | | j | 10.5 | 41.88 | | 16 Mile Marsh | 7 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 94 | 8 | 4 | 94-115 | 1 | Silver-Haired | m | | j | 9.75 | 42.05 | | 16 Mile Marsh | 7 |
| 94 | 8 | 4 | 94-116 | 1 | Silver-Haired | f | | j | 9.5 | 40.45 | | 16 Mile Marsh | 7 |
| 94 | 8 | 4 | 94-120 | 1 | Silver-Haired | f | | j | 9.5 | 39.97 | | 16 Mile Marsh | 7 |
| 95 | 7 | 16 | 95-97 | 1 | Townsend's Big-Eared | m | | a | 8.75 | 41.73 | | 16 Mile Road near cabin | 8 |
| 96 | 6 | 7 | 96-28 | 1 | Townsend's Big-Eared | m | | a | 8.75 | 42.7 | | Maloney's mine | 14 |
| 97 | 7 | 4 | 97-20 | 0 | Townsend's Big-Eared | m | | a | 9.5 | 44.07 | | Joan Smith's Shed | 13 |
| 94 | 7 | 13 | 94-18 | 1 | West Long-Eared | f | nr | a | 5.4 | 37.13 | | 16 Mile Marsh | 7 |
| 94 | 7 | 29 | 94-87 | 1 | West Long-Eared | f | pl | a | 6.25 | 38.18 | | Handley Marsh | 3 |
| 95 | 6 | 16 | 95-05 | 1 | West Long-Eared | f | nr | a | 6 | 38.03 | | 16 Mile Marsh | 7 |
| 95 | 6 | 16 | 95-09 | 1 | West Long-Eared | f | nr | a | 6 | 38.47 | | 16 Mile Marsh | 7 |
| 95 | 6 | 30 | 95-21 | 1 | West Long-Eared | f | p | a | 6.25 | 38.03 | | 16 Mile Marsh | 7 |
| 95 | 6 | 30 | 95-25 | 1 | West Long-Eared | f | p | a | . | . | | 16 Mile Marsh | 7 |
| 96 | 6 | 2 | 96-23 | 1 | West Long-Eared | f | nr | a | 5.75 | 37.1 | | 16 Mile Marsh | 7 |
| 96 | 6 | 16 | 96-36 | 1 | West Long-Eared | f | nr | a | 16.25 | 39.48 | | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-49 | 1 | West Long-Eared | f | nr | a | 5.5 | 35.83 | | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-51 | 1 | West Long-Eared | f | nr | a | 4.75 | 37.48 | | 16 Mile Marsh | 7 |
| 97 | 6 | 9 | 97-13 | 1 | West Long-Eared | f | nr | a | 6 | 36.5 | | 16 Mile Marsh | 7 |
| 97 | 7 | 4 | 97-29 | 1 | West Long-Eared | f | nr | a | 6.5 | 37 | | 16 Mile Marsh | 7 |
| 97 | 7 | 7 | 97-32 | 1 | West Long-Eared | f | nr | a | 4.5 | 37.7 | | 16 Mile Marsh | 7 |
| 97 | 7 | 12 | 97-33 | 1 | West Long-Eared | f | nr | a | 5.5 | 38.48 | | 16 Mile Marsh | 7 |
| 97 | 7 | 20 | 97-53 | 1 | West Long-Eared | f | nr | a | 6 | 37.5 | | 16 Mile Marsh | 7 |
| 97 | 7 | 22 | 97-57 | 1 | West Long-Eared | f | nr | a | 7 | 38.7 | | 16 Mile Road Above Marsh | 11 |
| 97 | 8 | 7 | 97-86 | 1 | West Long-Eared | f | pl | a | 6.25 | 37.65 | | 16 Mile Road Above Marsh | 11 |
| 98 | 7 | 20 | 98-07 | 1 | West Long-Eared | f | nr | a | 4.7 | 38.1 | | 16 Mile Marsh | 7 |
| 94 | 7 | 13 | 94-16 | 1 | West Long-Eared | m | | a | 5.6 | 37.56 | | 16 Mile Marsh | 7 |
| 95 | 7 | 19 | 95-118 | 1 | West Long-Eared | m | sc | a | 6 | 38.27 | | 16 Mile Marsh | 7 |
| 95 | 6 | 29 | 95-13 | 1 | West Long-Eared | m | | a | 5 | 35.6 | | Handley Marsh | 3 |
| 95 | 7 | 3 | 95-26 | 1 | West Long-Eared | m | | a | 7.5 | 36.9 | | 16 Mile Marsh | 7 |
| 95 | 7 | 6 | 95-37 | 1 | West Long-Eared | m | | a | 5 | 35.83 | | Harcourt Marsh | 6 |
| 95 | 7 | 14 | 95-61 | 1 | West Long-Eared | m | | a | 5.5 | 38.63 | | 16 Mile Marsh | 7 |
| 96 | 6 | 20 | 96-47 | 1 | West Long-Eared | m | | a | 4 | 35.23 | | 16 Mile Marsh | 7 |
| 96 | 7 | 21 | 96-172 | 1 | West Long-Eared | m | | a | 6.5 | 36.1 | | Harcourt Marsh | 6 |
| 96 | 7 | 21 | 96-173 | 1 | West Long-Eared | m | | a | 5.75 | 38.4 | | Harcourt Marsh | 6 |
| 97 | 7 | 12 | 97-34 | 1 | West Long-Eared | m | | a | 5.25 | 36.52 | | 16 Mile Marsh | 7 |
| 97 | 7 | 20 | 97-54 | 1 | West Long-Eared | m | | a | 5 | 38.6 | | 16 Mile Marsh | 7 |

Appendix 2, cont.

| Year | Month | Day | Bat# | Netted | Species | Sex | RC | Age | Mass | FA | Band# | Location | Location Number |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 97 | 8 | 1 | 97-83 | 1 | West Long-Eared | m | | a | 5.25 | 36.1 | | 16 Mile Marsh | 7 |
| 95 | 7 | 4 | 95-31 | 1 | Yuma | f | p | a | 8 | 37.7 | | Waneta Reservoir | 1 |
| 95 | 7 | 4 | 95-35 | 1 | Yuma | f | p | a | 6 | 37.7 | | Waneta Reservoir | 1 |

Appendix 3. Characteristics and locations of all roost trees found during the summers of 1995-98. Stand age class and crown closure class codes refer to forest cover label codes. Stand age class 0 refers to a forest cover designation of NSR (Not Satisfactorily Restocked). All UTM locations correspond to NAD 83, zone 11. Blanks indicate missing values.

| Year | Bat Species | Tree | Tree Spp. | Decay Stage | DBH (cm) | Tree Height (m) | Slope (°) | Aspect | BGC Zone | Stand Age Class | Crown Closure Class | UTM Easting | UTM Northing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 95 | Big Brown | 1 | At | 2 | 47 | 34.66 | 17 | 65 | ICH dw | 0 | 0 | 462290.906 | 5434053.5 |
| 95 | Big Brown | 2 | At | 2 | 43.5 | 26 | 3 | 170 | ICH dw | 0 | 0 | 469853.688 | 5434360 |
| 95 | Big Brown | 3 | At | 2 | 41.4 | 33.09 | 3 | 225 | ICH dw | 5 | 5 | 469959.031 | 5434551.5 |
| 95 | Big Brown | 4 | At | 6 | 45.7 | 15.93 | 19 | 250 | ICH dw | 0 | 0 | 469987.906 | 5435872 |
| 95 | Big Brown | 5 | At | 2 | 41.7 | 23.84 | 4 | 170 | ICH dw | 5 | 5 | 469915.281 | 5434427 |
| 95 | Big Brown | 11 | At | 6 | 54 | 20.05 | 19 | 270 | ICH dw | 5 | 5 | 469876.969 | 5435900 |
| 95 | Big Brown | 13 | Fd | 5 | 83.4 | 59.64 | 8 | 110 | ICH dw | 6 | 6 | 462252.656 | 5434291 |
| 95 | Big Brown | 15 | At | 2 | 39.6 | 20.81 | 22 | 245 | ICH dw | 5 | 5 | 469988.813 | 5435891 |
| 95 | Big Brown | 16 | Py | 2 | 74.2 | 21.48 | 34 | 90 | ICH dw | 6 | 6 | 462196.188 | 5434481.5 |
| 95 | Big Brown | 17 | At | 6 | 44.5 | 14.93 | 17 | 270 | ICH dw | 5 | 5 | 469999.563 | 5435936 |
| 95 | Big Brown | 22 | At | 2 | 32.1 | 28.71 | 21 | 174 | ICH dw | 3 | 9 | 464204.25 | 5433965.5 |
| 95 | Big Brown | 24 | At | 2 | 22.6 | 24.17 |  | 174 | ICH dw | 6 | 5 | 463645.125 | 5434107 |
| 95 | Big Brown | 25 | At | 2 | 59.5 | 35.65 | 2 | 40 | ICH dw | 0 | 0 | 461975.063 | 5435128.5 |
| 95 | Big Brown | 28 | At | 6 | 40.4 | 13.68 | 16 | 35 | ICH dw | 0 | 0 | 461954.25 | 5434979.5 |
| 95 | Big Brown | 31 | At | 3 | 57 | 31.76 | 15 | 200 | ICH dw | 8 | 4 | 469328.75 | 5437002 |
| 96 | Big Brown | BB01 | At | 2 | 43 | 25.28 | 10 | 130 | ICH dw | 6 | 5 | 468938.781 | 5433930.5 |
| 96 | Big Brown | BB02 | Pw | 4 | 46.5 | 41.03 | 21 | 110 | ICH dw | 5 | 4 | 468809.313 | 5434550 |
| 96 | Big Brown | BB03 | Pw | 4 | 71 | 47.85 | 38 | 140 | ICH dw | 6 | 5 | 469449.625 | 5435504.5 |
| 96 | Big Brown | BB04 | Pw | 4 | 58 | 38.6 | 38 | 270 | ICH dw | 6 | 5 | 469533.281 | 5435241 |
| 96 | Big Brown | BB05 | At | 2 | 38 | 25.36 | 19 | 240 | ICH xw | 6 | 4 | 470801.844 | 5434078.5 |
| 96 | Big Brown | BB06 | At | 6 | 46 | 16.28 | 23 | 246 | ICH xw | 6 | 3 | 470963.156 | 5433678 |
| 96 | Big Brown | BB07 | At | 2 | 46.5 | 33.71 | 14 | 230 | ICH xw | 6 | 4 | 470620.781 | 5433304.5 |
| 96 | Big Brown | BB08 | At | 2 | 40.5 | 28.08 | 18 | 260 | ICH xw |  |  | 470781.219 | 5433710.5 |
| 96 | Big Brown | BB09 | At | 2 | 31 | 26.08 | 3 | 196 | ICH dw | 5 | 5 | 469900.219 | 5434541 |
| 96 | Big Brown | BB10 | Fd | 4 | 77 | 29.74 | 9 | 175 | ICH dw | 5 | 5 | 470837.219 | 5435215.5 |
| 96 | Big Brown | BB12 | At | 2 | 42.5 | 26.2 | 14 | 235 | ICH xw | 6 | 4 | 470666.375 | 5433286 |
| 96 | Big Brown | BB13 | At | 2 | 46.7 | 32.04 | 12 | 238 | ICH xw | 6 | 3 | 470972.656 | 5433533 |
| 96 | Big Brown | BB14 | At | 2 | 36 | 24.45 | 9 | 171 | ICH dw | 5 | 5 | 470837.469 | 5435263 |
| 96 | Big Brown | BB15 | At | 2 | 53 | 35.74 | 23 | 246 | ICH xw | 6 | 3 | 470956.844 | 5433690.5 |

Appendix 3 cont .

| Year | Bat Species | Tree | Tree Spp. | Decay Stage | DBH (cm) | Tree Height (m) | Slope (°) | Aspect | BGC Zone | Stand Age Class | Crown Closure Class | UTM Easting | UTM Northing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96 | Big Brown | BB16 | At | 2 | 43.5 | 25.71 | 12 | 238 | ICH xw | 6 | 3 | 470986.313 | 5433544.5 |
| 96 | Big Brown | BB17 | At | 2 | 46.5 | 35.49 | 14 | 250 | ICH xw | 6 | 3 | 470839.094 | 5433513.5 |
| 96 | Big Brown | BB18 | At | 2 | 32 | 29.02 | 15 | 108 | ICH dw | 6 | 5 | 468912.75 | 5433979 |
| 96 | Big Brown | BB19 | At | 2 | 52 | 29.28 | 12 | 238 | ICH xw | 6 | 3 | 470980.25 | 5433524.5 |
| 96 | Big Brown | BB20 | At | 5 | 25.5 | 14.79 | 20 | 240 | ICH xw | 6 | 3 | 470910.875 | 5433563.5 |
| 96 | Big Brown | BB21 | At | 2 | 45.5 | 30.64 | 12 | 238 | ICH xw | 6 | 3 | 470960.594 | 5433536 |
| 96 | Big Brown | BB22 | At | 2 | 47 | 29.27 | 12 | 238 | ICH xw | 6 | 3 | 470972.719 | 5433530.5 |
| 96 | Big Brown | BB23 | At | 2 | 53.5 | 34.98 | 14 | 250 | ICH xw | 6 | 3 | 470845.219 | 5433523 |
| 96 | Big Brown | BB24 | Lw | 5 | 96.5 | 48.88 | 37 | 62 | ICH dw | 6 | 5 | 469074.219 | 5435563 |
| 96 | Big Brown | BB25 | At | 2 | 55 | 30.23 | 11 | 100 | ICH dw | 5 | 4 | 468806.656 | 5434718 |
| 97 | Big Brown | BB26 | Fd | 5 | 68.5 | 37.84 | 12 | 152 | ICH dw | 5 | 5 | 470603.156 | 5434886.5 |
| 97 | Big Brown | BB27 | Fd | 5 | 70.2 | 35.57 | 12 | 152 | ICH dw | 5 | 5 | 470606.781 | 5434883.5 |
| 97 | Big Brown | BB28 | At | 2 | 32.6 | 28.71 | 14 | 120 | ICH dw | 5 | 5 | 470683.813 | 5435100.5 |
| 97 | Big Brown | BB31 | At | 2 | 43.4 | 31.5 | 23 | 186 | ICH xw | 6 | 3 | 470922.5 | 5433362 |
| 97 | Big Brown | BB32 | At | 2 | 27.4 | 25.3 | 15 | 196 | ICH dw | 5 | 5 | 470587.656 | 5434973.5 |
| 97 | Big Brown | BB33 | Pw | 5 | 72 | 22.48 | 16 | 135 | ICH dw | 6 | 5 | 469501.625 | 5435616.5 |
| 97 | Big Brown | BB34 | At | 2 | 38.5 | 25.75 | 6 | 238 | ICH xw | 6 | 4 | 470431.188 | 5433203.5 |
| 95 | Silver-Haired | 6 | At | 2 | 37.6 | 28.19 | . | 140 | ICH dw | 5 | 4 | 469450.625 | 5430338.5 |
| 95 | Silver-Haired | 7 | Fd | 4 | 70 | 27.64 | 28 | 324 | ICH mw2 | 3 | 6 | 468689.031 | 5429292.5 |
| 95 | Silver-Haired | 8 | Fd | 6 | 29 | 5.99 | 28 | 70 | ICH dw | 6 | 6 | 461965.594 | 5434120 |
| 95 | Silver-Haired | 9 | Fd | 5 | 37.2 | 13.74 | 20 | 95 | ICH dw | 0 | 0 | 462044.125 | 5433669.5 |
| 95 | Silver-Haired | 10 | At | 5 | 40.4 | 24.5 | 6 | 97 | ICH dw | | | | |
| 95 | Silver-Haired | 12 | At | 2 | 44.6 | 37.59 | 19 | 90 | ICH dw | 5 | 4 | 468728.844 | 5434730.5 |
| 95 | Silver-Haired | 18 | At | 2 | 43.3 | 27 | 30 | 105 | ICH dw | 1 | 2 | 468961.75 | 5434952.5 |
| 95 | Silver-Haired | 20 | At | 2 | 46.2 | 24.3 | 11 | 140 | ICH xw | 6 | 4 | 469980.75 | 5433511 |
| 95 | Silver-Haired | 21 | Fd | 4 | 39.2 | 14.2 | 29 | 95 | ICH dw | 6 | 6 | 461952.219 | 5434099 |
| 95 | Silver-Haired | 23 | At | 5 | 30.2 | 13 | 20 | 100 | ICH dw | 5 | 4 | 468722.313 | 5434682 |
| 95 | Silver-Haired | 27 | At | 5 | 30.2 | 19.49 | 16 | 230 | ICH dw | 6 | 2 | 469810.125 | 5434669.5 |
| 95 | Silver-Haired | 32 | Pl | 7 | 36.6 | 5.36 | 20 | 240 | ICH xw | 4 | 5 | 471359.594 | 5431837.5 |
| 96 | Silver-Haired | SH01 | At | 6 | 45 | 9.39 | 0 | 0 | ICH dw | 5 | 2 | 477772.438 | 5427593 |

Appendix 3 cont .

| Year | Bat Species | Tree | Tree Spp. | Decay Stage | DBH (cm) | Tree Height (m) | Slope (°) | Aspect | BGC Zone | Stand Age Class | Crown Closure Class | UTM Easting | UTM Northing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 96 | Silver-Haired | SH02 | Fd | 3 | 79.5 | 37.49 | 20 | 7 | ICH mw2 | 8 | 2 | 468876.25 | 5429489.5 |
| 96 | Silver-Haired | SH03 | Py | 2 | 93 | 40.95 | 21 | 307 | ICH mw2 | 3 | 7 | 470231.781 | 5430215 |
| 96 | Silver-Haired | SH04 | At | 2 | 38.5 | 28.46 | 4 | 230 | ICH dw | 5 | 5 | 469952.5 | 5434797 |
| 96 | Silver-Haired | SH05 | At | 2 | 28.5 | 20.13 | 0 | 0 | ICH dw | 5 | 2 | 477778.563 | 5427507.5 |
| 96 | Silver-Haired | SH07 | At | 2 | 31.5 | 25.77 | 9 | 200 | ICH dw | 5 | 5 | 469942.969 | 5434723 |
| 96 | Silver-Haired | SH08 | At | 2 | 45 | 27.97 | 13 | 86 | ICH xw | 1 | 2 | 469119.594 | 5433507 |
| 96 | Silver-Haired | SH09 | Ep | 2 | 25 | 19.03 | 0 | 0 | ICH dw | 5 | 2 | 477875.813 | 5427512.5 |
| 96 | Silver-Haired | SH10 | At | 2 | 33 | 25.5 | 7.5 | 200 | ICH dw | 5 | 5 | 469950.75 | 5434597 |
| 96 | Silver-Haired | SH11 | Py | 2 | 67 | 33.06 | . | . | ICH mw2 | 3 | 7 | 469979.781 | 5430166.5 |
| 96 | Silver-Haired | SH12 | At | 2 | 32.5 | 30.32 | 7 | 230 | ICH dw | 5 | 5 | 469943.188 | 5434873 |
| 96 | Silver-Haired | SH13 | Py | 5 | 41.5 | 32.51 | 29 | 348 | ICH mw2 | 8 | 2 | 468771.5 | 5429486 |
| 96 | Silver-Haired | SH14 | At | 2 | 42 | 16.74 | 19 | 160 | ICH xw | 6 | 3 | 469002.75 | 5433312.5 |
| 96 | Silver-Haired | SH15 | At | 2 | 31 | 19.82 | 16 | 60 | ICH xw | 6 | 5 | 468907.5 | 5433303.5 |
| 96 | Silver-Haired | SH16 | At | 2 | 42 | 27.3 | 2 | 194 | ICH dw | 5 | 5 | 469908.156 | 5434457 |
| 96 | Silver-Haired | SH17 | At | 6 | 37 | 10.62 | 13 | 86 | ICH xw | 1 | 2 | 469123.156 | 5433504.5 |
| 96 | Silver-Haired | SH18 | Bg | 5 | 32.5 | 21.77 | 21 | 44 | ICH dw | 5 | 6 | 468318.344 | 5437333.5 |
| 96 | Silver-Haired | SH19 | Bg | 4 | 34.5 | 29.58 | 11 | 77 | ICH dw | 5 | 6 | 468433.219 | 5437299 |
| 97 | Silver-Haired | SH20 | Fd | 5 | 40.5 | 17.01 | 16 | 258 | ICH dw | 6 | 2 | 469824.719 | 5434678.5 |
| 97 | Silver-Haired | SH21 | At | 2 | 31.6 | 20.63 | 10 | 154 | ICH xw | 0 | 0 | 470211.063 | 5434246 |
| 97 | Silver-Haired | SH22 | Hw | 5 | 44 | 21.53 | 15 | 56 | ICH mw2 | 5 | 6 | 468089.844 | 5436935.5 |
| 97 | Silver-Haired | SH23 | At | 5 | 22.7 | 11.1 | 2 | 220 | ICH dw | 6 | 2 | 469797.375 | 5434553.5 |
| 97 | Silver-Haired | SH24 | At | 2 | 34.9 | 26.11 | 21 | 263 | ICH dw | 6 | 2 | 469737.875 | 5434784 |
| 97 | Silver-Haired | SH25 | At | 2 | 38 | 27.64 | 20 | 130 | ICH dw | 5 | 4 | 468896 | 5434604.5 |
| 97 | Silver-Haired | SH26 | At | 2 | 31 | 28.78 | 6 | 187 | ICH dw | 5 | 5 | 469907.75 | 5434568.5 |
| 97 | Silver-Haired | SH27 | At | 2 | 44 | 31.42 | 2 | 187 | ICH dw | 5 | 5 | 469903.656 | 5434530.5 |
| 97 | Silver-Haired | SH28 | At | 2 | 42 | 31.72 | 19 | 140 | ICH dw | 2 | 5 | 468482.375 | 5434915.5 |
| 97 | Silver-Haired | SH29 | At | 6 | 29 | 12.03 | 9 | 162 | ICH dw | 2 | 5 | 468765.969 | 5434885 |
| 97 | Silver-Haired | SH30 | Fd | 5 | 35.7 | 25.85 | 19 | 182 | ICH dw | 5 | 5 | 469996.25 | 5434947 |
| 98 | Silver-Haired | SH34 | At | 2 | 48.5 | 32.24 | 6 | 200 | ICH xw | 6 | 4 | 470320.875 | 5433700.5 |
| 98 | Silver-Haired | SH35 | At | 4 | 36.5 | 22.66 | 6 | 200 | ICH xw | 6 | 4 | 470312.406 | 5433629 |

Appendix 3 cont .

| Year | Bat Species | Tree | Tree Spp. | Decay Stage | DBH (cm) | Tree Height (m) | Slope (°) | Aspect | BGC Zone | Stand Age Class | Crown Closure Class | UTM Easting | UTM Northing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 98 | Silver-Haired | SH36 | At | 2 | 27 | 25.49 | 3 | 210 | ICH dw | 5 | 5 | 469961 | 5434465 |
| 98 | Silver-Haired | SH37 | At | 2 | 35 | 28.94 | 9 | 150 | ICH dw | 5 | 5 | 470725.063 | 5435134 |
| 98 | Silver-Haired | SH38 | At | 2 | 38 | 28.84 | 31 | 280 | ICH dw | 6 | 2 | 469724.938 | 5434756.5 |
| 95 | California | 26 | Fd | 5 | 64.6 | 27.53 | 19 | 160 | ICH dw | 5 | 5 | 470625.688 | 5435042 |
| 95 | California | 29 | Fd | 4 | 49.3 | 30.31 | 20 | 240 | ICH mw2 | 8 | 6 | 469560.5 | 5437366 |
| 95 | California | 30 | Fd | 5 | 55.7 | 17.97 | 15 | 194 | ICH mw2 | 8 | 6 | 469825.219 | 5437471 |
| 95 | California | 33 | Fd | 5 | 44.2 | 23.58 | 19 | 160 | ICH dw | 5 | 5 | 470628.625 | 5435038.5 |
| 96 | California | CA02 | Bg | 4 | 41.5 | 24.82 | 17 | 108 | ICH dw | 0 | 0 | 470822.313 | 5435691 |
| 96 | California | CA03 | Fd | 5 | 46 | 15.19 | 24 | 128 | ICH dw | 0 | 0 | 470840.031 | 5435999.5 |
| 96 | California | CA04 | Bg | 3 | 37 | 22.17 | 22 | 163 | ICH dw | 5 | 5 | 470570.938 | 5435552.5 |
| 96 | California | CA05 | Pw | 4 | 42.5 | 31.37 | 11 | 255 | ICH dw | 6 | 2 | 469823.531 | 5434967 |
| 96 | California | CA06 | Fd | 4 | 66 | 36.91 | 17 | 250 | ICH dw | 5 | 5 | 469958.656 | 5435069 |
| 96 | California | CA07 | Fd | 4 | 45.5 | 28.3 | 14 | 260 | ICH dw | 5 | 5 | 469916.469 | 5435080.5 |
| 97 | California | CA08 | Pw | 4 | 82 | 41.96 | 40 | 137 | ICH dw | 6 | 5 | 469459.844 | 5435335.5 |
| 97 | California | CA09 | Pw | 4 | 52.3 | 31.68 | 45 | 114 | ICH dw | 6 | 5 | 469441.469 | 5435464 |
| 97 | California | CA10 | Pw | 4 | 58 | 38.6 | 38 | 270 | ICH dw | 6 | 5 | 469533.281 | 5435241 |
| 97 | California | CA11 | Pw | 5 | 46.2 | 27.12 | 32 | 286 | ICH dw | 6 | 5 | 469544.094 | 5435243 |
| 97 | California | CA12 | Fd | 5 | 48.1 | 29.74 | 14 | 236 | ICH dw | 5 | 5 | 469939.719 | 5435052.5 |
| 97 | California | CA13 | Fd | 4 | 49.5 | 32.52 | 21 | 140 | ICH dw | 5 | 5 | 470951.5 | 5435539.5 |
| 97 | California | CA14 | Fd | 4 | 71 | 25.61 | 21 | 140 | ICH dw | 5 | 5 | 470958.281 | 5435530.5 |
| 97 | California | CA15 | Fd | 4 | 86 | 37.32 | 21 | 140 | ICH dw | 5 | 5 | 470935.688 | 5435528 |
| 97 | California | CA16 | Fd | 4 | 78 | 30.73 | 22 | 191 | ICH dw | 0 | 0 | 470881.781 | 5435710.5 |
| 97 | California | CA17 | Fd | 4 | 53.1 | 32.56 | 22 | 177 | ICH dw | 0 | 0 | 470818.031 | 5435680 |
| 97 | Western Long-Eared | EV01 | Fd | 4 | 18.2 | 12.43 | 3 | 30 | ICH xw | 5 | 5 | 470071.656 | 5433947 |
| 97 | Western Long-Eared | EV02 | Lw | 5 | 48.5 | 35.06 | 25 | 304 | ICH dw | 0 | 0 | 470372.5 | 5435713.5 |
| 97 | Western Long-Eared | EV03 | Bg | 5 | 31.8 | 7.88 | 5 | 248 | ICH dw | 6 | 2 | 469812.344 | 5434600 |
| 97 | Western Long-Eared | EV04 | Pw | 4 | 54 | 33.48 | 27 | 234 | ICH dw | 5 | 5 | 470337.063 | 5435560.5 |
| 97 | Western Long-Eared | EV05 | Bg | 4 | 27 | 17.82 | 22 | 187 | ICH dw | 5 | 5 | 470502 | 5435613 |
| 97 | Western Long-Eared | EV06 | Pl | 4 | 39 | 32.16 | 4 | 220 | ICH dw | 6 | 2 | 469886.625 | 5434586.5 |
| 97 | Western Long-Eared | EV07 | Fd | 4 | 52.5 | 30.92 | 9 | 350 | ICH dw | 0 | 0 | 470402.938 | 5435714.5 |

Appendix 3 cont .

| Year | Bat Species | Tree | Tree Spp. | Decay Stage | DBH (cm) | Tree Height (m) | Slope (°) | Aspect | BGC Zone | Stand Age Class | Crown Closure Class | UTM Easting | UTM Northing |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 97 | Western Long-Eared | EV08 | Pl | 5 | 26.5 | 25.05 | 10 | 240 | ICH dw | 5 | 5 | 469995.688 | 5434659.5 |
| 97 | Western Long-Eared | EV09 | Fd | 5 | 44.4 | 27.92 | 10 | 240 | ICH dw | 5 | 5 | 469993.844 | 5434652 |
| 97 | Long-Legged | VOL01 | Bg | 4 | 41 | 27.82 | 14 | 188 | ICH xw | 5 | 5 | 470521.844 | 5434592.5 |
| 97 | Long-Legged | VOL02 | Pw | 5 | 43.5 | 35.75 | 18 | 146 | ICH xw | 5 | 5 | 470571.813 | 5434687.5 |
| 97 | Long-Legged | VOL03 | Fd | 4 | 72.5 | 32.65 | 14 | 190 | ICH dw | 5 | 5 | 470613 | 5435065 |


Figure 7. Locations of all roost trees found in the summers of 1995-98 in the POV

Columbia Basin Fish and Wildlife Compensation Program GIS -- December 13, 2000