Table of Contents

List of Tables

List of Figures

Summary

Constant effort mist-netting data was successfully collected in three MAPS sites in Lesser Slave Lake Provincial Park during the 2000 season. It is the fourth year in row that the mist-netting effort is constant among MAPS sites at LSLBO. Additionally, data relating to the songbird breeding status, habitat structure and songbird active nests has been collected at each MAPS site.

Activities at the Fern Gully (FEGU) site were abandoned, and another site, Residence (RESI) was established 3km South-East of the banding station[L1]. The RESI site was chosen due to its great habitat diversity and access. Contrasting with the two other MAPS sites, net lanes within the RESI site are well scattered over 20 ha (distances between lanes average 75m). Moreover, half of the net lanes in RESI site were located in edge habitat while the other half were set up in interior forest habitat at least 75m from any edges.

Comparisons of the bird number and species richness as well as capture rate among site show greater values for RESI site. More birds were captured at ROAD site than FAWA but both sites had a similar number of species. One Sharp-shinned Hawk (SSHA), one Western Wood-Pewee (WWPE) and one Bay-breasted Warbler (BBWA) that had been captured at the RESI site had never been caught before during MAPS operation. A greater diversity of habitat at the RESI site was likely to be responsible for its greater species richness.

Of a total of 524 birds banded at the ROAD site since 1994, only four birds (0.8%) were recaptured in 2000. On the other hand, from a total 202 birds banded in FAWA since 1994 four birds (2.0%) were recaptured during the 2000 MAPS session. Despite the fact that no banding activities had been done before in RESI, this site had a recapture of one adult Ovenbird (OVEN) caught previously during the LSLBO Migration Monitoring Program in the fall of 1999.

Productivity rates for 2000 were generally lower than values obtained in 1999. The Mourning Warbler (MOWA) was the only species having a higher productivity in 2000. Also, productivity values for the Canada Warbler (CAWA) and the Magnolia Warbler (MAWA) in 1999 were eight and five times greater than in 2000. A greater sample size over several other years of operation will be needed in order to make valid comparisons of productivity among species and years[L2].

Net lane location within MAPS sites and the use of different MAPS sites (i.e., FEGU in 1999 and RESI in 2000) in the calculation of the averages values were likely the main causes of the lower productivity rate values obtained during 2000[L3]. Also, field observations taken during MAPS program suggest that many hatching year birds were missed during constant effort mist-netting periods. In fact, soon after the nestling have fledged, family groups of songbirds that nested within MAPS sites boundaries seemed to move into the forest edges where no net lanes were in operation.

Evaluation of bird breeding status (e.g., confirmed, likely or transient nesters) for 2000 indicates a higher number of confirmed breeding species in RESI with 27 species (56% of all species observed at this site). In contrast, 19 (37%) and 8 (23%) species were confirmed nester in ROAD and FAWA sites respectively[L4]. During the 2000 season, we confirmed the nesting of the BBWA and the Black-throated Green Warbler (BTNW) that are designated blue-listed species in Alberta and red-listed in British Columbia.

Nest searches during the 2000 breeding season produced a total of 41 nests of 18 species. The American Redstart (AMRE) and the Least Flycatcher (LEFL) were the most common species for which nests have been found with nine and seven nests respectively. Most of the nests found concerned tree/open-cup nesting species (83%) followed by cavity nesters (15%) and ground nesters (2%). At the exception of AMRE for which nests were found exclusively in willows, most of the other nests were found in Trembling Aspen or White Spruce. Interesting discoveries include the finding of four BBWA nests; one nest of BTNW and one nest of WETA.

Recommendations from the 2000 season of the MAPS program at LSLBO can be summarized in four major points. First, considering the low number of MAPS stations in the Canadian boreal forests and LSLBO expertise in running a MAPS program, LSLBO should increase its network of sites across Lesser Slave Lake Provincial Park. Second, I suggest to locate future MAPS stations in heterogeneous areas and, within sites, to carefully distribute net lanes equally in edge and interior forest habitats. Thirdly, I propose LSLBO to consider the potential negative effects of other project research and human traffic on data collected at the ROAD site and to take initiative to mitigate these possible impacts. Finally, LSLBO staff should intensified nest searches in the future, especially for blue liste species such as the BBWA and BTNW which seems to be relatively common in Lesser Slave Lake Provincial Park and for which they is still a lack of ecological information.

Introduction

Large-scale declines in some North American songbird populations have raised concerns regarding the long-term viability of these populations (Hagan and Johnston 1992). In the eastern North America for example, data from the Bird Breeding Survey have shown a decline of species that are mostly forest interior specialists (Robbins et al. 1989). Results from Long Point Bird Observatory also show a similar trend since 30 years (Hagan and Johnston 1992). The cause of this decline is not well understood. Some studies have suggest that the decline is due to events occurring on the wintering ground while others studies have pointed out events on the breeding ground (Ambuel and Temble 1983; Askins et al. 1990, Hagan and Johnston 1992; Finch 1991; Robinson et al. 1995). There is also concern that poor quality stop-over sites affect songbirds during their migration (Hagan and Johnston 1992). Among the potential cause of the decline, several studies have suggested habitat fragmentation, predation and parasitism as the main causes of the decline on the breeding ground (Wilcove 1985; Askins et al. 1990; Robinson et al. 1995). On the wintering ground on the other hand, habitat fragmentation and habitat loss were found to be the main events affecting songbird populations (Hagan and Johnston 1992).

There is currently very few studies trying to understand the decline of songbirds using a wider approach that considers events happening in both the breeding and the wintering ground. Using data collected by volunteers across North America, the Institute for Bird Population (IBP) in California is coordinating the Monitoring Avian Productivity and Survivorship Program (MAPS) in order to better understand the cause of the decline. The main goal of the MAPS program is to pin point possible causes of the songbird decline in order to develop effective management guidelines that would act both in the breeding and in the wintering ground. With more than 400 MAPS stations distributed all over North America, target species were selected in each of the five regions and data are collected on songbird productivity and survivorship using constant effort mist-netting at each station during the breeding season (DeSante et al. 1998). Potential effects of events occurring on the wintering ground could be estimated by changes over years of the songbird survivorship or adults return rate. In contrast, effects of events originating from

the breeding ground could be estimated by the change in the songbird productivity or proportion of young birds on the total of aged birds in a population.

Lesser Slave Lake Bird Observatory (LSLBO) which lies within the Boreal Canada/Alaska region is volunteering data for MAPS since 1994. Currently LSLBO operates is among the few North American conservation organization or individuals that operates the MAPS program in the boreal forest. With less than 15 sites in operation in Canada, LSLBO with its three sites is nationally important in the operation of a MAPS program (see DeSante et al. 1998 for locations of the MAPS sites across North America). So far, data from LSLBO MAPS program has contributed to analyses for six species for productivity (i.e., Alder Flycatcher (ALFL), Black-capped Chickadee (BCCH), Swainson's Thrush (SWTH), American Robin (AMRO), Yellow Warbler (YWAR) and Myrtle Warbler (MYWA). On the other hand, LSLBO still need to gather data on productivity and survivorship until it reaches five years of constant effort at each site. According to their high capture rates at LSLBO MAPS sites, species such as the CAWA, the AMRE, the White-throated Sparrow (WTSP) and the MAWA are likely to be include in future productivity and survivorship analyses.

The main goal of the 2000 season was therefore to collect productivity and survivorship data with constant mist-netting effort in two existing MAPS sites (i.e., FAWA and ROAD) as well as in one new site. A secondary goal was to locate this new MAPS site few km for the already existing MAPS sites, distribute the net lanes in a way to optimize capture rate and to clear vegetation from net lane and trails. Also in 2000, vegetation structure assessment as well as breeding status data was collected at each MAPS site.

The present report present and discuss the 2000 results obtained at FAWA, ROAD and RESI sites with a focus on the productivity and the banding data (i.e., new captures and recaptures). I also included a description of the new MAPS site and a short discussion about the reasons I choose this particular location. Also, I identify some potential impacts of other research project on the accuracy of the data collected at ROAD

MAPS site. Finally, I suggest recommendations to improve the quality of data collected at MAPS sites.

Methods

Constant effort mist-netting

Each site contained 10 net lanes and standard nets (i.e., 2.5m by 12.5m with 30mm mesh) that were run ideally for six hours (starting at sunrise) in each net lane for one day out of each of the six ten-day periods starting June 10. Among each site, net lane were ideally distributed within a 20 ha core area in productive area such as edged and in the interior forest. Net lanes in FAWA and ROAD site lied in less than 10 ha. Distance between each net lane average 25m for FAWA and ROAD and 75m for RESI.

For each bird captures during mist-netting sessions banding data was recorded on the forms provided by MAPS coordinators. Banding information included the date and time of capture, site and net lane number at which the bird was captured, species, age and sex of the bird, aging and sexing criteria, capture status and additional measurements (i.e., birds' weight and wing cord). For recaptured birds band number was carefully recorded and measurements mentioned above were also recorded. In addition to banding data, effort data (i.e., date and time of opening and closure of nets) was recorded for each visit.

Breeding status and nest search

Field observations were taken at each visit in order to determine the breeding status of occurring birds. Status for a given species was either confirmed nester (i.e., if nests or local birds were found; if adults were seen carrying nest material, food or fecal sac or if adults were observed in distraction display); probable nester (i.e., if adults were seen in courtship/copulation; signing/drumming or performing other territorial behavior) or observed (i.e., if a given species was banded/captured; encountered or seen flying over).

Opportunistic nest searches was also undertaken during each visit at site and also in the park outside the MAPS schedule. Nests were found by following adults carrying food to a nest. Nests were also located by listening for begging calls of nestling at a nest. At each nests found, tree species; tree height, nest height canopy, sub-canopy and shrub cover and nest fate were recorded. In this report only data on the tree species, tree height and nest height is presented.

Habitat structure assessment

A habitat structure description has been taken at each site for main vegetation types and detailed maps of each site that includes precise location of net lanes were designed (see Nott 2000 for a detailed protocol). Appendix gives an example of data collected at each site.

Data entry, proofing and verification

Data were entered and proofed using MAPSPROG v. 3.0 (Froehlich et al. 2000), a software designed by the IBP for MAPS volunteers/coordinators. Data were run through a verification process that checks for discrepancies within and between records. In 2000, the data verification was done by the field coordinator (the author of this report).

Selection of a new MAPS site for the 2000 breeding season

For the 2000 season it was agreed to abandon the data collection at FEGU site, so that data collected at FAWA and ROAD become more independent (an important statistical criteria). It was also agreed to set up a new site further away from the already existing MAPS sites that are located near the banding station of the Migration Monitoring Program. This new site has been located and data has been collected in an area situated three km south-east of the LSLBO banding station.

This site was selected due to its good variety of habitat and by its easy access within the park. It is generally characterized by a mature dry mixed-wood stand dominated by Trembling Aspen and White Spruce. It is crossed by a 15 year old pipeline dominated by dense willow-aspen shrubs. In its western section, the site is composed by a

beaver pond (i.e., an enlargement of the pipeline) and represents one quarter of the site area. The beaver pond offers abundant edge habitat as well as many dead trees. In its extreme NE corner, there is a mature–old growth White spruce stand. On the NW section the site is composed by an old oil site, now dominated by grass and dense willow patches. This section also offer large area of productive edge habitat (for more details about habitat description see detailed map of this site in appendix).

Among the 10 net lanes in operation through the RESI site, five were located in the pipeline, along the beaver pond and the old oil site. Five other net lanes were also set up on each side of the pipeline in the interior mature forest. Each net lane in the interior habitat is at least 75 m from any edges. Also each 10 net lane are in average 75 m from each other (see map in appendix for details on the distribution of net lanes).

All trails in the RESI are now well flagged and relatively well worn and each net lane is well identified with small wooden boards (Boars for net lanes 4 and 5 would need to be switch for the 2001 season). Vegetation maintenance work would need to be done before the 2001 season start at net lane # 2 where a tree is lying down across the net lane. Also removal of large logs would need to be done along trails between net # 1 and 4 and net # 5 and 8. Along the pipeline, an already existing wildlife trail was used in 2000 and would probably need some grass mowing.

Poles for net lanes through this site would also need small 2*4 blocs in order to insert rebars and maintain the poles height. Rebars are still in the ground at net lanes and are marked with red flag tap. The 20 poles are stored in the garage of the park residence. (Net poles for ROAD and FAWA are stored underneath Fraser's House (there is 42 of them, 25 large one and the rest are small diameter).

Data analysis

In this present report only descriptive comparisons were made with the 2000 data. The reason for this is that the three MAPS sites of LSLBO are only a small sample of stations operating in the Boreal Canada/Alaska region. Sites runs by LSLBO would therefore

need to be pooled with all other stations lying in this region in order to be statistically significant. Also because LSLBO operate these stations with constant effort mist-netting only since 1997, data would still need to be collected for few more years in order to increase the sample size.

Newly banded and recaptured birds and capture rate

Banding data were first use to compare the number of species caught as well as the number of newly banded and recaptured at birds each site. Capture rates for each species was estimated and compared among sites as well as with the 1999 data. Here, the percent of capture rate of both years was calculated as the number of all captures (i.e., new banded birds and all recaptured and unbanded birds) divided by the total unit of net/hours per station, which is 360 net/hours for both years. Finally, a comparison of capture rate at each net lane for each MAPS site is included in order to evaluate the difference existing between edge and interior forest habitats.

Productivity

The productivity was estimated by pooling the data on HY and aged birds (unbanded birds were excluded) from all three sites. Songbird productivity was therefore defined as the pooled number of HY birds from all three stations divided by the total number of aged birds. Finally productivity values obtained for each species in 2000 were compared with those of 1999.

Results and Discussion

Comparison of newly banded and recaptured birds among sites

During the 2000 season a total of 176 individual birds (including 142 newly banded birds) were captured at the three MAPS sites (Table 1,2 & 3). The RESI site had the highest number of captures with more than half (53%) of the total individual birds caught in the three sites together. At RESI site, a total of 94 individual birds were caught compared to 48 in ROAD and 34 at FAWA. The number of new captured birds (i.e.,

birds never caught before in any given MAPS site) for ROAD, FAWA and RESI was 44 (92%), 29 (85%) and 94 (100%) respectively. This result suggests that the individual bird turn-over rate in ROAD and FAWA sites in 2000 was relatively high and similar at each site. The difference between RESI and the two other sites is explained by the fact that the later site was run for the first time in 2000 and no banding activities has been done within three km of this area in previous years.

For the 2000 season, the number of recaptured birds was higher in the ROAD site (49% of all captured birds) compared with 28% in FAWA and 10% in RESI (Table 1,2 & 3). Most of the recaptures at ROAD site (i.e., 72% of all recaptured birds) came from the Migration Monitoring Program and only 16% (4 birds) originated from MAPS activities during previous years. In contrast, only 18% (2 birds) of the total recaptures at FAWA originated from the migration monitoring site and 36% (4 birds) originated from MAPS activities of previous years. Finally, most recaptured birds in RESI originated for this site earlier during the 2000 season. The large number of recaptured birds in ROAD originating from the migration monitoring site is likely due to the fact that a large number of passerines have been banded close by at the LSLBO banding station between April and June 2000 and which overlapping with ROAD site.

The proportion of recaptured birds in a given site in 2000 and originating from previous years during the MAPS program on the total of birds banded at this site since 1994 is likely to correspond to an index of songbird site fidelity. Of a total of 524 birds banded at ROAD site since 1994, only four birds (0.8%) were recaptured in 2000. On the other hand, from 202 birds banded in FAWA since 1994 four birds (2.0%) were recaptured during the 2000 MAPS session (Table 1,2 & 3). Although the proportion of returned birds seems higher in FAWA site, return rate should be averaged for many years and for many sites having similar vegetation characteristics in order to give valid comparisons. Also, considering the fact that most of returned birds in a given year are usually birds that were born during the immediate previous years (Jungkind 2000), our estimate of return rate for ROAD and FAWA would likely to be higher if the number of recaptured birds in 2000 would be divided by the total number of birds captures since

1998. Finally, in order to obtain a accurate estimate of the number of returned birds for each MAPS site, the banding data collected since 1994 would gained to be analyzed using a model of capture-recapture.

The most frequent recaptured species originating from previous years during the MAPS program in 2000 were CAWA, MAWA and OVEN. These species were also among the most common species nesting in MAPS sites in 2000 and also since 1994. In 2000, these species also had one of the highest capture rates among all species banded during the MAPS program at LSLBO. Among the interesting recaptures this year, there was the recapture of an adult OVEN at RESI site (the only RESI recapture from another year) that was previously banded as a HY during the fall 1999 at the LSLBO banding station. Also, a CAWA that was banded as a second year male for the first time in the FAWA site in 1995 was recaptured this year at the same site and same net lane.

The higher number of capture in the RESI site compared to the other sites was likely to be caused by the distribution of net lanes within each MAPS site. The average distance between net lane in RESI is about 75 m compared to 25m for FAWA and ROAD. Also, net lanes in RESI are distributed over 20 ha as recommended in the MAPS manual compared to net lanes in FAWA and in ROAD that are distributed only over less than 10 ha. By spreading out the net lanes through a given site, the chance of capturing birds from many different territories was likely to increase. The higher number of birds caught in RESI can also be explain by the fact that there was five net lanes in high productive edge habitats compared to only one and four for FAWA and ROAD sites. In 2000, nets located in edge habitat had, in average, higher capture rate than nets located in interior forest habitat (Fig. 1, 2 & 3).

Comparison of the species richness among sites.

A total of 25 species were captured at RESI compared to only 10 and 9 at the ROAD and at the FAWA site respectively. 13 species were captured only in RESI compared to only one species for FAWA (Downy Woodpecker; DOWO) and one for ROAD (Winter Wren; WIWR) (Table 1,2 & 3). Interestingly, three species (SSHA; WWPE and BBWA)

that were also caught at the RESI had never been caught before in other MAPS sites since 1994. Comparison of the bird number among sites also showed similarities. For example, seven species (26%) were common to both sites. The AMRE, the CAWA and the WTSP were the most common species captures in both sites (Table 1, 2 & 3).

The reason why the RESI site had a higher bird richness than the other MAPS sites lies in its higher heterogeneity of its vegetation. It is well known that bird species diversity generally increase with an increase in habitat heterogeneity (Rottenberry and. Wiens 1980). The RESI site included habitat types such as fields, old pipeline and beaver pond that were not found in the other MAPS sites. For example, the LEFL, YWAR, Tennessee Warbler (TEWA) and the Hermit Thrush (HETH) had high capture rates in the pipeline area of RESI where dense cover provided suitable nesting sites. This habitat type was absent at the other sites and so these species.

Although species richness gives interesting comparison among sites, diversity index such as Shannon-Wiener would likely improve comparisons among sites. A diversity index would take into account not only the species number but also the relative abundance of each species. In the present case however, a simple comparison of the species richness between sites was faster than any other diversity index.

Comparison of species capture rate

The comparison of capture rate among species shows that AMRE, CAWA and WTSP had the highest capture rates (Table 4). AMRE had a similar capture rate among the three sites while CAWA had higher values in ROAD and FAWA sites. WTSP on the other hand showed a higher capture rate in RESI and lower values in FAWA and ROAD sites. While compared with 1999 capture rate data, values for 2000 for the two most common songbirds (i.e., AMRE and CAWA) were lower by nearly half (Table 4). The high capture rate values for AMRE and CAWA in 1999 is likely to be caused by the high capture rate obtained in FEGU site which is now not operating anymore. Finally, WTSP and OVEN had similar capture rate values between 1999 and 2000.

Comparison of songbird productivity

During the 2000 season, 40% of the species caught were represented by HY birds and 10% of the captures (i.e., 18 birds) were aged as HY birds (Table 5). In contrast, 47% of the species caught in 1999 were represented by HY birds and 28% (52 birds) of the total captures were aged as HY birds (Jungkind 2000). In 2000, BAWW and MOWA had the highest productivity rate compared to MAWA and CAWA in 1999.

Compared to 1999 data, productivity results from 2000 generally show low values for most of the species caught. For example, CAWA, MAWA values for 1999 were height and five times higher than in 2000 respectively and productivity values for TEWA and SWTH for 1999 were twice as high as in 2000. The only species that show higher productivity values in 2000 was MOWA. BAWW and LEFL values for 2000 were also higher than in 1999 but they were captured only in 2000. Finally, AMRE which was the most common species caught during 2000 showed similar productivity values to 1999.

The lower productivity rates obtained during the 2000 season for common species such as the CAWA can be explain by many factors. Firstly, due to the low sample size for most the species caught, productivity values obtained in 2000 are likely to be caused by a random event. Second, a difference in the vegetation structure between FEGU and RESI might have affected comparison of productivity values between 1999 and 2000. For example, a higher number of AHY and HY of CAWA were caught in FEGU in 1999 (n=16) compared to only three adults in RESI in 2000. Because FEGU is probably a better habitat for CAWA where its reaches high density, we would expect a higher number of nesting pairs and a higher productivity than in RESI site. Consequently, due to the fact that the 2000 productivity values did not include FEGU data which offered high productivity for some species, averaged values obtained in 2000 were likely to be lower than in 1999. Finally, there is a possibility that the low productivity experienced in 2000 season could have been related to a real decrease in songbirds productivity caused by events that occurred during the 2000 breeding season such as an increase of precipitation or high predation rate. This later hypothesis however will remain untested as long as weather and predation rate data are collected at MAPS sites during the breeding season.

During the last intended periods (i.e., 9 and 10), few HY birds were caught in net lanes despite the fact that many active nests and family groups of common species such as AMRE and TEWA were observed close to net lanes. At six occasions during MAPS visits, I found active nests of AMRE, LEFL, BBWA and BTNW that were only within 5 m of net lanes and which seemed to be successful in raising young. At these net lanes capture rates of confirmed nesting adults were higher than rates of HY birds. Many other species such as CAWA, WTSP and MOWA that were also probably nesting within few meters of net lanes (suspected nesting by their constant calls and nesting behaviors) had a low capture rate of HY compared to rates for AHY. This is suggesting that the productivity of some species was probably higher than predicted by our constant effort mist-netting.

From my personal observations, the low productivity at the MAPS sites during 2000 could have been be related to a dispersal movement of family groups during the post-fledgling period away of their breeding home range towards different habitats. For example, the day after nestling from two AMRE nests in FAWA have fledged no birds were seen near nests. In the same time however, many family groups of AMRE were unusually common at the edge of the forest. Furthermore, while the capture rate was decreasing during the last two intended periods at net lanes in FAWA and ROAD, bird density (from the census data during the Migration Monitoring Program) in the shrubby habitat located at the edges of both site was quite high. I therefore suspect that soon as the fledgling were old enough to follow their parents, families moved away from the natal home range to the edges of the forest where no net lanes were in operation. Considering that MAPS sites are visited only every 10 days through out the breeding season, we might have missed most of the HY that had already left for edge habitats outside of MAPS area.

I observed a similar dispersal movement from birds nesting in the interior forest at the banding station. In the second half of July fledglings of several species (e.g. WTSP and OVEN) that were previously banded during the MAPS and Canopy Project at least 100m inside the forest behind the station were recaptured more than once in the willow

section of the migration monitoring site. Capture rate in ROAD during this period was very low but capture rate of dependent and banded birds was raising at the migration monitoring site. I therefore suspect that during the post-fledgling period family groups spent most of their time in dense vegetation in edge habitat as a protection cover and higher food productivity.

One way to improve accuracy of productivity data would be to add supplemental net lanes in edge habitats of FAWA and ROAD sites where the HY seem to concentrate after the post-fledgling period. The MAPS manual recommend to locate half of net lanes (i.e., five) in productive edge habitats and the other half in interior forest habitats. Currently, the new RESI site has half of its net lanes in edge habitat compared to only one net lane in FAWA site and four lanes in ROAD site. I therefore highly recommend to locate supplemental net lanes in edge habitat in FAWA and ROAD site in order to increase accuracy of productivity data. I also recommend to follow the IBP MAPS protocol which suggests to locate five net lanes in high productive edge habitat and five more in interior habitats.

Description of songbird breeding status

Evaluation of the breeding status for birds present at MAPS sites indicates a higher number of confirmed breeding at the RESI site with 27 species (i.e., 56% of all species observed at this site). In contrast, ROAD and FAWA sites had 19 (37%) and 8 (23%) species confirmed respectively and most species observed at these two sites were classified likely breeders. In 2000, most of the confirmed species were species using shrub layer for nesting (e.g., AMRE, CAWA and MAWA) and only a few canopy species (e.g., BTNW and REVI) have been confirmed as nesters. This difference could be explained by the fact that canopy species are more inconspicuous than shrub layer species making their nesting behavior more difficult to observe. Interestingly, most of species with a high capture rate during the constant effort mist-netting (i.e., such as AMRE and CAWA) were also confirmed nesters.

Results of the 2000 nest searches

Opportunistic nest searches effectuated during the 2000 breeding season produced a total of 41 nests of 18 species (Table 7). Most of nests were found by following adult to their nests between June 15 and July 15 but also by searching through dense vegetation for open-cut nests. Among the nests found at MAPS sites, a greater number of nests was found at the RESI site with a total of 11 compared to three and two in FAWA and ROAD respectively (Table 7). Most of nests found concerned tree/open-cup nesting species (83%); cavity nesters (15%) and ground/open-cup nesters (2%). The AMRE and the LEFL were the most common species for which nests have been found with nine and seven nests respectively. Most of the species that are classified shrub and mid-canopy nesters such as AMRE, AMRO, LEFL and BHVI had their average nest height ranging from 2 to 5.5m (Table 7). In contrast, canopy species such as BTNW, WETA and BBWA were nesting at 8 ranging from eight to 12m. At the exception of AMRE for which nests were found exclusively in willows, most of the other nests were found in Trembling Aspen or White Spruce. Other interesting discoveries include the finding of four BBWA nests; one nest of BTNW, one nest of WETA and one nest of Rose-breasted Grosbeak (RBGR).

The discovery of active nest of BBWA and BTNW are especially important considering they are blue-listed (i.e., vulnerable species) in Alberta (Alberta Wildlife Management Division 1996) and red-listed in British Columbia (B.C Wildlife Branch 1993). These species are vulnerable mainly because of the current lack of basic ecological information as well as their potential sensibility to industrial activities increasingly occurring through their range. Considering that Lesser Slave Lake Provincial Park offers large areas of suitable habitat (i.e., mature and old growth mixed deciduous forests), more effort should be made to collect data on their abundance, breeding density and reproductive success. More intensive nest searches for BBWA and BTNW and other listed species should therefore be effectuated in the future in selected sites by LSLBO staffs without compromising the other existing programs. Also, nest searches can be done by the MAPS field coordinator in concordance with MAPS periods. A protocol

describing the methodology of site selection and nest search should be prepared as well a schedule showing how this new project can be integrated within the MAPS schedule.

Potential impact of the Canopy project on MAPS program

For the season 2000, it was agreed to set up one site of the new research project the Canopy project (thereafter as CP) at the emplacement of FEGU MAPS site, a site where the operation ceased in 1999. The canopy project site is also at proximity of ROAD site and both sites overlap at the SW corner of the ROAD site. During the summer 2000, there was an increase of the human traffic (but also a dog) during net lane construction and bird surveys done by the crew of the CP. Also, vegetation was cleared to set up of a new trail system passing though the ROAD MAPS site. Although potential effects of this project on the MAPS results obtained for the 2000 season in the ROAD site were not measured, there is concern that the CP might affect future results in the ROAD site.

During the summer 2000, a crew of three people was setting up ground and canopy nets in the CP site. On a daily basis, the crew was using the main trail behind the banding station, the same one that is used for MAPS project in the RAOD site. There was also a dog (i.e., Jonathan's dog) which was unleash most of the time and was running free in the trail system and likely off trails. There is four net lanes along this trail (1,2,3,5) that might have been directly affected by the increasing traffic. Human traffic was also increasing outside of the main trail as a new trail system has been built for the purpose of the spot-mapping surveys conducted by the CP. These new trails were build every 20 or 40m through out the CP site as well in the MAPS site. I have noticed these new trails at nets 1; 4 and 6.

One of the potential impacts of the CP on MAPS program in ROAD site is habitat degradation. Habitat degradation along new trails might change the quality of home ranges for some bird species (mostly ground nesting species). A possible consequence of this is that some species may shift their home range or at least redefine their boundaries in order to include a greater proportion of high quality habitat. A more direct impact on results from the ROAD site from activities of CP is a potential change in the capture rate

at some net lanes. New trails is likely to have an effect on birds behavior as they might avoid net lanes that are close to trails experiencing a lot of human traffic. Although it is hard to measure the effect of the traffic and new trail system in ROAD site, a potential avoidance of net lane will likely result in a lower capture rate for some species. On the other hand, the ROAD site might experience a higher capture rate if some species nesting in the CP site are pushed toward ROAD site net lanes.

Extensive traffic on the new and already existing trail system at the ROAD site a MAPS project may also lead to a greater rate of predation by mammals and avian predators. Some avian predator common on the site such as the Blue Jay (BLJA), Gray Jay (GRAJ) and American Crows (AMCR) can learn quite fast how to detect songbird nests by locating birds by their distress calls when disturb by somebody walking close to their active nest. Some other predators such coyotes and Black Bear (which are abundant around the MAPS site) can also use the new trail system in order to find songbird nests. Finally with the presence of the CP site near the ROAD site, we might experience higher predation by Red Squirrel on birds caught in mist nets. Because predation by Red Squirrel is a concern while mist netting in MAPS sites (mostly for species that get caught in lower pockets), birds that would have their home range in both ROAD and CP sites would be likely to be captured more than once and would therefore see their chance of been predated in mist-net increased.

Recommendations

1- I highly recommend that LSLBO increase its number of MAPS sites within the Lesser Slave Lake Provincial Park (e.g., up to five sites). Firstly, additional MAPS sites would provide more needful ecological data on songbirds for the Boreal Canada/Alaska region. Secondly, a greater sample size in the number of MAPS sites would allow LSLBO to have a sufficient amount of data to perform its own analysis of survivorship and productivity on common species specific to the dry mixed-wood boreal forest. A larger sample size of data originating from MAPS would also allow LSLBO to perform different analysis such as songbird-vegetation structure relationships. Such studies would, for example, help developing habitat models that

could be used by forest engineers and land managers in order to integrated wildlife requirement into already land management plans

2- In order to establish future MAPS sites in Lesser Slave Lake Provincial Park I would like to recommend three important points. First, I highly suggest that future MAPS sites be located in area offering high habitat heterogeneity. In Lesser Slave Lake Provincial Park, high productive area could include beaver ponds, old pipeline, lake shorelines and major rivers or creeks. Second, as the MAPS manual recommend it, I suggest that net lanes within new MAPS sites be distributed equally in edge and interior forest habitats with an average distance between net lanes of 75 m. This two suggestions will increase the capture rate and would consequently improve survivorship and productivity results. Finally, due to the fact that net lanes in FAWA and ROAD sites are distributed over a relatively small and homogenous habitat compared to what the MAPS manual suggest, I recommend to add supplemental net lanes over a larger area and in edge habitats.

3- Although potential effects of the CP site on future results of capture data from ROAD site mentioned above remain speculative, one should be aware of possible bias in the data from this MAPS site. It would be worth for LSLBO to try to establish a protocol with the CP leader in order to mitigate possible negative impacts of human traffic on songbirds and their habitat. Such protocol would for example establish guidelines to minimize impacts of vegetation degradation on birds nesting at the MAPS and CP sites. It would also establish a schedule of activities occurring at the CP and ROAD sites in order to control the traffic in a way that not all the same trails would be used all the time.

4- Because of its central location and its importance in the field of conservation, the LSLBO banding station will likely see an increase in the public traffic in the near future. Although the ROAD site could be used as a unique conservation and education tools that could enhance the MAPS program, LSLBO must however ensure

that data collecting at this site stay constant year after year. Again, a detailed schedule should be designed in order to coordinate public visits with MAPS sites operation.

5- Because Lesser Slave Lake Provincial Park seems to offer large areas of suitable habitat for blue-listed species such as the BBWA and the BTNW, more intensive nest searches for these two and other listed species should be done by LSLBO staff in the future. A protocol should also be prepared documenting the methodology requires to search nests as well as a methodology for recording the reproductive success and habitat structure. There is an already existing protocol called 'BBIRD' that was developed by Dr. Thomas Martin of the University of Montana and describes a methodology for assessing songbird reproductive success and the associated effects of vegetation. LSLBO could use this protocol as it is available for the public on the internet at http://pica.wru.umt.edu/BBIRD/default.htm. As for the MAPS program, BBIRD has a software available for data entry and verification.

Table 1: Number of newly banded and recaptured birds at ROAD site, 2000.

Species[a]	New Banded	Recapture from MAPS 2000	Recapture from MAPS (94-99)	Recapture M. M. P. (all yrs)[b]	Unbanded	Total[c]
CAWA	7	1	1	2	0	10
OVEN	5	0	1	2	0	8
SWTH	5	2	0	2	1	8
AMRE	4	0	0	3	0	7
MAWA	2	0	2	3	0	7
BAWW	1	0	0	2	0	3
BTNW	1	0	0	0	0	1
MYWA	0	0	0	1	0	1
WIWR	0	0	0	1	0	1
WTSP	0	0	0	2	0	2
Total	25	3	4	18	1	48

a See species names and codes in Appendix
b M. M. P. signify Migration Monitoring Program
c Total does not includes the number of recaptured birds originating from MAPS 2000.

Table 2: Number of newly banded and recaptured birds at FAWA site, 2000.

Species[a]	New Banded	Recapture from MAPS 2000	Recapture from MAPS (94-99)	Recapture from M. M. P. (all yrs)[b]	Unbanded	Total[c]
CAWA	6	2	2	0	0	8
WTSP	6	2	0	0	1	7
AMRE	5	1	0	1	0	6
MYWA	3	0	0	0	0	3
OVEN	3	0	1	0	0	4
MOWA	2	0	1	0	0	3
RBGR	1	0	0	0	0	1
SWTH	1	0	0	0	0	1
DOWO	0	0	0	1	0	1
Total	27	5	4	2	1	34

a See species names and codes in Appendix
b M. M. P. signify Migration Monitoring Program
c Total does not includes the number of recaptured birds originating from MAPS 2000.

Table 3: Number of newly banded and recaptured birds at RESI site, 2000.

Species[a]	New Banded	Recapture from MAPS 2000	Recapture from MAPS (94-99)	Recapture from M. M. P. (all yrs)[b]	Unbanded	Total[c]
LEFL	11	0	0	0	0	11
WTSP	11	0	0	0	3	14
AMRE	10	0	0	0	0	10
TEWA	7	1	0	0	0	7
MYWA	6	1	0	0	0	6
SWTH	6	2	0	0	0	6
MAWA	5	2	0	0	0	5
HETH	4	0	0	0	0	4
CAWA	3	0	0	0	0	3
MOWA	3	1	0	0	0	3
OVEN	3	0	0	1	0	4
YWAR	3	1	0	0	0	3
AMRO	2	0	0	0	0	2
BAWW	2	1	0	0	0	2
BBWA	2	0	0	0	0	2
CHSP	2	0	0	0	0	2
YBSA	2	0	0	0	0	2
BCCH	1	0	0	0	0	1
BTNW	1	0	0	0	0	1
LISP	1	0	0	0	0	1
PISI	1	0	0	0	0	1
RBGR	1	0	0	0	0	1
SSHA	1	0	0	0	0	1
WETA	1	0	0	0	0	1
WWPE	1	0	0	0	0	1
Total	90	9	0	1	3	94

a See species names and codes in Appendix
b M. M. P. signify Migration Monitoring Program
c Total does not includes the number of recaptured birds originating from MAPS 2000.

Table 4: Comparison of 1999 and 2000 capture rates for species captured at three MAPS sites at LSLBO, 2000. (All captures were included in the comparison).

Species	FAWA 1999	FAWA 2000	ROAD 1999	ROAD 2000	FEGU 1999	RESI 2000	Mean 1999	SE	Mean 2000	SE
AMRE	0.6	3.3	4.2	2.8	13.3	2.8	6.02	2.94	3.0	0.06
CAWA	4.2	4.2	3.3	3.6	5.6	0.8	4.35	0.59	2.9	0.36
WTSP	2.8	2.8	1.4	0.8	2.8	3.9	2.31	0.58	2.5	0.30
SWTH	0.0	0.3	2.2	3.3	1.1	2.2	1.11	1.15	1.9	0.33
OVEN	1.1	1.4	2.5	2.2	2.2	1.4	1.94	0.58	1.7	0.11
MAWA	0.3	0	6.7	2.8	1.4	1.9	2.78	2.24	1.6	0.35
HETH	0.0	0	0.0	0	0.0	3.1			1.0	0.89
LEFL	0.0	0	0.0	0	0.0	3.1			1.0	0.54
MYWA	0.0	0.8	0.6	0.3	1.1	1.9	0.56	0.82	1.0	0.25
TEWA	0.0	0	1.4	0	0.6	2.5	0.65	0.95	0.8	0.48
MOWA	2.5	1.1	0.6	0	1.1	1.1	1.39	0.93	0.7	0.22
BAWW	0.3	0	0.3	0.8	0.0	0.8	0.19	0.41	0.5	0.19
YWAR	0.0	0	0.0	0	0.6	1.1	0.19	0.82	0.4	0.32
RBGR	0.0	0.3	0.0	0	0.0	0.3			0.2	0.12
BTNW	0.0	0	0.0	0.3	0.3	0.3	0.09	0.58	0.2	0.12
WIWR	0.0	0	0.0	0.3	0.3	0.3	0.09	0.58	0.2	0.17
AMRO	0.3	0	0.0	0	0.3	0.6	0.19	0.41	0.2	0.24
BBWA	0.0	0	0.0	0	0.6	0.6	0.19	0.82	0.2	0.24
CHSP	0.0	0	0.3	0	0.0	0.6	0.09	0.58	0.2	0.24
YBSA	0.0	0	0.0	0	0.0	0.6			0.2	0.24
DOWO	0.0	0.3	0.0	0	0.0	0			0.1	0.17
BCCH	0.0	0	0.3	0	0.0	0.3	0.09	0.58	0.1	0.17
LISP	0.0	0	0.0	0	0.0	0.3			0.1	0.17
PISI	0.0	0	0.0	0	0.0	0.3			0.1	0.17
SSHA	0.0	0	0.0	0	0.0	0.3			0.1	0.17
WETA	0.0	0	0.0	0	0.0	0.3			0.1	0.17
WEWP	0.0	0	0.0	0	0.0	0.3			0.1	0.17
COYE	0.3	0	0.0	0	0.3	0	0.19	0.41		
COWA	0.3	0	0.0	0	0.0	0	0.09	0.58		
REVI	0.0	0	0.0	0	0.3	0	0.09	0.58		
SWSP	0.0	0	0.0	0	0.3	0	0.09	0.58		

See species names and codes in Appendix

Table 5: Comparison of songbird productivity (number HY birds divided by the number of aged birds) at three MAPS sites at LSLBO for 1999 and 2000.

Species	AHY(2000)	HY(2000)	HY Ratio(2000)	HY Ratio 99*
BAWW	3	2	0.40	-
MOWA	4	2	0.33	0.25
OVEN	13	3	0.19	0.29
SWTH	13	2	0.13	0.27
AMRE	20	3	0.13	0.18
TEWA	7	1	0.13	0.29
LEFL	10	1	0.09	-
WTSP	20	2	0.09	0.11
MAWA	11	1	0.09	0.44
CAWA	20	1	0.05	0.42
AMRO	2	0	0.00	-
BBWA	2	0	0.00	-
BCCH	1	0	0.00	-
BTNW	2	0	0.00	-
CHSP	2	0	0.00	-
DOWO	1	0	0.00	-
HETH	4	0	0.00	-
LISP	1	0	0.00	-
MYWA	10	0	0.00	0.17
PISI	1	0	0.00	-
RBGR	2	0	0.00	-
SSHA	1	0	0.00	-
WETA	1	0	0.00	-
WIWR	1	0	0.00	-
WEWP	1	0	0.00	-
YBSA	2	0	0.00	-
YWAR	3	0	0.00	-

From Jungkind 2000
See species names and codes in Appendix

Table 6: Breeding status of birds observed at three MAPS sites at LSLBO, 2000.

Species	RESI	ROAD	FAWA	Species	RESI	ROAD	FAWA
ALFL	L	L		PIWO	L	L	L
AMCR			L	PUFI	T	T	
AMRE	B	B	B	RBGR	B	B	L
AMRO	B	B	B	RBNU	B	L	
AWPE		T		RCKI	L		
BAEA		L	T	REVI	B	B	L
BARS		T		RUGR		B	
BAWW	L	B	L	RWBL		T	
BBMA			T	SOSP		B	
BBWA	B			SPSA	T		
BCCH	B	B	B	SSHA	B		
BHCO		T		SWTH	B	L	L
BHVI	L	T		TEWA	B	L	L
BLJA	T			TRES		T	
BLPW		T		TTWO	T		
BOCH	B			VESP		T	
BTNW	B	B		WAVI	B	L	
BWHA		T		WETA	L	B	
CAWA	B	B	B	WEWP	B	L	
CCSP	B	L	L	WIWR	B	B	
CEDW	L	B	L	WTSP	B	L	B
CHSP	B	B		WWCR	T	T	T
CONW			L	YBSA	B	L	L
CORA	T	L	L	YSFL	T		
COYE	B	B	L	YWAR	B	L	L
DOWO	T		B				
EAPH		B		**Total sp. confirmed (B)**	**27**	**19**	**8**
EVGR	T	T	T	**Total sp. likely (L)**	**11**	**20**	**20**
GRJA	L			**Total transient sp. (T)**	**10**	**12**	**7**
HAWO	L	L	L	**Total**	**48**	**51**	**35**
HETH	L		L				
HOWR			T				
LEFL	B	L	L				
LISP	L	L	L				
AMKE		T					
MALL			L				
MAWA	B	B					
MERL		B					
MOWA	B	L	B				
MYWA	B	L	B				
NOWA		L					
OSPR		L	T				
OVEN	B	B	L				
PISI	T	L	T				

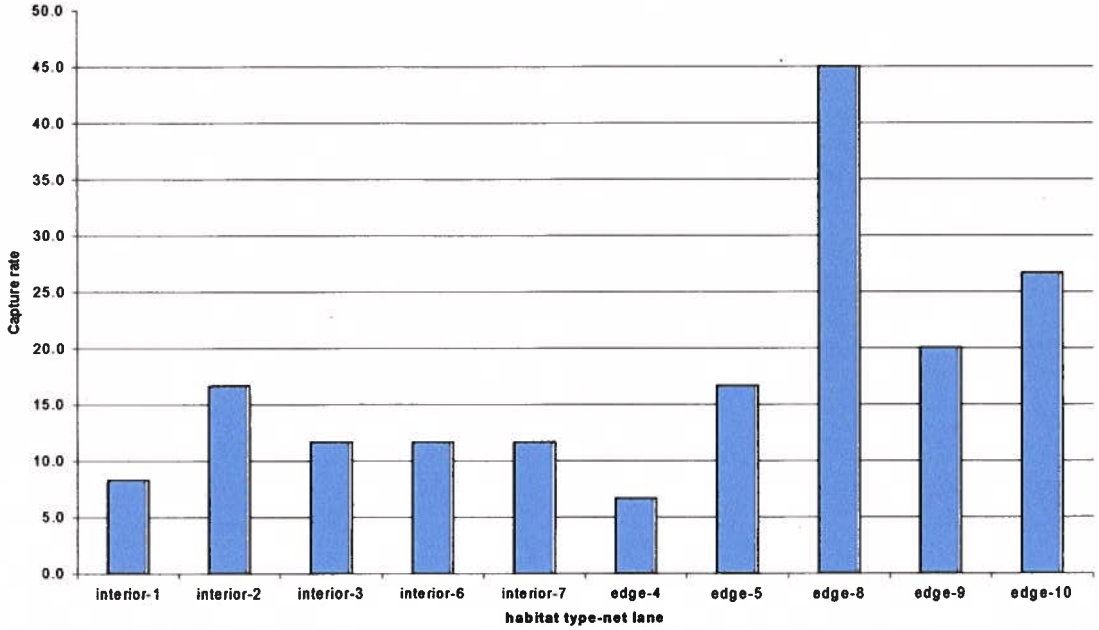
See species names and codes in Appendix

Table 7: Nests found during the MAPS program and during opportunistically searches in the Lesser Slave Lake Provincial Park, 2000.

Species	Nest number	Substratum (%)	Mean nest height	Mean substratum height
AMRE	9	Willow (100)	3	8
LEFL	7	Aspen (72) Willow (14) Balsam Poplar (14)	2.4	8.4
BBWA	4	White Spruce (100)	10.3	19.3
YBSA	4	Aspen (100)	6.8	17.5
EAPH	4	Buildings (100)	5.3	–
BTNW	1	White Spruce (100)	8	15
AMRO	1	Willow (100)	2	4
BHVI	1	White Birch (100)	5.5	10
CEDW	1	Willow (100)	2.3	6
CHSP	1	White Spruce (100)	12	26
DOWO	1	Aspen (100)	4	22
RBGR	1	White Spruce (100)	2.5	3.3
RCKI	1	White Spruce (100)	20	26
SWTH	1	White Spruce (100)	4.5	16
WAVI	1	White Birch (100)	2	3
WETA	1	White Spruce (100)	12	24
WTSP	1	Ground	–	–
RBNU	1	Aspen (100)	8	8
TOTAL	41			

See species names and codes in Appendix

RESI



FAWA

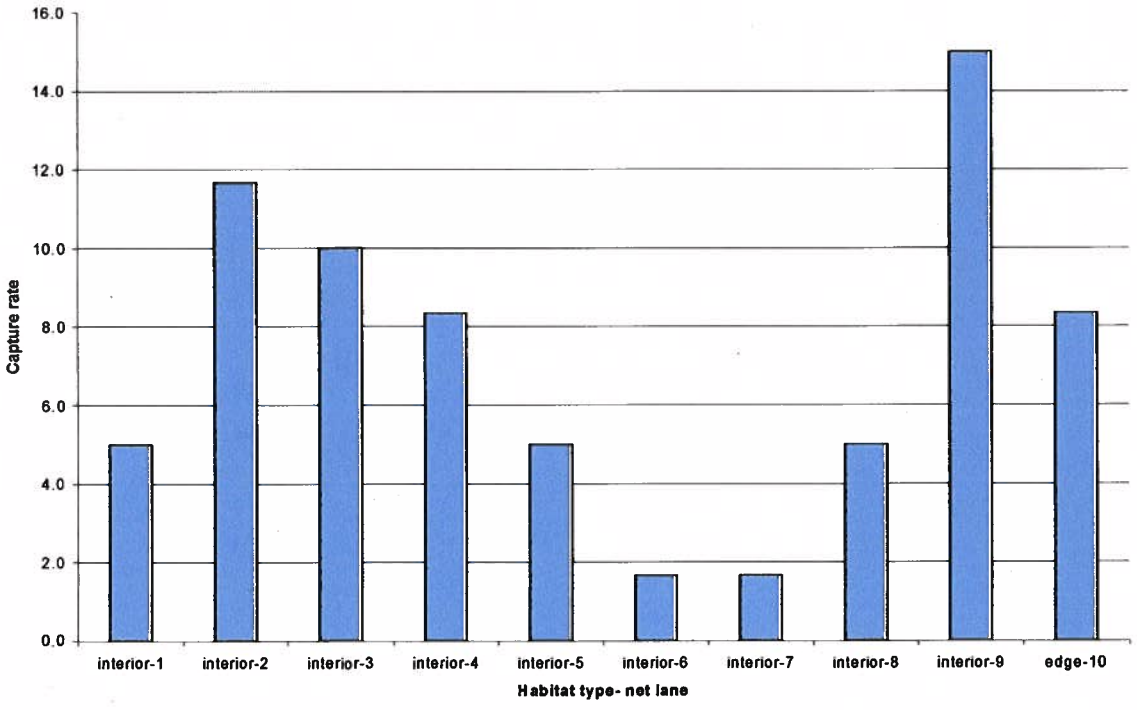


Figure 1: Capture rate per net lane for RESI and FAWA sites at LSLBO, 2000. Each bar is named according to the habitat type where it is found and by its net number. Bars are grouped by habitat type. All captures were included in the analysis.

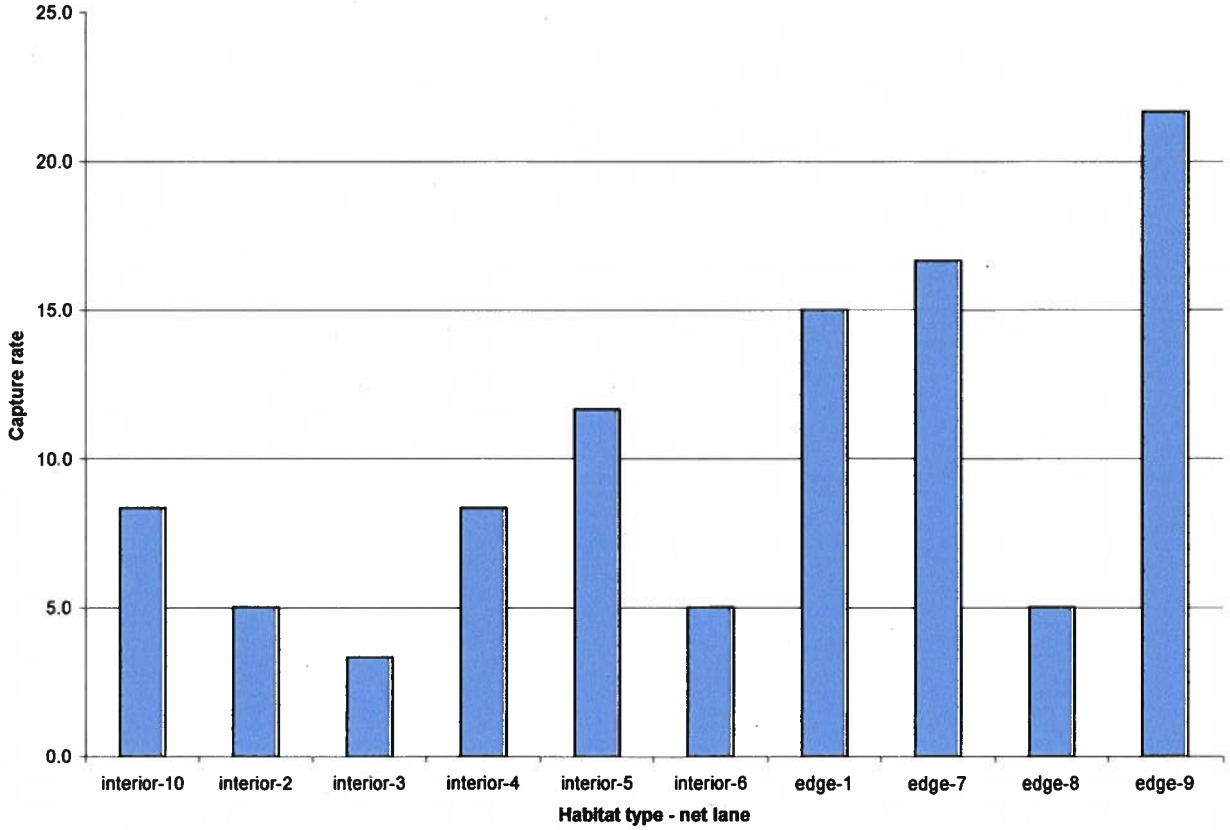


Figure 2: Capture rate per net lane for ROAD site at LSLBO, 2000. Each bar is named according to the habitat type where it is found and by its net number. Bars are grouped by habitat type. All captures were included in the analysis.

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Appendix

Common names and code of species that occurred during the MAPS program, 2000

Common name	Bird species code
Alder Flycatcher	ALFL
American Crow	AMCR
American Kestrel	AMKE
American Redstart	AMRE
American Robin	AMRO
American White Pelican	AWPE
Bald Eagle	BAEA
Barn Swallow	BARS
Bay-breasted Warbler	BBWA
Black and White Warbler	BAWW
Black-bellied Magpie	BBMA
Black-capped Chickadee	BCCH
Blackpoll Warbler	BLPW
Black-throated Green Warbler	BTNW
Blue Jay	BLJA
Blue-headed Vireo	BHVI
Blue-headed Vireo	BHVI
Boreal Chickadee	BOCH
Broad-winged Hawk	BWHA
Brown-headed Cowbird	BHCO
Canada Warbler	CAWA
Cedar Waxwing	CEWA
Chipping Sparrow	CHSP
Clay-colored Sparrow	CCSP
Common Raven	CORA
Common Yellowthroat	COYE
Connecticut Warbler	COWA
Downy Woodpecker	DOWO
Eastern Phoebe	EAPH
Evening Grosbeak	EVGR
Gray Jay	GRAJ
Hairy Woodpecker	HAWO
Hermit Thrush	HETH
House Wren	HOWR
Least Flycatcher	LEFL
Lincoln's Sparrow	LISP
Magnolia Warbler	MAWA

Appendix

Common names and code of species that occurred during the MAPS program, 2000

Common name	Bird species code
Mallard	MALL
Merlin	MERL
Morning Warbler	MOWA
Myrtle Warbler	MYWA
Northern Waterthush	NOWA
Osprey	OSPR
Ovenbird	OVEN
Pileated Woodpecker	PIWO
Pine Siskin	PISI
Purple Finch	PUFI
Red-breasted Nuthatch	RBNU
Red-eyed Vireo	REVI
Red-winged Blackbird	RWBL
Rose-breasted Grosbeak	RBGR
Ruby-crowned Kinglet	RCKI
Ruffed Grouse	RUGR
Sharp-shinned Hawk	SSHA
Song Sparrow	SOSP
Swainson's Thrush	SWTH
Tennessee Warbler	TEWA
Three-toed Woodpecker	TTWO
Tree Swallow	TRES
Vesperal Sparrow	VESP
Warbling Vireo	WAVI
Western Tanager	WETA
Western Wood-pewee	WEWP
White-throated Sparrow	WTSP
White-winged Crossbill	WWCR
Winter Wren	WIWR
Yellow Warbler	YWAR
Yellow-bellied Sapsucker	YBSA
Yellow-shafted Flicker	YSFL

Appendix
Maps of the three MAPS sites operated in 2000.
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Appendix
Example of data sheet for the habitat structure assessment

Page: 4
[L1]Carl, maybe we shouldn't divulge the whereabouts of the MAPS site. You might get unwanted attention. In fact, you may wish to change the site's name to further hide its location.
Page: 5
[L2]Carl, make sure you list this point in your recommendations. It is a very important observation that the Board must be cognizant of.
Page: 5
[L3]Shouldn't this be of the MAPS program at large? That is, every year there has been a low productivity rate, not just in 2000.
Page: 5
[L4]not sure what you mean here

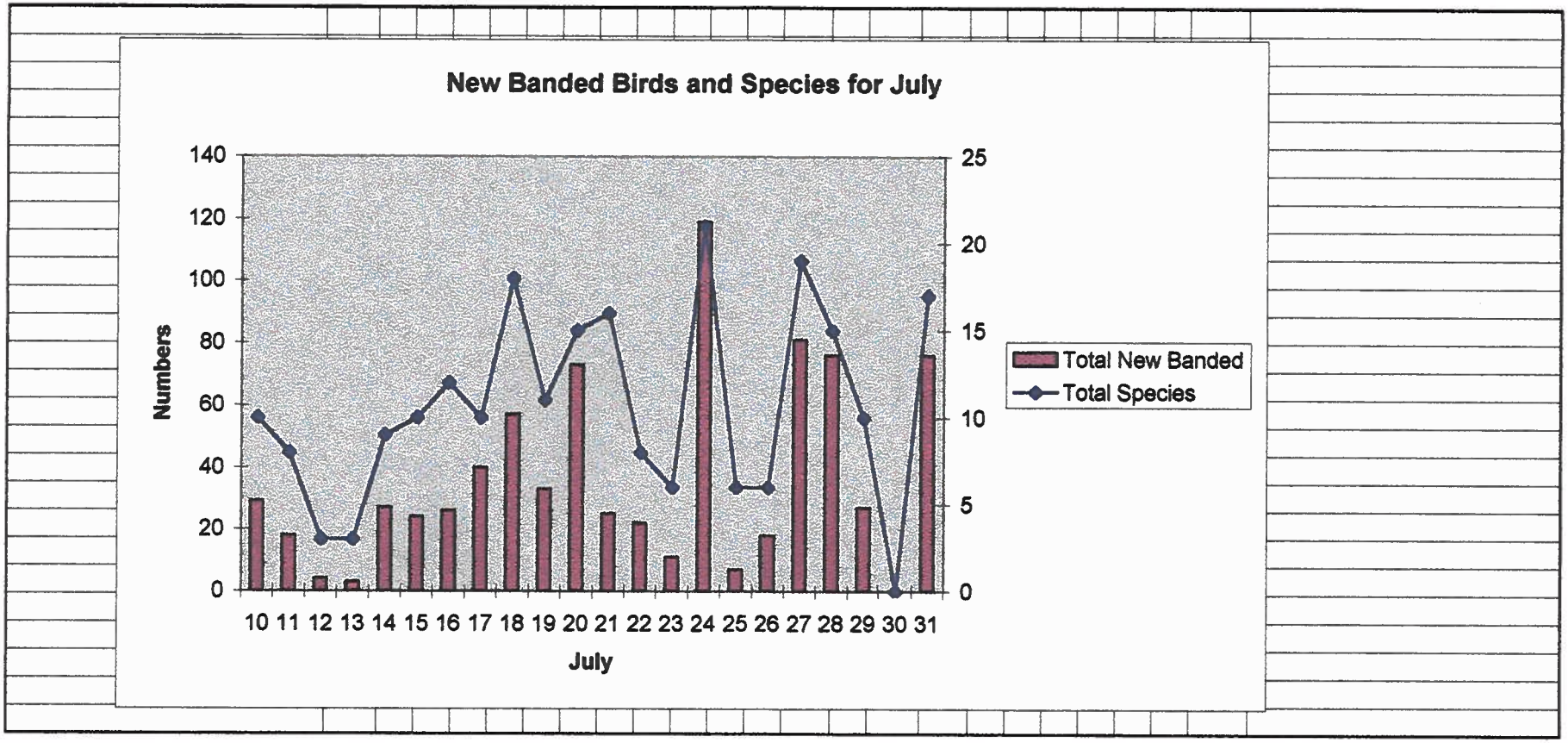
Lesser Slave Lake Bird Observatory

JULY, 1999	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	total	
Species																								
Alder Flycatcher	1			1	1	6		1	2	2	1	2			2	1		1	1	1		2	25	Alder Flycatcher
American Redstart	3	7	2	1	8	4	8	1	7	10	18	3	7		16		9	28	19	11		23	185	American Redstart
American Robin																							0	American Robin
American Tree Sparrow																							0	American Tree Sparrow
Bay-breasted Warbler																		1	1			1	3	Bay-breasted Warbler
Black-and-White Warbler	3				1		1	3	3		5	1			4	1		3	3			3	31	Black-and-White Warbler
Black-capped Chickadee									1		2				1								4	Black-capped Chickadee
Blackpoll Warbler																							0	Blackpoll Warbler
Black-throated Green Warbler											1	1											2	Black-throated Green Warbler
Blue-headed Vireo												2											2	Blue-headed Vireo
Canada Warbler	4		1					2	1		3	2	4	2	5	1	3	9	15	1		10	63	Canada Warbler
Cape May Warbler																				1			1	Cape May Warbler
Cedar Waxwing																		1					1	Cedar Waxwing
Chipping Sparrow						1																1	2	Chipping Sparrow
Clay-colored Sparrow									1		1				1			1					4	Clay-colored Sparrow
Common Yellowthroat					1	1	3		1			1	1		1		1	1	2			1	14	Common Yellowthroat
Eastern Phoebe																				1			1	Eastern Phoebe
Fox Sparrow																							0	Fox Sparrow
Hermit Thrush																							0	Hermit Thrush
Least Flycatcher					1		1	1	1	3	1		3	1	4			4	3	3		5	31	Least Flaycatcher
Lincoln's Sparrow			1			1						1											3	Lincoln's Sparrow
Magnolia Warbler	1	1			1	1	3		4						2		1		3	2		1	20	Magnolia Warbler
Mourning Warbler						1													1				2	Mourning Warbler
Myrtle warbler	8	2			3	2	1	3	8	1	8		1		17	1		9	9				73	Myrtle warbler
Northern Watertrhush																		1					1	Northern Watertrhush
Orange-crowned Warbler											4	1			5								10	Orange-crowned Warbler
Ovenbird	1	2				1	1	5	5	1	2	2	1		2			2	3			5	33	Ovenbird
Philadelphia Vireo												1		1				1				1	4	Philadelphia Vireo
Pine Siskin										1													1	Pine Siskin
Purple Finch												1											1	Purple Finch
Rose-breasted Grosbeak		1													3	1		3	1	2		1	12	Rose-breasted Grosbeak
Red-breasted Nuthatch															1								1	Red-breasted Nuthatch
Red-eyed Vireo	1	2		1	2				1	1		1			4			2					15	Red-eyed Vireo
Ruby-crowned Kinglet																							0	Ruby-crowned Kinglet
Savannah Sparrow																							0	Savannah Sparrow
Sharp shinned Hawk																						1	1	Sharp-shinned Hawk

no data collected (weather)

Lesser Slave Lake Bird Observatory

Slate-colored Junco																						0	Slate-colored Junco	
Song Sparrow														1								1	Song Sparrow	
Swainson'sThrush	3	2				6	3	1	1	2	4	1	2	1	4		1	3	1	2	3	40	Swainson'sThrush	
Swamp Sparrow									1													1	Swamp Sparrow	
Tennessee Warbler	4						1	5	7	3	1			2	6			1	1		2	33	Tennessee Warbler	
Warbling Vireo									1													1	Warbling Vireo	
Western Palm Warbler																						0	Western Palm Warbler	
Western Tanager															3			1				4	Western Tanager	
Western Wood-Pewee							1														1	2	Western Wood-Pewee	
White-crowned Sparrow																						0	White-crowned Sparrow	
White-throated Sparrow							1		2	1	1				1							6	White-throated Sparrow	
Wilson Warbler																						0	Wilson Warbler	
Yellow-bellied Sapsucker																						0	Yellow-bellied Sapsucker	
Yellow Warbler		1			9		2	18	10	8	21	4	3	4	36	2	3	9	13	3	15	161	Yellow Warbler	
Yellow-bellied Flycatcher												1										1	Yellow-bellied Flycatcher	
																						0		
																						0		
																						0		
TOTAL BIRDS	**29**	**18**	**4**	**3**	**27**	**24**	**26**	**40**	**57**	**33**	**73**	**25**	**22**	**11**	**119**	**7**	**18**	**81**	**76**	**27**	**0**	**76**	**796**	36
TOTAL SPECIES	10	8	3	3	9	10	12	10	18	11	15	16	8	6	21	6	6	19	15	10	0	17		11
Jul-99	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		


New Banded Birds and Species for July
Numbers
140
120
100
80
60
40
20
0
25
20
15
10
5
0
10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
July
Total New Banded
Total Species