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THE STATUS OF NEOTROPICAL MIGRANT BIRDS IN THE PRAIRIE LANDSCAPE

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Abstract

Neotropical migratory birds breed in the United States and Canada and winter south of the United States border in Mexico, Central America and South America. Surveys have found populations of these species to be declining and scientists believe that these declines may be related to habitat loss (both breeding and wintering habitat), predation and nest parasitism. We have compiled preliminary data from many completed and ongoing studies in the South Puget Sound in order to present our current knowledge of the distribution and management of neotropical migrant birds that are found in prairie grassland and Oregon white oak habitats. The data used in this presentation are from studies at McChord Air Force Base, Fort Lewis Military Reservation, the Morse Preserve and breeding bird survey routes.

In surveys of oak and prairie habitats during the 1994-1996 breeding season, approximately 65 bird species have been identified. Of these species, 46 (71%) are neotropical migrants. Forty-two species were present in oak stands while 28 species were in prairie habitats. In comparison, wetland habitats contained 47 neotropical migrant species. Although many species are found in several different habitat types, some are more commonly found in oak woodlands and prairie. At McChord Air Force Base, for example, we have found American goldfinch, cedar waxwing, common yellowthroat, house finch, house wren, orange-crowned warbler, rufous hummingbird, spotted towhee, and western-wood pewee to be more abundant in oak habitats in comparison to random sites.

Several neotropical species within the prairie landscape are thought to be declining or otherwise of management concern. Declining species include band-tailed pigeon, rufous hummingbird, barn swallow, orange-crowned warbler, yellow warbler, Wilson's warbler and chipping sparrow. The MacGillivray's warbler is a species of management concern. Predation of nests and cowbird parasitism may be a significant factor in the decline of these birds. At McChord Air Force Base in 1996, we followed the progress of 38 open-cupped nests and found 11 (29%) were destroyed

by predators and 11 were parasitized by brown-headed cowbirds. Other factors influencing the decline of these species include habitat loss and habitat modification. Scotch broom is a serious pest in prairie and oak habitats and infestations can significantly alter the habitat value for different species. The table below shows the difference in abundance of birds identified in open oak stands on McChord Air Force Base before and after mowing of Scotch broom. Conservation of neotropical migrant birds in the South Puget Sound should involve both the protection and management or restoration of oak woodland and prairie habitats.

INTRODUCTION

The term "neotropical migrant" generally refers to bird species that nest in North America and winter in the tropics. Recently bird conservationists have become concerned about neotropical migrants for two main reasons: the observation of widespread deforestation in tropical wintering habitat, and evidence of long term population declines of several species of birds that breed in Eastern North America. Considerable effort has been expended over the past 20 years to examine the possible causes for the disappearance of several neotropical migrant bird species from large areas of their former breeding habitat (Robbins et al. 1989, Hagan and Johnston 1992, Finch and Stengel 1993).

Neotropical migratory birds and population declines

Although a complete review of the literature concerning neotropical migrant species declines is inappropriate here, the general conclusions are relevant. While destruction of winter habitat is a likely exacerbating factor, several studies conclude that changes in habitats and breeding success also appear to be responsible for observed population declines in many species. In particular, the fragmentation of primeval forests into small woodlots has, over the time scale of a century or more, led to the selective loss of what are termed "interior forest birds" (Askins 1995, Robinson et al. 1995).

Many of the declining species, which are primarily long-distance migrants, tend to nest low to the ground in open-cup nests, and are vulnerable to nest predators or nest parasitism (Brittingham and Temple 1983). Many common nest predators, including crows and jays (Corvidae), raccoons (*Procyon lotor*), Virginia opossums (*Didelphis virginiana*), striped skunks (*Mephitis mephitis*), and feral cats (*Felis domesticus*) are more abundant near the edges of woodlots rather than in the interior of forests (Faaborg et al. 1995). The Brown-Headed Cowbird (*Molothrus ater*), which was formerly limited to following the bison herds on the Great Plains, has spread eastward and westward in response to the spread of agriculture and cattle ranching. Neotropical migrant are often poorly adapted to having cowbird eggs in their nests, and the high densities of cowbirds in forest patches that are intermingled with agricultural land have led to high rates of parasitism (Robinson et al. 1995). In sum, the destruction and alteration of breeding habitat coupled with increased nest predation and nest parasitism appears to have led to the virtual extirpation of several species from large parts of their former range.

Neotropical Migratory Bird Conservation in the Puget Sound Lowlands

The Puget Sound Lowlands were formerly an open mosaic of prairie, Oregon white oak (*Quercus garryana*) woodlands, and wetlands set within a matrix of Douglas-fir (*Pseudotsuga menziesii*) and western hemlock (*Tsuga mertensiana*) forest (Franklin and Dyrness 1973). This historic landscape has been rapidly converted to agricultural, urban, and industrial development. Such development has also promoted the spread of several destructive non-native species, including the Brown-Headed Cowbird, European Starling (*Sturnus vulgaris*), House Sparrow (*Passer domesticus*), and Scot's broom (*Cytisus scoparius*).

Several native bird species have suffered dramatic declines in Puget Sound due to habitat loss and invasion of non-native species. Species which have declined precipitously or disappeared altogether include the White-Breasted Nuthatch (*Sitta carolinensis aculeata*), Lewis' Woodpecker (*Melanerpes lewisii*), Streaked Horned Lark (*Eremophila alpestris strigata*), Purple Martin (*Progne subis*), and Yellow-Billed Cuckoo (*Coccyzus americanus*) (Paulson 1992).
Of these species, the Purple Martin, Streaked Horned Lark, and Yellow-Billed Cuckoo are neotropical migrants while the woodpecker and nuthatch are closely associated with oak habitats.

Concern over these species, and recognition of the importance of large semi-natural habitats on the Fort Lewis Military Reservation and McChord Air Force Base (AFB) led to the development of studies on these facilities. This paper will summarize a few of the initial results from studies on these military bases and also introduce other ongoing studies within the South Puget Sound prairie landscape. To further explore the specific causes of local population declines, additional research is encouraged for individual species of concern, with emphasis on the evaluation of potential impacts or benefits from various management strategies.

STUDIES OF NEOTROPICAL MIGRANT BIRDS IN THE SOUTH PUGET SOUND

Few studies have quantitatively investigated the distribution, abundance, and habitat relationships of neotropical migrant birds in the South Puget Sound. We outline below the studies with which we are familiar rather than presenting an exhaustive literature review. Other studies, including nest box programs (e.g., Tahoma Audubon Society), and banding (e.g., Fort Lewis, Tahoma Audubon Society) are ongoing at Fort Lewis and throughout the prairie landscape and we encourage the reader to also learn more about these efforts.

Point Counts

Point counts that targeted neotropical migratory birds were performed at McChord AFB in 1995 and 1996 (The Nature Conservancy 1996) and the Fort Lewis Military Reservation in 1994 (Resources Northwest, Inc. and Pentec Environmental, Inc. 1995). At both locations, point counts were used to assess species richness, relative abundance of neotropical species, and species-habitat associations.

In 1995 the Nature Conservancy began a systematic three year study of neotropical migrant birds at McChord Air Force Base. Point count stations are being sampled for 3 years to allow some measure of population variability between years. A set of 100 systematic stations were located on the base and adjoining Fort Lewis, and an additional 20 subjectively located stations were placed in wetlands and oak woodlands. Systematic stations were spaced 300 meters apart with the grid of stations being randomly placed within the study area. Each station was visited 3 times between May 1 and June 30 (although some subjective stations were visited more frequently) and sampled for 8 minutes during each survey.

At Fort Lewis, counts were performed 3 times at 40-45 stations in each of 4 general habitat types; oak, wetland/riparian, prairie, and ponderosa pine. A single count occurred at each station during the months of April, May, and June. The number of birds occurring within 50 meters was recorded for 0-3 minutes, although additional birds observed from 3-5 minutes and 5-10 minutes were noted.

Nest Searches

As part of the neotropical migrant study at McChord AFB, an effort was made to locate nests during the 1996 field season. The effort was purely opportunistic for the first year and no systematic study design was followed. To locate nests, active birds (especially female birds displaying nest related behavior) were followed using standardized nest locating procedures (Ralph et al. 1993). Once a nest was located it was marked for further monitoring. Data collected at a nest site included the dates for initial location, presence of the 1st egg, completion of the clutch, hatching, and fledging or failure. We also kept careful note of cowbird parasitism and clues of predation.

BBS Data Compilation

In 1995, Don Norman established a new breeding bird survey (BBS) route in South Puget Sound that incorporates Oregon white oak, ponderosa pine, prairie grassland, Douglas-fir, and wetland habitats. The route starts at Flett Woods in Lakewood, passes through McChord AFB, proceeds south along the eastern side of the Fort Lewis' Central Impact Area and ends on 13th Division Prairie east of the town of Roy. This route has now been surveyed 3 times (1995, and twice in 1996) and it is hoped that the new route can provide long-term data concerning species richness and population fluctuations within prairie landscape habitats of South Puget Sound.

A typical BBS route consists of 50 stops, spaced one-half mile apart, where all birds seen and heard in a 3 minute time period are recorded. Each route starts at the same time and location during the peak of the breeding season in early June. Consistency of data collection is considered to be the primary survey objective for these routes (for more information on methodology see Robbins et al. 1986). As data analysis has not been completed for the McChord AFB-Fort Lewis BBS route, we will not report any results here. Data is available, however, from the US Fish and Wildlife Service for 8 other BBS routes that are found in the vicinity of South Puget Sound, although their coverage of prairie landscape habitats is minimal.

Constant Effort Bird Banding

Survey data from point count stations does not provide information on bird density, survival, recruitment, or productivity. Using a fixed number of mist nets in a fixed

location, a program called the Monitoring Avian Productivity and Survivorship (MAPS) was begun in 1989 (DeSante 1993) to increase and standardize the collection of demographic information. A number of MAPS sites have been established and monitored in the Cascade Range of Washington by the US Forest Service for the past 5 years. Only two sites have been surveyed in south Puget Sound, however, and the sites chosen for banding are located in second growth Douglas fir. Unfortunately, their is no current MAPS stations that incorporate prairie habitats of the Puget Trough.

The longest functioning MAPS station in South Puget Sound is located northwest of Johnson's Marsh at Fort Lewis, and a second site was started in 1996 on Muck Creek in the Morse Wildlife Preserve (Tahoma Land Conservancy) in Graham, WA. These 2 sites operate between June 1st and September 1st, with 1996 being the 3rd year of operation for the Fort Lewis site. Standard procedures for aging, sexing, and determining the molt of individuals have been established (Ralph et al. 1993) and all banding is performed using trained biologists with US Fish and Wildlife Service permits.

PRELIMINARY FINDINGS

Point Counts

In point count surveys at McChord AFB and Fort Lewis, a total of 65 bird species were identified in Oregon white oak and prairie grassland habitats during the breeding seasons of 1994-1996. Of these species, 46 (71%) were neotropical migrants as defined by Andelman and Stock (1994). Oak woodlands had a higher species richness with 58 species (42 migrants) compared to the 35 species (28 migrants) identified in prairie grassland counts (Figure 1). Other habitats surveyed on both bases include wetland and Douglas-fir which contained 81 (47 migrants) and 41 (29 migrants) bird species respectively. The richness of bird species in prairie landscape habitats (i.e., oak and prairie), therefore, does seem to be eclipsed by wetland habitats in particular; however, species assemblages in each habitat can be quite different.

Although many species are found in several different habitat types, some are restricted to or significantly associated with oak and prairie habitats. At McChord AFB, for example, we have found American Goldfinch (*Carduelis tristis*), Cedar Waxwing (*Bombycilla cedrorum*), Common Yellowthroat (*Geothlypis trichas*), House Finch (*Carpodacus mexicanus*), House Wren (*Troglodytes aedon*), Orange-Crowned Warbler (*Vermivora celata*), Rufous Hummingbird (*Selasphorus rufus*), Spotted Towhee (*Pipilo erythrophthalmus*) and Western Wood-Pewee (*Contopus sordidulus*) to be more abundant in oak habitats in comparison to random sites (Figure 2). Habitat variables have been correlated with bird density at Fort Lewis (Resources Northwest, Inc. and Pentec Environmental, Inc. 1995) and we hope to do a detailed analysis of species and habitats following the collection of point count data from McChord AFB.

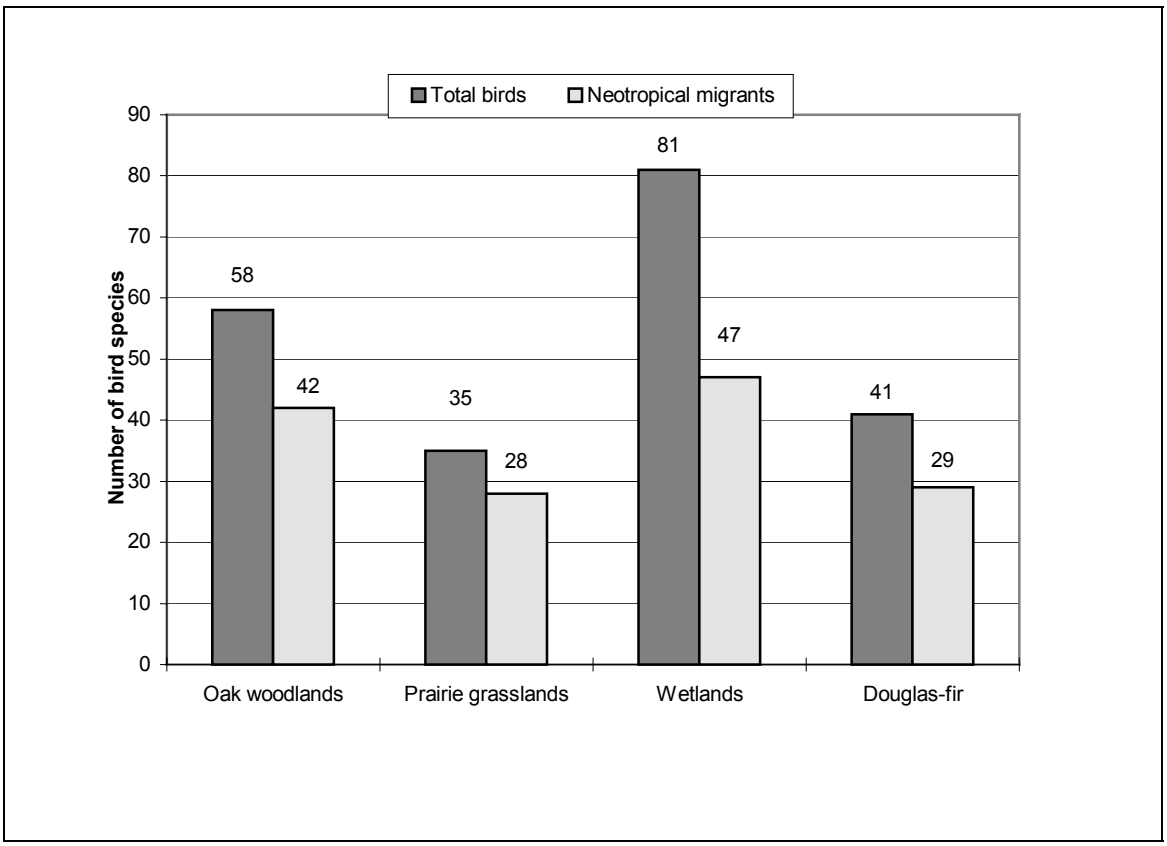

Figure 1. Avian species richness in 4 general habitat types on McChord AFB and Fort Lewis that were surveyed using point count stations from 1994-1996.

Nest Searching

In 1996, 110 nests of any type (i.e., not just neotropical migrant species) were located at McChord AFB (Figure 3). The most commonly found nests included dark-eyed junco (18), American Robin (14), Chipping Sparrow (11), and Orange-Crowned Warbler (7). Seventy-nine (72%) of the nests were an open-cup design that could be parasitised by Brown-Headed Cowbirds and we were able to determine the outcome for 46 of these nests. Nestlings fledged successfully from only 17 (37%) of the monitored open-cup nests and an additional 11 nests (24%) were parasitised by brown-headed cowbirds. Nest predation (24%, N=11) and abandonment (15%, N=7) accounted for a large percentage of nest failures. Moreover, we were unable to determine the cause of abandoned nests and it is quite possible that several of these nests were also subject to predation.

The results from our initial nest searching efforts at McChord AFB suggest that nest success is low and the influence from nest parasitism and predation is high. In comparison to other studies of neotropical migrant birds, however, these rates are not abnormal. Martin (1992) reviewed data

from studies across the United States for 32 open-cup nesting neotropical migrants and found a mean success rate of 44% , predation rate of 43%, and parasitism rate of 9%. These numbers were also found to vary quite dramatically between species and location. Because at this stage our sample size of nests at McChord AFB is so limited, any conclusions must be considered speculative. An increased emphasis on nest monitoring in 1997 is expected to significantly increase our ability to make conclusions concerning the significance of nest parasitism and predation in the mixed oak, conifer, wetland, and grassland habitats of McChord AFB.

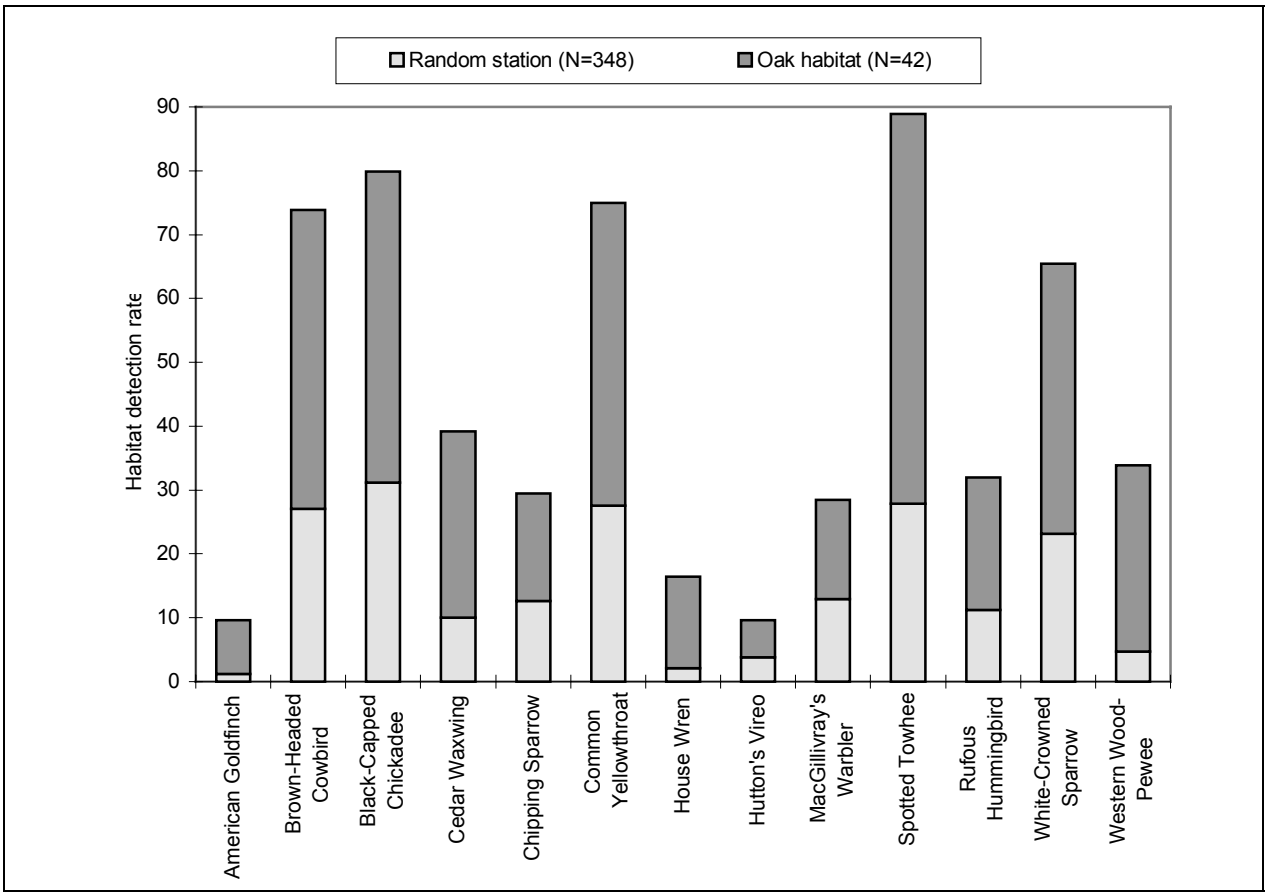

Figure 2. Habitat detection rate for bird species that appear to be in higher abundance within oak habitat types on McChord AFB in 1995. Here, detections at 14 subjectively placed oak woodland point counts (sampled 3 times each) are compared to 112 randomly placed point counts (also sampled 3 times). Habitat detection rate = (total number of detections/total number of counts) x 100.

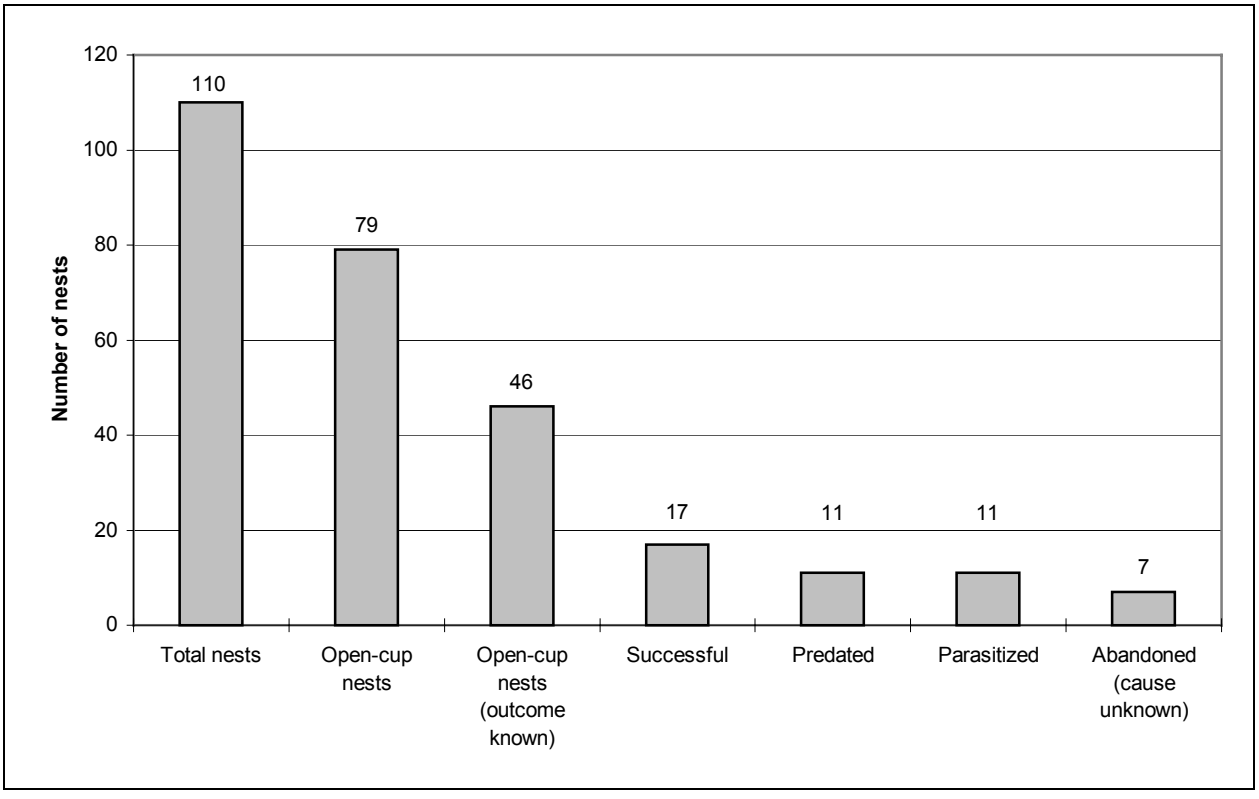
Number of nests
120
100
80
60
40
20
0
110
79
46
17
11
11
7
Total nests
Open-cup nests
Open-cup nests (outcome known)
Successful
Predated
Parasitized
Abandoned (cause unknown)

Figure 3. Results from 1996 nest search effort at McChord AFB. Of the 110 total nests found, 46 were open-cup nests that were monitored until an outcome was determined. Of these 46 nests, a high percentage were unsuccessful due to nest predation, parasitism, or abandonment.

NEOTROPICAL MIGRANT SPECIES OF CONCERN IN PRAIRIE LANDSCAPES

The prairie landscape of South Puget Sound provides habitat for a number neotropical migrant birds that are species of concern. Using data from the breeding bird survey Partners in Flight (Andelman and Stock 1994) lists the Killdeer (*Charadrius vociferous*), Band-Tailed Pigeon (*Columbia fasciata*), Rufous Hummingbird, Barn Swallow (*Hirundo rustica*), Orange-Crowned Warbler (*Vermivora celata*), Yellow Warbler (*Dendroica petechia*), Wilson's Warbler (*Wilsonia pusilla*), and Chipping Sparrow as species with known population declines. The MacGillivray's Warbler is noted as a species of special management concern because of its localized breeding distribution and specialized habitat requirements. An additional four species are listed by the Washington Department of Fish and Wildlife as species of concern. The Lewis Woodpecker and Western Bluebird (*Sialia mexicana*) are both considered state candidates while the Oregon Vesper Sparrow (*Pooecetes gramineus affinis*) and Streaked Horned Lark are monitor species. Other than the Lewis Woodpecker (no longer extant in this region) all of these species breed in or are seasonally found within appropriate oak and prairie habitats.

Neotropical migrants are not the only bird species of concern in the prairie landscape. Several other declining species or subspecies of note are either restricted to oak and prairie habitats or use these habitats regularly for breeding. These species include the White-Breasted Nuthatch, Common Nighthawk (*Chordeiles minor*), Purple Martin, House Wren (*Troglodytes aedon*), and Western Meadowlark (*Sturnella neglecta*). We give short descriptions of the status for many species of concern that are associated with habitats of the prairie landscape. We also encourage others to take note of these species and join in building local knowledge concerning habitat associations, migratory and breeding behavior, and population trends.

Common Nighthawk. An uncommon breeder with populations declining sharply in the last 50 years in Puget Sound. The reasons for its decline are unclear and populations should be monitored closely. Nighthawks typically don't arrive in the area until late May, and have completely departed by mid-September (Hunn 1982).

Rufous hummingbird. A common breeder in a variety of habitats on Fort Lewis and McChord AFB. Population declines have been noted from BBS routes, however, and should be monitored. This species is also found to be more abundant in oak habitats on McChord AFB in comparison to random habitats (see Figure 3).

Lewis' Woodpecker. Formerly a common breeder in western Washington, however, it

is no longer extant in the area. The species is occasionally reported as a vagrant, mostly often during migration. It is believed that the a loss of recently burned woodlands are a major cause of population decline (Hunn 1982, Wahl 1995). However, it should also be noted that around the turn of the century, when burns were more numerous, Dawson and Bowles (1909) observed wide fluctuations in Lewis' Woodpecker populations in western Washington.

Streaked Horned Lark. An uncommon breeder in western Washington. This species is found in small numbers on Fort Lewis and McChord AFB, and was noted as extirpated from much of its former range as early as 1900 (Dawson and Bowles 1909). The actual population status is not clear due to the difficulty of detecting these birds using conventional survey methods. The use of playback recordings at dusk and dawn may improve the number of detections. Further study could help determine population levels and the range of Streaked Horned Larks within the Puget Trough lowlands.

Purple Martin. Washington state candidate species. An uncommon breeder in western Washington that has shown a sharp population decline over the last 50 years. On Fort Lewis, nests were reported in Wood Duck (*Aix sponsa*) boxes at the Johnson Marsh in 1978. By 1987, there were 6 known nesting locations on Fort Lewis and more extensive surveys were performed on the base in 1993 (Resources Northwest, Inc. and Pentec Environmental, Inc 1995). In comparison, 12,500 Purple Martins were observed at a roost in Seattle in 1945 (Larrison 1945).

White-Breasted Nuthatch. A very uncommon breeder in this region. Although not considered a neotropical migrant, this species is closely associated with Oregon white oak woodlands in western Washington. Populations in the Puget Sound lowlands have been in steep decline for the past 20 years, while those along the lower Columbia River appear to be more stable (C. Chappell pers. comm.). The reasons for this decline are not clear. White-breasted Nuthatches are consistently sighted at only a single remaining site in South Puget Sound. Further inventories and studies of population trends and habitat requirement are needed. Note: the population of White-breasted Nuthatches found in this region have historically been referred to as the Slender-Billed Nuthatch which appears to be a geographically restricted subspecies of the more widespread species (AOU 1957, Jewitt et al. 1953).

House Wren. A common breeder in oak woodlands of the south Puget Sound lowlands, but rare or accidental elsewhere in western Washington. House Wrens are typically associated with open oak and ponderosa pine (*Pinus ponderosa*) habitat, but will readily occupy residential area too open for Bewick's Wren (*Thryomanes bewickii*). They are also known to occupy bluebird nesting boxes.

Western Bluebird. Locally common in the south Puget Sound lowlands. Bluebirds are limited in their occurrence, however, to areas at Fort Lewis and McChord AFB (and other prairie patches within South Puget Sound) where nesting boxes have been provided in open ponderosa pine and oak habitats adjacent to prairies. These birds were probably more numerous, and found in a wider geographic area, earlier in the century when more frequent fires created snags suitable for nesting.

Orange-Crowned Warbler. A common breeder that is most frequently encountered

in oak (see Figure 3) or open Douglas-fir habitats with a dense understory. Populations of this warbler have shown a consistent decline in western BBS counts, and there is much debate as to its status throughout the whole of western Washington. Further monitoring of populations is needed to determine the actual status in South Puget Sound.

MacGillivray's Warbler. A common breeder in oak woodlands of South Puget Sound. Apparently uncommon in other lowland areas of western Washington. This warbler is quite habitat specific and prefers to locate nests in dense shrubs, such as snowberry *(Symphoricarpos albus*) or tall Oregon grape (*Berberis aquifolium*).

Chipping Sparrow. An abundant species in ponderosa pine and oak habitats, and also in very open Douglas-fir. Chipping Sparrows are uncommon in western Washington outside of the prairie landscape areas of the south Puget Sound (Hunn 1982, Wahl 1995).

Oregon Vesper Sparrow. Monitor species in Washington. An uncommon breeder throughout western Washington that was recorded on 20 plots on Fort Lewis in 1994 along prairie edges near trees or shrubs. In contrast, it was recorded only two times on McChord AFB, in April 1995 and in June 1996. The species status outside of Fort Lewis and McChord AFB is largely unknown, and it is believed to be decidedly rare in King County (Hunn 1982). A determination of the reproductive status and range of Oregon Vesper Sparrows should be a priority in this region.

Western Meadowlark. In addition to prairie sites, this species is also seen in open ponderosa pine habitats on Fort Lewis. At McChord AFB, meadowlarks were recorded only on the airfield. Further study is needed to determine the distribution and population trends on this species in the south Puget Sound lowlands.

MANAGEMENT ACTIONS TO BENEFIT SPECIES OF CONCERN

The oak woodlands and prairie grasslands of South Puget Sound are being rapidly altered through modification of natural ecological processes and increasing human development. These impacts significantly influence the suitability of habitat for avian species of concern, including neotropical migrants. Similarly, changes to existing habitats caused by active management and restoration also can quite dramatically effect habitat occupancy for some bird species. At McChord AFB, we have had the opportunity to monitor the response of birds to mowing of Scot's broom in an open oak savannah habitat.

Scot's broom was mowed in the South Approach Zone (SAZ) area of McChord AFB in the fall of 1995. The habitat within the SAZ is composed of young (approx. 40 yr. old), widely spaced Oregon white oak, mixed native and exotic grasses and herbs, and Scot's broom of mixed density. As part of our study of neotropical migrants on the base, 4 point count stations were sampled in the area during the 1995 and 1996 field season (i.e., before and after mowing). Although this is a very limited sample, we recorded what appears to be a significant and rapid response to this habitat alteration (Table 1). In 1995, 19 species were recorded at the 4 stations including a single sparrow species, the White-Crowned Sparrow (*Zonotrichia leucophrys*), which was abundant. Common Yellowthroats were also quite abundant. Following the mowing of broom, 25 species were

recorded, including 4 sparrow species, one of which was the Oregon Vesper Sparrow. The population density of Common Yellowthroats also dropped to 3 singing individuals. Further sampling in 1997 in this and other similarly treated areas should further quantify these relationships.

This small example of how birds may respond to habitat modification illustrates that managers of these prairie landscape habitats should try to be aware of potential benefits and impacts their management may have on species of concern. Much of the South Puget Sound prairie landscape has been altered from its historic condition. As fires burn less frequently and ground disturbance increases, exotic species are rapidly invading oak and prairie habitats, tree canopy cover is increasing in oak woodlands (primarily oak and Douglas-fir), and shrub density is increasing. Managers are responding to these changes, and restoration efforts are increasing; however, we also need to carefully think about and try to predict the consequences of such actions for species we hope to retain as part of the landscape.

The prairie landscape of South Puget Sound contains a diverse assemblage of neotropical migrant birds and through the studies that have been completed or are ongoing we are learning more about the population dynamics and habitat requirements for these species. More information is needed, however, and the data collected through long-term research and monitoring will help us plan more effectively for habitat protection and restoration efforts in the future.

Table 1. Results of point count sampling in an oak savannah habitat on McChord AFB where Scot's broom was mowed in the fall of 1995. The numbers of sparrow species and Common Yellowthroats responded dramatically to this management action.

YEAR	TOTAL NUMBER OF BIRDS	TOTAL NUMBER OF SPECIES	SPARROW SPECIES	INDIVIDUAL SPARROWS	INDIVIDUAL WHITE-CROWNED SPARROWS	INDIVIDUAL COMMON YELLOWTHROATS
1995 (unmowed)	91	19	1	17	17	12
1996 (mowed)	124	25	4*	42	31	3

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