2024 Ranger Creek MAPS Station Summary Report

1999-2024

Photos clockwise from top left (by Cyndi Smith):

White-throated Sparrow (after second year male)
Northern Flicker (hatch year, unknown sex)
Flicker Intergrade (after third year male)
Flicker Intergrade, "red-shafted" wing (third year male)

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Table of Contents

List of Figures

List of Tables

List of Appendices

1.0 Background

The Monitoring Avian Productivity and Survivorship (MAPS) program was established in 1989 by The Institute for Bird Populations (IBP), Petaluma, California. Its goal is to provide long-term demographic data on landbirds as an aid in identifying the causal factors driving population trends documented by other avian monitoring programs such as the North American Breeding Bird Survey and Christmas Bird Counts (DeSante and Nott 2001). It is a cooperative effort among public agencies, private organizations, and individual bird banders in North America to operate a continent-wide network of constant-effort mist-netting stations during the breeding season.

1.1 Objectives

The objective of MAPS is to provide long-term population and demographic information on target passerine species at various spatial scales by providing:

- annual indices and longer-term trends in adult population size and post-fledging productivity from analyses of numbers and proportions of adult and young birds captured during the breeding season; and
- annual estimates and longer-term trends of adult survivorship, adult population size, and recruitment into the adult population from analyses of mark-recapture data on adult birds gathered at these same stations.

These indices and estimates can be used to aid in:

- identifying the proximate causes of population changes in the target species;
- identifying conservation and management actions to reverse the population trends of declining species; and
- evaluating the effectiveness of the conservation and management actions implemented.

MAPS data has contributed to a diverse suite of publications, such as: survival rate estimates (DeSante et al. 1995, Kaschube et al. 2022), proximate demographic causes of population change (DeSante and Nott 2001), the influence of climate change on avian demographics (Nott et al. 2002, Youngflesh et al. 2023), demographic declines due to human footprint (Saracco et al. 2022) and the influence of noise on avian abundance productivity (Ng et al. 2020). These publications, as well as many technical reports, can be found on the IBP's website https://www.birdpop.org/pages/pubsDatabase.php.

1.2 Target species

The MAPS program divides the continent into eight major regions based on biogeographical and meteorological considerations, and each region has target species identified within it. While IBP statisticians rarely analyse the data using these specific target species, it is still instructive to consider the original target list. Banff National Park falls into the Northwest Region, whose target species (scientific names can be found in Appendix A) are:

- Dusky Flycatcher
- Western Flycatcher
- Swainson's Thrush
- American Robin

- Warbling Vireo
- Orange-crowned Warbler
- Yellow Warbler
- MacGillivray's Warbler
- Wilson's Warbler
- Song Sparrow
- Lincoln's Sparrow
- "Oregon" Dark-eyed Junco

2.0 Ranger Creek MAPS Station (RANG)

There are parameters for establishing a MAPS station. They should be sited in locations:

- that will allow for their operation indefinitely into the future, or at least for five to ten years;
- that will permit the capture of substantial numbers of many of the common species of passerines breeding in the area, including at least one of the target species for that region;
- where floating, transient and migrant birds do not tend to concentrate;
- that are upland woodland or forest habitats, lowland woodland or riparian habitats, or in scrub habitats;
- that are in relatively mature habitats or where the habitat is held in a lower successional stage by active management; and
- that are likely to remain free of major human-caused disturbance for the duration of the project.

The establishment of a MAPS station near Ranger Creek (RANG), in 1999, fulfilled these parameters. At the time of its establishment the only other MAPS station in the mountain national parks was in Mount Revelstoke National Park, which operated from 1993 until 2002. In 2002, a MAPS station was started in Waterton Lakes National Park, and in 2004, a MAPS station was initiated in Jasper National Park, and both are ongoing (Smith et al. 2008). Ranger Creek is the longest-running MAPS station in a national park in Canada, the 5th longest running station in Alberta, and the 7th longest running station in Canada.

The MAPS Program is a recommended survey in the Canadian Landbird Monitoring Strategy of the Canadian Wildlife Service (Anon. 1994). The *Special Resources of Banff National Park* (Achuff et al. 1986) recommended further study of "Bird Community 9" (montane shrub wetland, as classified by Holland and Coen 1983), which is almost wholly confined to the Vermilion Lakes Ecosection in the Montane ecoregion. While considerable study had been undertaken of the waterfowl species of this community, landbird surveys, such as point counts were only undertaken in the early 1990s (Mike McIvor, pers. comm.). Since 2007 autonomous recording units have been used to monitor landbirds at point count sites along permanent transects throughout the park (Whittington et al. 2019).

The Ranger Creek site was chosen as 1) being representative of the Ecosection (wet shrub/spruce complex), 2) receiving little human traffic, and 3) having easy access. Monitoring of passerine use of the Ecosection will provide valuable baseline data to study the effects of vegetation changes and altered hydrological processes.

The station was established near where Ranger Creek joins the Bow River, approximately 17 km west of Banff on the Bow Valley Parkway (Fig. 1), also known as Highway 1A, at an elevation

of approximately 1,380 m. The station area (approximately 100 m beyond each net) encloses roughly 11 ha of habitat.

2.1 Habitat description

The Ranger Creek station is situated in the Vermilion Lakes Ecosite 3 (VL3), which encompasses wet level floodplains dominated by forest and shrub vegetation (Holland and Coen 1983). Vegetation patterns are complex (Figs. 2 and 3). A Rapid Habitat Structure Assessment (HSA) protocol (Nott 1999) was used in 1999 to determine spatial habitat patterns at the site, and re-assessed in 2004, 2011, 2016 and 2021 (Nott et al. 2003). Currently there are four primary habitat types: closed canopy forest of aspen with spruce and some pine, sedge meadow, closed canopy spruce/willow forest, and aspen shrubland with meadow (Fig. 3). Detailed habitat descriptions can be found in Smith (2001) and in the primary author's files. A few years after establishment of the station beavers had left the site, and the wetland to the northwest is slowly drying out and becoming shrubland. In recent years beaver have returned but their dam is at the culvert under the railway, which the CPR is controlling, and the water is not flooding back into the meadow. With the reduction of elk in the area, and subsequently little browsing of young aspen, the montane meadow has become predominantly an aspen shrubland (Fig. 4). A number of spruce trees on the edge of the pond blew down or died (Fig. 5).

3.0 Methods

3.1 Operation of station

The MAPS Program consists of standardized constant-effort mist-netting during the breeding season (DeSante et al. 2005, 2019). The breeding season is considered to extend from May 01 to August 28, depending on local latitude and altitude, and is divided into 10 ten-day periods. For Ranger Creek the MAPS season begins in period five (June 10 - June 19) and ends with period ten (July 30 - August 8). Mist-netting commences the first 10-day period during which the great majority of the breeding adults of the target species have established territories and migrant individuals of these species are no longer passing through the area. Ten mist nets were operated for six hours from sunrise on one day during each of the 10-day periods.

New mandatory access restrictions (closed from 8:00 p.m. until 8:00 a.m. between 1 May and 25 June) on the Bow Valley Parkway were implemented in 2014. This affects the first banding session in period five, but by setting and furling the nets the evening before, we are able to open the nets by 8:30 a.m., thus only losing 20 net hours.

The mist nets were placed where birds could be captured most efficiently, such as the brushy portions of wooded areas, forest breaks or edges, and the vicinity of water. Nets were removed from the site after the completion of each banding session, but poles and rebar pegs used to hold them in place, as well as banding table and chairs, were left until the end of the banding season.

The type and location of nets may be changed after the first year, but should be kept constant after that time. However, net 1 was discontinued after 2002 because of difficulty in accessing it across a small creek, and net 6 was discontinued after 2002 because rising waters from the wetland were flooding that lane; nets 11 and 12 were added in 2004 to keep the number of nets at

10. In 2001, the banding table was relocated from next to the grazing exclosure to near net 10, to reduce trampling of vegetation adjacent to the exclosure, which is part of a long-term vegetation monitoring program of Parks Canada. Also in 2001, boardwalks were installed at nets 6-10 to reduce impact on the wetland vegetation. Some of these have been subsequently removed due to deterioration and to drying out of the wet area.

Ten mist nets (30-mm mesh; 2.6 m tall x 12 m long) were used to capture birds. A portable electronic scale (weighing to nearest 0.1 gram) was used to weigh birds.

In an effort to reduce injuries and mortalities a number of procedures have been implemented over the years. A "hospital box" has been added to the banding station's equipment, consisting of an insulated lunch box lined with soft material, and chemical hand warmers that can be wrapped in cloth and used as an external heat source. It is a quiet place for stressed birds to recover while being monitored. Volunteers are trained to use the "body grasp" technique (Ralph 2005) for removing birds from the net, which is faster and results in fewer leg and wing strains than the leg grip. An additional change that was implemented in 2017 was the use of coloured clothespins to designate high priority birds to be actioned first by the bander. These included birds that were a difficult extraction, hatch year birds, and species considered sensitive (American Robin, House Wren, Lincoln's Sparrow, Swainson's Thrush, and Veery) (Wesbrook 2016; unpublished data this station). In 2023 we started using an electrolyte mix (1 tbsp. sugar and 1 tsp. of salt dissolved in water) for lethargic or injured birds, applied to the beak using a medicine dropper. A detailed Bird Handling Protocol was developed and implemented in 2019, with minor revisions since then (Appendix B; Smith 2022).

3.2 Data collection

All birds captured were identified to species, age, and sex (Pyle 2022). Except for hummingbirds, all unbanded birds were banded with a uniquely-numbered internationally-recognized aluminum leg band. The following data were taken on all birds captured, including recaptures, according to MAPS guidelines, using standardized codes and forms (DeSante et al. 2005, 2019):

- capture code (newly banded, recaptured, band changed, unbanded),
- band number,
- species,
- age (both calendar year and WRP coding) and how aged,
- sex (if possible) and how sexed (if applicable),
- extent of skull pneumaticization (if assessed),
- breeding condition of adults (i.e., extent of cloacal protuberance or brood patch),
- extent of juvenal plumage in young birds,
- extent of body and flight-feather moult,
- extent of primary-feather wear,
- presence of moult limits and plumage characteristics,
- wing chord,
- fat class and body mass,
- date and time of capture (net-run time),
- station and net site where captured, and

- any pertinent notes.

Since 2017 we have been cooperating occasionally with the Bird Genoscape Project (www.birdgenoscape.org) by collecting tail feathers (generally R1 and L6) from certain species for genetic analysis. The skin cells still attached to the shaft of the feather are a source of DNA that can be used to determine the breeding origin of an individual. The resulting population-specific range maps for these species can be used to explore various research questions (e.g., Bay et al. 2018, Ruegg et al. 2018).

The times of opening and closing each net and beginning of each net run is recorded to the nearest 10 minutes each day (period) so that effort can be calculated to allow constant-effort comparisons of data. The breeding status (confirmed breeder, likely breeder, non-breeder) of each species seen, heard, or captured at the station on each day was recorded.

3.3 Data entry and verification

All banding data were entered into MAPSPROG ver. 6.0.04 (Froehlich et al. 2008) by the author. The critical data for each banding record (capture code, band number, species, age, sex, date, capture time and net number) were proofed by hand against the raw data and any computer-entry errors were corrected. All banding data were then run through a series of verification programs in MAPSPROG, as follows:

- clean-up programs to check the validity of all codes entered and the ranges of all numerical data,
- cross-check programs to compare state, date, and net fields from the banding data with those from the summary of mist netting effort data,
- cross-check programs to compare species, age, and sex determinations against degree of skull pneumaticization, breeding condition, and extent of body and flight-feather moult, primary-feather wear, and juvenal plumage,
- screening programs which allow identification of unusual or duplicate band numbers or unusual band sizes for each species, and
- verification programs to screen banding and recapture data from all years of operation for inconsistent species, age, or sex determinations for each band number.

Any discrepancies or suspicious data identified during these verification programs were examined manually and corrected if necessary. The data is ultimately checked and verified by IBP biologists before it is added to their database.

3.4 Data analyses

All species encountered at the station were classified into six groups based upon their breeding or summer residency status. Each species was classified as one of the following:

- a regular breeder (B) if we had positive or probable evidence of breeding or summer residency within the boundaries of the MAPS station during all years that the station was operated.
- a usual breeder (U) if we had positive or probable evidence of breeding or summer residency within the boundaries of the MAPS station during more than half but not all of the years that the station was operated.

- an occasional breeder (O) if we had positive or probable evidence of breeding or summer residency within the boundaries of the MAPS station during half or fewer of the years that the station was operated.
- a transient (T) if the species was never a breeder or summer resident at the station, but the station was within the overall breeding range of the species.
- an altitudinal disperser (A) if the species breeds only at lower elevation than that of the station but disperses to higher elevations after breeding.
- a migrant (M) if the station was not located within the overall breeding range of the species. This category includes extralimital breeders, i.e., the species bred at the station but the station was outside the normal breeding range for the species.

The banding data are used to determine the:

- numbers of newly banded birds, recaptured birds (year-to-year, same year and same day), and birds released unbanded,
- the numbers and capture rates (per 100 net hours) of first captures (in a given year) of individual adults and young birds,
- an index of adult population size,
- reproductive index, and
- population trends in relation to predicted changes due to climate change.

The number of adult birds captured was used as an index of adult population size. The reproductive index (number of young divided by number of adults) reflects post-fledging productivity.

To capture variation in annual capture rates we analyse all data using polynomial regression in Excel, and provide results as r^2.

3.5 Population trend projections due to climate change

Bird communities are changing due to climate shifts, even within protected areas (Wu et al. 2018). To understand the projected trend in species composition, Parks Canada determined the climate suitability (based on range of temperature, precipitation and seasonal shifts) of 513 species in national parks across the country, then used climate models to determine future climate suitability (for the year 2050) for each species in each national park (Parker et al. 2019a). Two climate scenarios were modelled: a high-emissions pathway (RCP8.5) and a moderate-emissions pathway (RCP4.5) (Parker et al. 2019b). In Banff National Park, adequate data existed to model 145 of the 208 species currently found in the park in the summer (Parker et al. 2019b). Conditions for 73 species are projected to improve, 41 species are projected to remain stable, 19 are projected to worsen, and 12 may be locally extirpated.

Populations of the following species are projected to decline:

- Ruby-crowned Kinglet
- Fox Sparrow
- Lincoln's Sparrow
- White-crowned Sparrow
- Orange-crowned Warbler
- Blackpoll Warbler
- Wilson's Warbler

Populations of the following species are projected to increase:

- Willow Flycatcher
- Least Flycatcher
- Warbling Vireo
- Golden-crowned Kinglet
- Swainson's Thrush
- American Robin
- Chipping Sparrow
- Brown-headed Cowbird
- MacGillivray's Warbler
- Common Yellowthroat
- American Redstart

Populations of the following species are projected to remain stable:

- Mountain Chickadee
- Clay-coloured Sparrow
- Northern Waterthrush
- Tennessee Warbler
- Yellow Warbler
- Yellow-rumped Warbler

To analyze climate change impacts we chose those species on the list for which we had data from at least half of the years of operation (minimum 12 years). We then used a 3-year moving average to smooth the annual variation in captures.

4.0 Results and Discussion

At Ranger Creek MAPS station, in 2024:

- this was the 26th year of operation of the station,
- 252 birds were captured (Table 1), which was above average (n = 231),
- 106 adults were banded, which is slightly below average (average = 111, range 57-182), of 27 species (Table 2; average = 29),
- 47 juveniles were banded (Table 3), which was about average (average = 46, range 7-115), but considerably lower than the last few years, of 16 species (average = 15), and
- a total of 34 species were captured, which is right on the average.

Between 1999 and 2024:

- 6,008 birds were captured,
- the busiest year was 2001, with 356 birds handled; 2016 had the second highest number of captures, with 337 birds handled, and; 2023 was third highest,
- of 4,062 known-age birds banded, 2,876 were adults (Table 2), of 73 species,
- 1,186 juveniles, of 51 species, were banded (Table 3),
- 78 species or subspecies (adults and juveniles) have been captured, with an average of 34 per year,
- first capture rate of adults averaged 31.5 per 100 net hours (range 18.1-50.6),
- juvenile capture rate averaged 14.0 per 100 net hours (range 2.1-33.1) for first captures, and
- capture rates for all birds (newly banded adults and juveniles, recaptures and unbanded) peaked in 2016, but the long-term trend is declining slightly (r^2 = -0.26) since 1999 (Fig. 6).

The reproductive index (RI; number of young divided by number of adults) continues to fluctuate, with 2024 (0.38) being just slightly below average (0.39; range 0.06-1.23), and barely half of what it was the previous two years. These fluctuations (Fig. 7) are probably most influenced by early summer weather. The years 2002, 2007, 2012, 2013 and 2019 were very wet, with reduced numbers of young produced in all five years, possibly due to females having to leave the nest more frequently to feed in cold weather, harder to provision the nestlings, and/or direct hypothermia of nestlings and fledglings. It is possible that by scheduling the period 10 date quite early in 2015 (July 26), due to the bander's scheduling conflict, rather than between July 30 and August 8, that some juveniles were not fledged yet. The spring and summer of 2023 were very mild, and juveniles were being captured two weeks earlier than in previous years. Years of very high RI seem to be driven by high numbers of a single species, such as 30 juvenile Yellow-rumped Warblers in 2003 (RI = 2.73), 28 Swainson's Thrushes in 2022 (RI = 3.11), and 18 Dark-eyed Juncos in 2023 (RI = 6.0). In 2024 we banded seven juvenile Common Yellowthroats; we had never had more than one in any previous year. The RI over the 24 years of operation has been increasing ($r^2 = 0.11$).

Many individuals are recaptured in the same year they were banded, but 268 individuals of 34 species or sub-species have been banded in one year and recaptured in a subsequent year at the site (Appendix B). In 2023 a Cedar Waxwing was recaptured in a subsequent year for the first time, and a Yellow-rumped Warbler for only the second time. Most recaptures occur in the first year following banding (Table 4), but many individuals have been recaptured in more than one year. In 2024, 23 individuals of 12 species were recaptured from previous years. Unsurprisingly, only one of 108 Cedar Waxwings and one of 168 Pine Siskins banded have been recaptured, as these are irruptive species and only breed occasionally at the site.

The return rate of adults (recaptured at least once in a year subsequent to banding) for each species (Table 5) is a function of many factors, including: breeding site fidelity of that species (and sex), territorial fidelity, nest success in previous years, the probability of recapturing the bird if it is present, and the probability of it surviving the full year (or more) in between captures. The overall return rate for all species and sexes combined at Ranger Creek was 14%, but males were almost twice as likely to return and be recaptured as females (17% vs. 10%). It is interesting to compare the adult return rate to the reproductive index (RI) for a few species: the return rate of Northern Waterthrush was high at 40%, but the RI was only 0.20 (144 adults and 29 juveniles banded); the return rate of Golden-crowned Kinglet was zero (no recaptures) but the RI was 6.93 (9 adults and 62 juveniles banded), and; the return rate of Ruby-crowned Kinglet was 5% but the RI was 0.71 (119 adults and 82 juveniles banded).

There have been five significant recaptures over the years:

- an after-second-year (ASY) male Northern Waterthrush (#2321-20551) banded in 2012, was recaptured in 2013, but not recaptured again until 2020, making him at least 10 years old, which is a new longevity record for this species (BBL 2022),
- an ASY male Northern Waterthrush (#2321-20588), banded in 2015, was not recaptured again until 2018, then in 2019, 2021 and 2022, making him at least 9 years old, which is the second-longest longevity record for this species (BBL 2022),

- an after-second-year (ASY) female Willow Flycatcher (#2440-33147) banded in 2009 was recaptured every year until 2018, making her at least 11 years and 2 months old, which is the longevity record for this species (BBL 2022), and
- in 2016 an after-second-year (ASY) male Pine Siskin (#2780-67607) was our first foreign recapture (not banded at Ranger Creek). It had been banded almost five months earlier at Long Point Bird Observatory in Ontario, approximately 2,850 kms in a straight line from our station (Appendix C).

In 2024 we had eight stressed birds, no injuries, and no mortalities (Table 6). Stressed birds that were held in the recovery box for varying periods of time before release were Calliope and Rufous hummingbirds, Ruby-crowned Kinglet, Northern Waterthrush, Yellow Warbler, and Wilson's Warbler.

Since 1999 there have been 28 mortalities (0.49% of captures). This is higher than the average mortality (0.23% ± 0.15) reported at 22 banding sites in North America (Spotswood et al. 2011), 0.34% in Jasper National Park (Wesbrook 2016) and 0.15% in Waterton Lakes National Park (Smith 2023). There have been 27 recorded injuries since 1999 (0.47% of captures), lower than 0.59% in Jasper National Park and 0.73% in Waterton Lakes National Park. These included: bleeding in the mouth from being tongued, wing abrasion, wing strain, dislocated and broken legs, hypothermia and capture/handling stress (these latter two are difficult to separate). Since 1999, 23 birds have been considered stressed (no apparent injuries, hypothermic) and released (0.40% of captures).

Some nets capture more birds than others due to their proximity to certain vegetation communities or water (Fig. 3). Habitat edges, where forest meets willow or grassy meadow, are the most productive. Nets #2 and #5 were the most productive nets, with 25.2% and 22.5% of new captures in 2024 (Table 7). Net #2 has been the most productive net by far since 1999 (Table 8), capturing 21% of new captures, almost double the next busiest net (Net #5 with 13.8% of new captures).

Eleven of the 12 target species (Section 1.2) have been captured, observed or heard at the site. The average number of individuals of these species captured per year is six, ranging from 1-15 (Table 9). Swainson's Thrushes have shown a significant increase in numbers banded since 1999 (r^2 = 0.682), which perhaps reflects the increasing amount of aspen/mixed forest habitat. Orange-crowned Warbler, which use similar habitat, are showing a nearly-significant increase (r^2 = 0.477) although their peak was in 2016 and they have been declining again since. Wilson's and Yellow warblers are showing moderate declines (r^2 = -0.157, and r^2 = -0.291, respectively). The two warblers primarily inhabit the willow shrubland with adjacent conifer forest.

Of the species predicted to show a declining trend by 2050 (Parker et al. 2019b) we had sufficient data on seven species for analysis. From 1999-2024, Fox Sparrow and Orange-crowned Warbler showed a significant declining trend; Wilson's Warbler and Lincoln's Sparrow showed a non-significant declining trend; Ruby-crowned Kinglet, White-crowned Sparrow and Blackpoll Warbler showed an increasing trend (the first two significantly) (Table 10, Fig. 8). Of the species predicted to show an increasing trend we had sufficient data on 11 species for analysis. American Robin, Swainson's Thrush, American Redstart, and Chipping Sparrow showed increasing trends (the first three significantly); Brown-headed Cowbird, Common

Yellowthroat, and Golden-crowned Kinglet showed significantly declining trends, and; Least Flycatcher, Willow Flycatcher, Warbling Vireo, and MacGillivray's Warbler are declining, but not significantly (Table 10, Fig. 9). Of the six species predicted to maintain a stable population Yellow Warbler, Clay-coloured Sparrow and Yellow-rumped Warbler are showing a decline (the first significantly), while Mountain Chickadee, Northern Waterthrush and Tennessee Warbler are showing increases (Table 10, Fig. 10), the last two significantly.

Species richness (number of species captured per year, standardized to 340 net hours per year, which is the average) has been increasing since 1999 ($r^2 = 0.331$) (Fig. 11). Seventy-eight species, including recognizable subspecies, have been captured, with an average of 34 species per year. In terms of bird families that have been banded, warblers form the highest percentage, followed by sparrows, thrushes and flycatchers (Fig. 12). The site species list, including those that were captured, identified only by call, or were observed flying overhead, totals 115 species or subspecies, such as both Myrtle and Audubon warblers, as well as the collective Yellow-rumped Warblers. Forty-two of these species have been confirmed to be breeding in all (status = B) or over half (status = U) of the years (Table 10). Breeders are confirmed by observation of courtship, nesting or feeding of young activities; brood patch or cloacal protuberance; captures at least seven days apart, or; captures in two consecutive years. An additional 29 species have bred at the site occasionally. A list of the common and scientific names of all species is in Appendix A (Pyle and DeSante 2023).

5.0 Volunteers

Over the reporting period nearly 50 people have volunteered at the MAPS station, although participation varies greatly from session to session and from season to season. There are typically four to five volunteers each session, and volunteers have contributed approximately 275 hours per year on the MAPS project for the past decade. This effort is provided not only on the banding days themselves, but also in planning, session coordination, site preparation, photography, data entry and report preparation. The contribution of all those who have volunteered valuable free time from their short mountain summers to keep this MAPS station operating is very much appreciated.

6.0 Outreach

Highlights from the Ranger Creek MAPS project are commonly featured in the newsletter of the Bow Valley Naturalists (BVN), and occasionally in the local newspaper, the *Rocky Mountain Outlook*. The BVN website has a page on how the data is collected, links to reports, and a photo gallery of captured birds. Go to www.bowvalleynaturalists.org, scroll down to the "Join Citizen Science Projects" menu box part way down the page, click on "Projects," then scroll down to the "MAPS" menu box and click on "Go to Maps." Thanks to Heather Dempsey of BVN for maintaining the website

7.0 Authorities

The MAPS station is operated under research permit from Parks Canada (C98-15, BAN-2005-841, BAN-2013-13373, BAN-2016-21136, BAN-2019-31257, and BAN-2022-42020, consecutively). The Bander-in-Charge (BIC), Cyndi Smith, has a master banding permit

(#10701) from Environment Canada. Ken Symington (#10701B) also banded in 2024. From 1999 through 2008, band management was under the permit of Grahame Booth (#10666). Since 2009 band management and station operation has been under the permit of Cyndi Smith.

8.0 Funding and Acknowledgements

Peter Duck of BVN manages the day-to-day coordination of the project. From 2000-2018 funds for this work were provided to BVN through a contract with Parks Canada which provided for reimbursement of costs upon submission of invoices. This contract provided funding for equipment and supplies, as well as per diems and/or expenses to ensure that a BIC was available for each session. Since then funding has been entirely provided by BVN.

9.0 Literature Cited

Achuff, P., C. White, and I. Pengally. 1986. Special resources of Banff National Park. Unpublished technical report. Warden Service, Banff National Park, Banff, AB.

Anon. 1994. Canadian Landbird Monitoring Strategy. Unpublished technical report. National Wildlife Research Centre, Canadian Wildlife Service, Ottawa. ON.

Bay, R.A., R.J. Harrigan, V.L. Underwood, H.L. Gibbs, T.B. Smith, and K. Ruegg. 2018. Genomic signals of selection predict climate-driven population declines in a migratory bird. Science 359:83-86.

Bird Banding Laboratory (BBL). 2022. Longevity records of North American birds. Version 2021.1. Patuxent Wildlife Research Center, US Geological Survey, Laurel, MD.

DeSante, D.F. and M.P. Nott. 2001. An overview of the North American Monitoring Avian Productivity and Survivorship (MAPS) program. *In* EURING Newsletter (Volume 3), F. Spina (Ed.). Istituto Nazionale per la Fauna Selvetica "Alessandro Ghigi", Italy. EURING Newsletter 3.

DeSante, D.F., K.M. Burton, J.F. Saracco, and B.L. Walker. 1995. Productivity indices and survival-rate estimates from MAPS, a continent-wide programme of constant-effort mist-netting in North America. Journal of Applied Statistics 22:935-947.

DeSante, D.F., K.M. Burton, P. Velez, and D. Froehlich. 2005. MAPS Manual 2005 Protocol: instructions for the establishment and operation of constant-effort bird-banding stations as part of the Monitoring Avian Productivity and Survivorship (MAPS) program. Institute for Bird Populations, Point Reyes Station, CA.

DeSante, D.F., K.M. Burton, P. Velez, D. Froehlich, D.R. Kaschube, and S. Albert. 2019. MAPS manual: 2019 protocol. The Institute for Bird Populations, Point Reyes Station, CA.

Froehlich, D., N. Michel, D. DeSante, and P. Velez. 2008. MAPSPROG Version 4.2.1 user's guide and manual. Institute for Bird Populations, Point Reyes Station, CA.

Holland, W.D., and G.M. Coen. 1983. Ecological (biophysical) land classification of Banff and Jasper National Parks. Vol II: Soil and vegetation resources. Alberta Institute of Pedology Publication SS-82-44. Alberta Institute of Pedology, Edmonton, AB.

Kaschube, D.R., J.F. Saracco, C. Ray, C.M. Godwin, K.R. Foster, and P. Pyle. 2022. Minimum capture-recapture rates and years of banding station operations to obtain reliable adult annual survival estimates. Journal of Field Ornithology 93:7.

Ng, A.M.B., M. Pontius, S.L. De Ruiter, and D.S. Proppe. 2020. Noise, avian abundance, and productivity at banding stations across the Continental United States. Avian Conservation and Ecology 15(2):4. doi.org/10.5751/ACE-01633-150204.

Nott, P. 1999. Rapid Habitat Structure Assessment protocol: determining spatial habitat patterns at MAPS stations. Institute for Bird Populations, Point Reyes Station, CA.

Nott, P., D.F. DeSante, and N. Michel. 2003. Monitoring Avian Productivity and Survivorship (MAPS) habitat structure assessment (HSA) protocol. The Institute for Bird Populations, Pt. Reyes Station, CA.

Nott, M.P., D.F. DeSante, R.B. Siegel, and P. Pyle. 2002. Influences of the El Niño/Southern Oscillation and the North Atlantic Oscillation on avian productivity in forests of the Pacific Northwest of North America. Global Ecology and Biogeography 11:333-342.

Parker, S., J. Wu, D. Whitaker, B. Bateman, C. Harpur, and D. Lepage. 2019a. Birds and climate change: summary report on the projected effects of climate change on birds in Canada's national parks and national marine conservation areas. Unpublished technical report, Parks Canada, Ottawa, ON. 5 pp.

Parker, S., J. Wu, D. Whitaker, B. Bateman, C. Harpur, and D. Lepage. 2019b. Birds and climate change: Banff National Park. Unpublished technical report, Parks Canada, Ottawa, ON. 6 pp.

Pyle, P. 2022. *Identification guide to North American Birds, Part 1*. 2nd Ed. Slate Creek Press, Forest Knolls, CA.

Pyle, P. and D. DeSante. 2023. List of North American birds and alpha codes according to American Ornithologists Society taxonomy through the 64nd AOS Supplement [Downloaded 16 August 2023]. Available from http://www.birdpop.org/alphacodes.htm.

Ralph, C.J. 2005. The body grasp technique: a rapid method for removing birds from mist nets. North American Bird Bander 30(2): 65-70.

Ruegg, K., R.A. Bay, E.C. Anderson, J.F. Saracco, R.J. Harrigan, M. Whitfield, E.H. Paxton, and T.B. Smith. 2018. Ecological genomics predicts climate vulnerability in an endangered southwestern songbird. Ecology Letters 21:1085-1096.

Saracco, J.F. and M. Rubenstein. 2020. Integrating broad-scale data to assess demographic and climatic contributions to population change in a declining songbird. Ecology and Evolution 10:1804-1816.

Saracco, J.F., P. Pyle, D.R. Kaschube, M. Kohler, C.M. Godwin, and K.R. Foster. 2022. Demographic declines over time and variable responses of breeding bird populations to human footprint in the Athabasca Oil Sands Region, Alberta, Canada. Ornithological Applications 125:1-14.

Smith, C.M. 2001. Ranger Creek MAPS station annual report 2001. Unpublished technical report. Bow Valley Naturalists, Banff, AB.

Smith, C.M. 2022. Does my station need a bird handling protocol? North American Bird Bander 47(3):136-139. https://easternbirdbanding.org/wp-content/uploads/2022/12/136-protocol.pdf. Retrieved 27 January 2023.

Smith, C.M. 2024. 2023 Wishbone MAPS station summary report, 2002-2023. Unpublished technical report. Parks Canada, Waterton Lakes National Park, Waterton Park, AB. 60 pp.

Smith, C.M., D.R. Kaschube, B. Shepherd, and J. Woods. 2008. Monitoring Avian Productivity and Survivorship (MAPS) in Mount Revelstoke, Banff, Waterton Lakes and Jasper national parks, 1993-2006. Unpublished technical report. Parks Canada, Waterton Lakes National Park, Waterton Park, AB.

Spotswood, E.N., K.R. Goodman, J. Carlisle, R.L. Cormier, D.L. Humple, J. Rousseau, S.L. Guers, and G.G. Barton. 2011. How safe is mistnetting? evaluating the risk of injury and mortality to birds. Methods in Ecology and Evolution. doi: 10.1111/j.2041-210x.2011.00123.x.

Wesbrook, M. 2016. Animal health care report: bird capture and handling in Jasper National Park, 1995-2016. Resource Conservation, Parks Canada, Jasper National Park, Jasper, AB.
Whittington, J., B. Shepherd, A. Forshner, J. St-Amand, J. L. Greenwood, C. S. Gillies, B. Johnston, R. Owchar, D. Petersen, and J. K. Rogala. 2019. Landbird trends in protected areas using time-to-event occupancy models. Ecosphere 10(11):e02946. 10.1002/ecs2.2946.
Wu, J.X., C.B. Wilsey, L. Taylor, and G.W. Schuurman. 2018. Projected avifaunal responses to climate change across the U.S. National Park System. PLoS ONE 13(3): e0190557.
Youngflesh, C., G.A. Montgomery, J.F. Saracco, D.A.W. Millerd, R.P. Guralnicke, A.H. Hurlbert, R.B. Siegel, R. LaFrancee, and M.W. Tingley. 2023. Demographic consequences of phenological asynchrony for North American songbirds. Proceedings of the National Academy of Sciences 28:e2221961120.

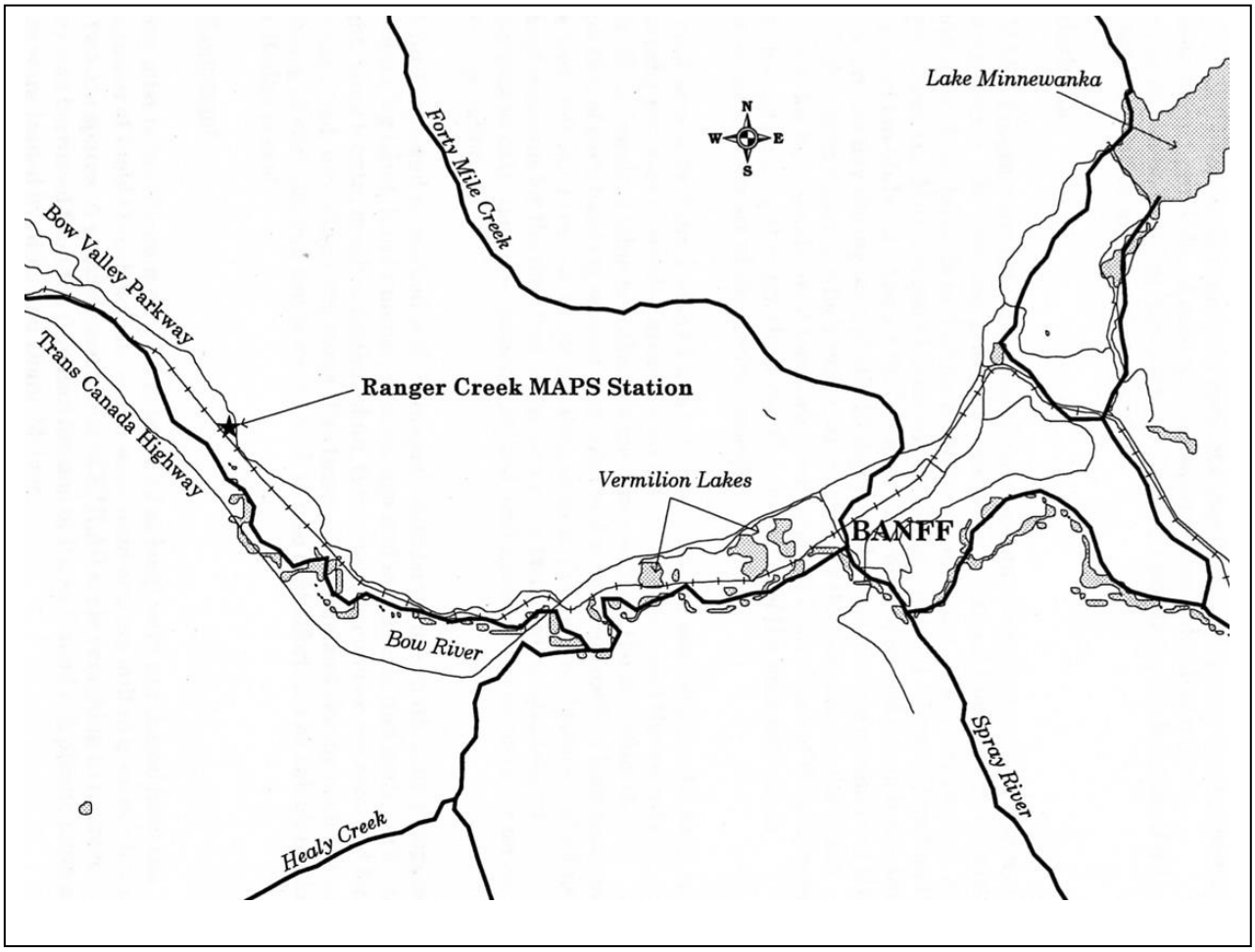

Figure 1. Location of Ranger Creek MAPS station in Banff National Park, Alberta.

Figure 2. Aerial photograph (2021) of Ranger Creek MAPS station in Banff National Park, showing location of the banding table (star) and mist net lanes (shown by circle and number).

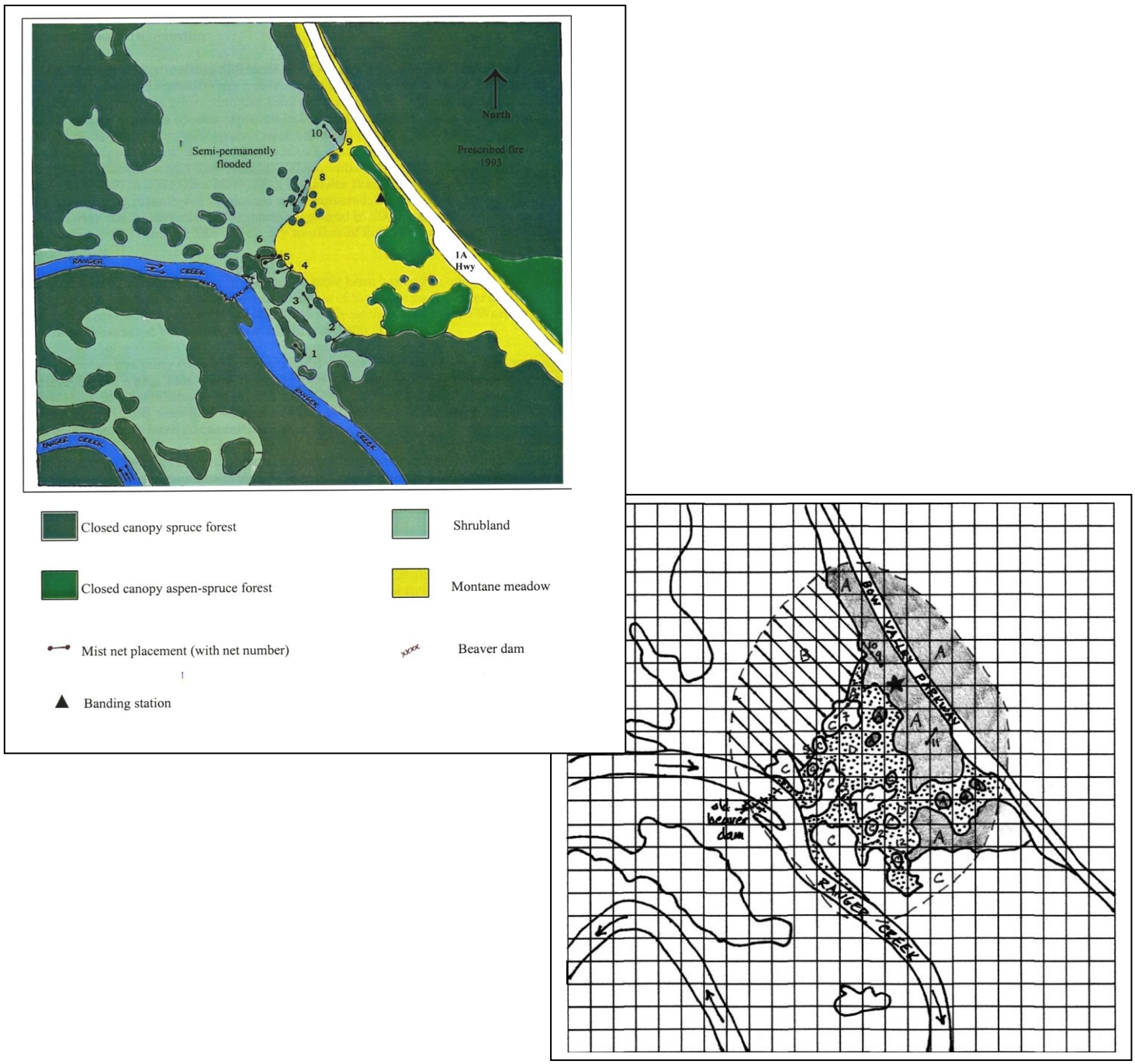

Figure 3. Colour (2004) and black-and-white (2016) maps of Ranger Creek MAPS station, showing habitat types and location of the banding table (triangle or star) and mist net lanes (shown by number). Each square is 30 m. The dotted line is the station "boundary" for purposes of recording birds seen and heard and station habitat types. Notice the changes in extent of habitat types, and conversion of meadow to shrubland. The habitat types are:
A = Dominant habitat: closed forest aspen, mixed forest with spruce & some pine
B = Sub-dominant habitat: sedge meadow C = Minor habitat 1: closed forest spruce and willow
D = Minor habitat 2: aspen shrubland with meadow

Figure 4. Aerial view of Ranger Creek MAPS station in 2002 (top) and 2021 (bottom). Note the change from semi-permanently flood shrubland (A) in 2002 to drier sedge meadow (B) in 2021. Near the centre of the photo (C) is montane meadow in 2002 that by 2021 has converted to aspen shrubland with only a little meadow (D). The yellow star denotes the banding table location.

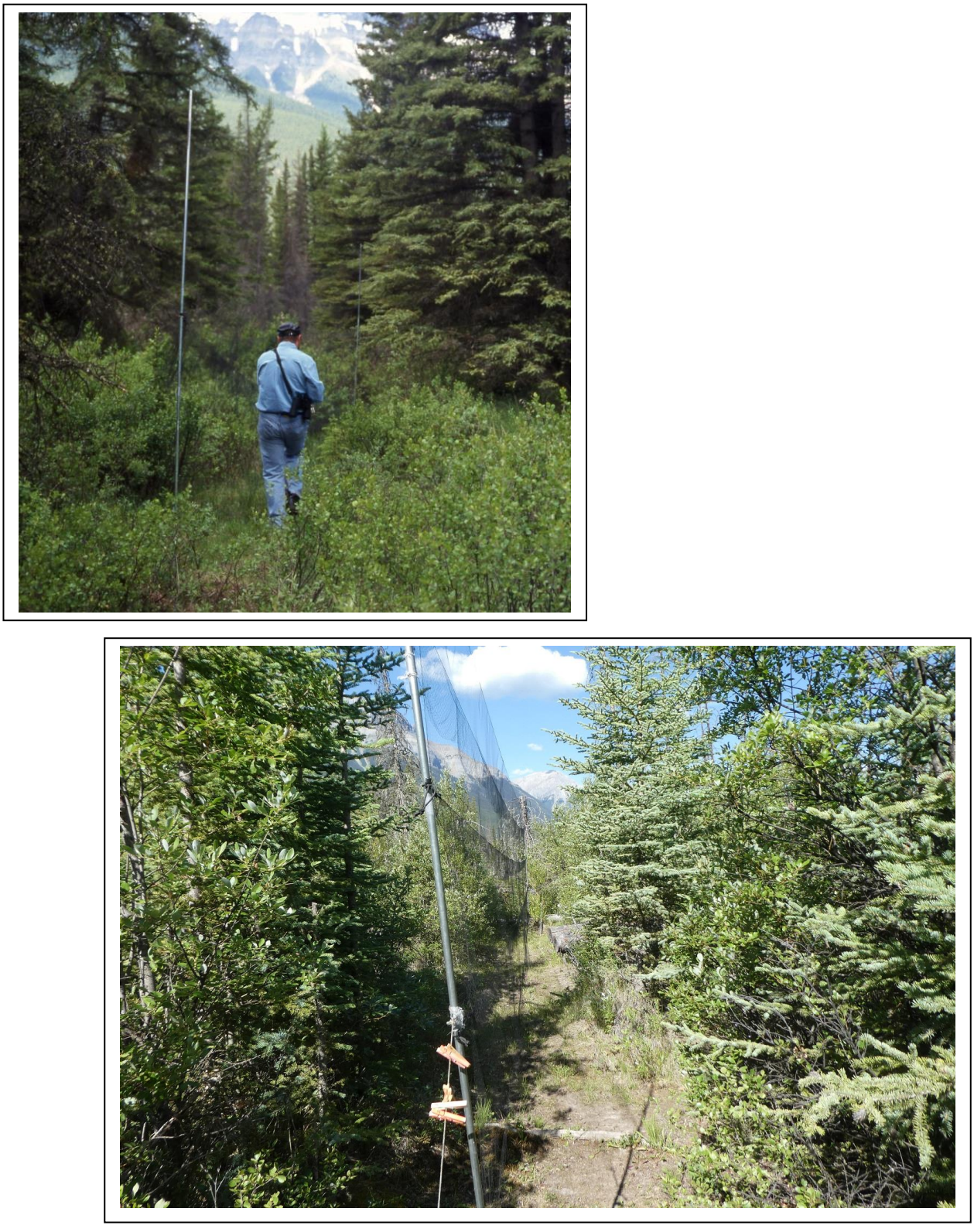

Figure 5. Net lane #5 in 2001 (upper left) was surrounded by fairly low willows and mature spruce trees. By 2022 (lower right) the mature spruce trees had died or been blown over and the willows have grown much taller. Second growth spruce trees are filling the gaps.

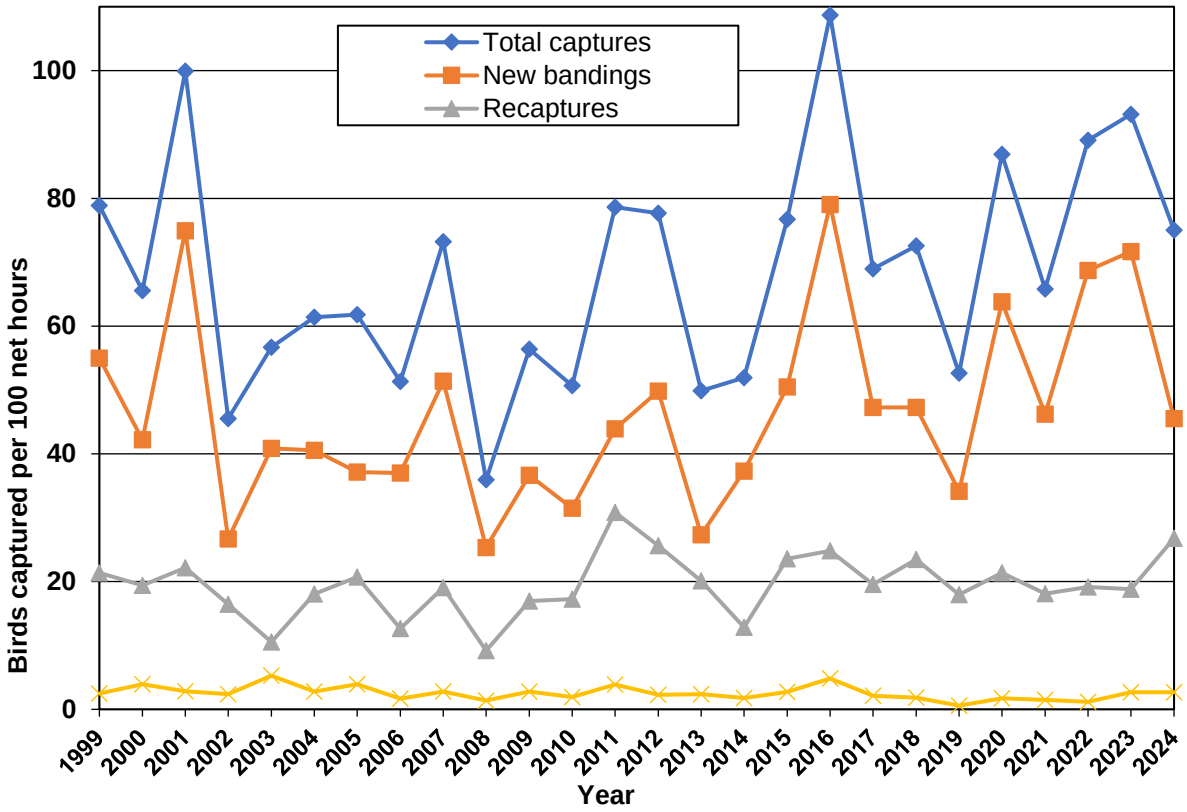

Figure 6. Total birds captured, new bandings, recaptures and birds released unbanded, per 100 net hours, at Ranger Creek (1999-2024).

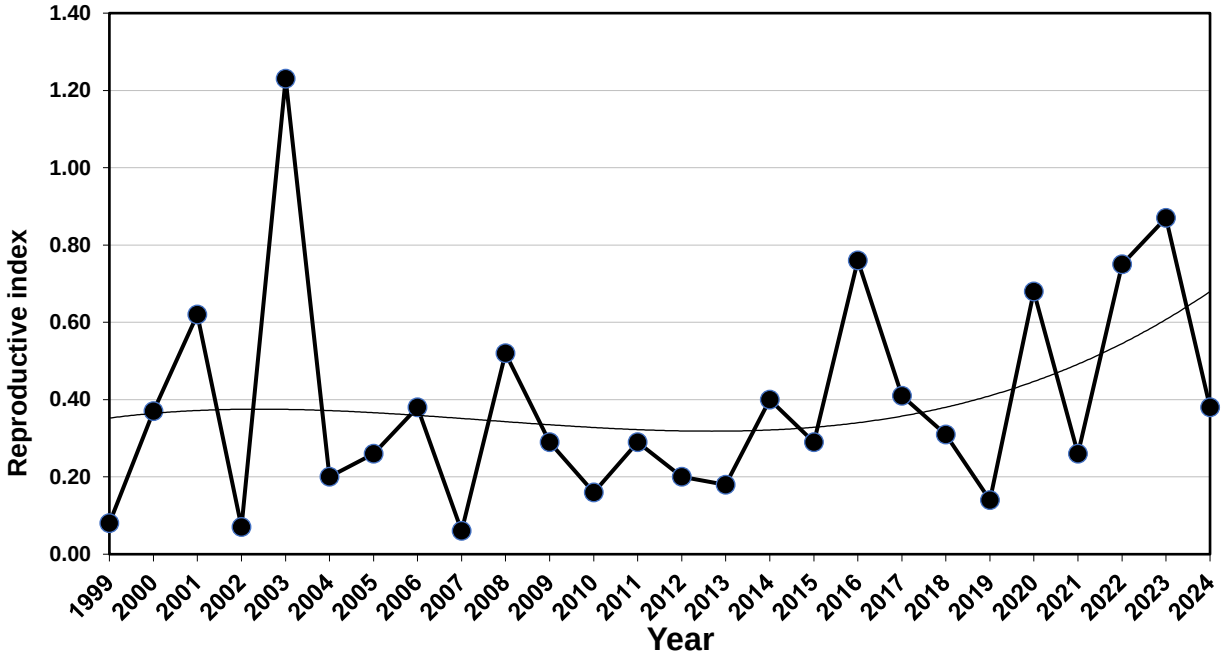

Figure 7. Reproductive index (number of young divided by number of adults) at Ranger Creek, 1999-2024. Number of adults in any given year includes newly banded adults from that year, as well as first recaptures of adults banded in previous years. P(3) r^2 = 0.11.

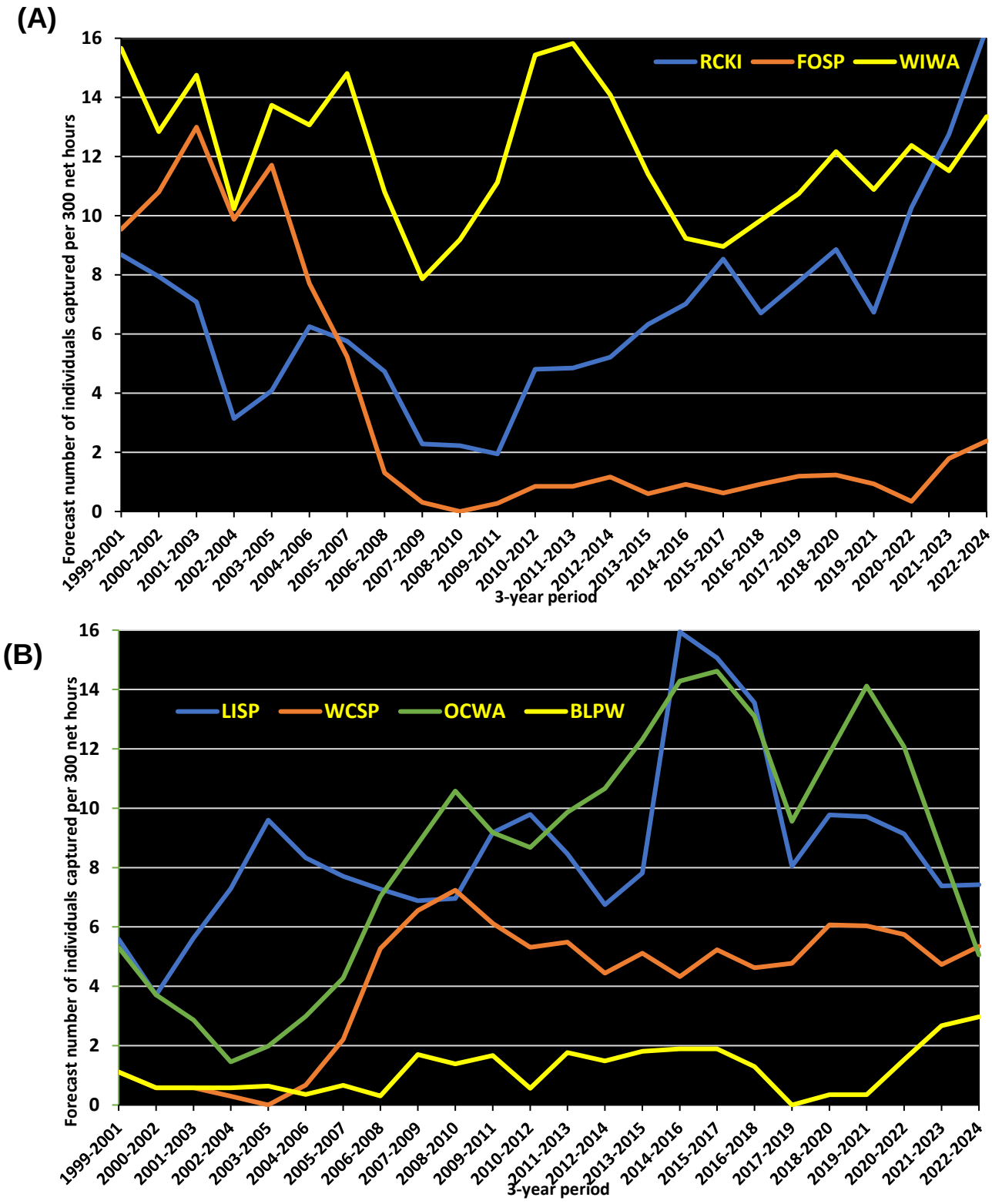

Figure 8. Population trend (1999-20234 of seven species whose numbers are predicted to decrease under climate change predictions, at Ranger Creek MAPS station in Banff National Park. (A) RCKI = Ruby-crowned Kinglet, FOSP = Fox Sparrow, WIWA = Wilson's Warbler. (B) LISP = Lincoln's Sparrow, WCSP = White-crowned Sparrow, OCWA = Orange-crowned Warbler, BLPW = Blackpoll Warbler.

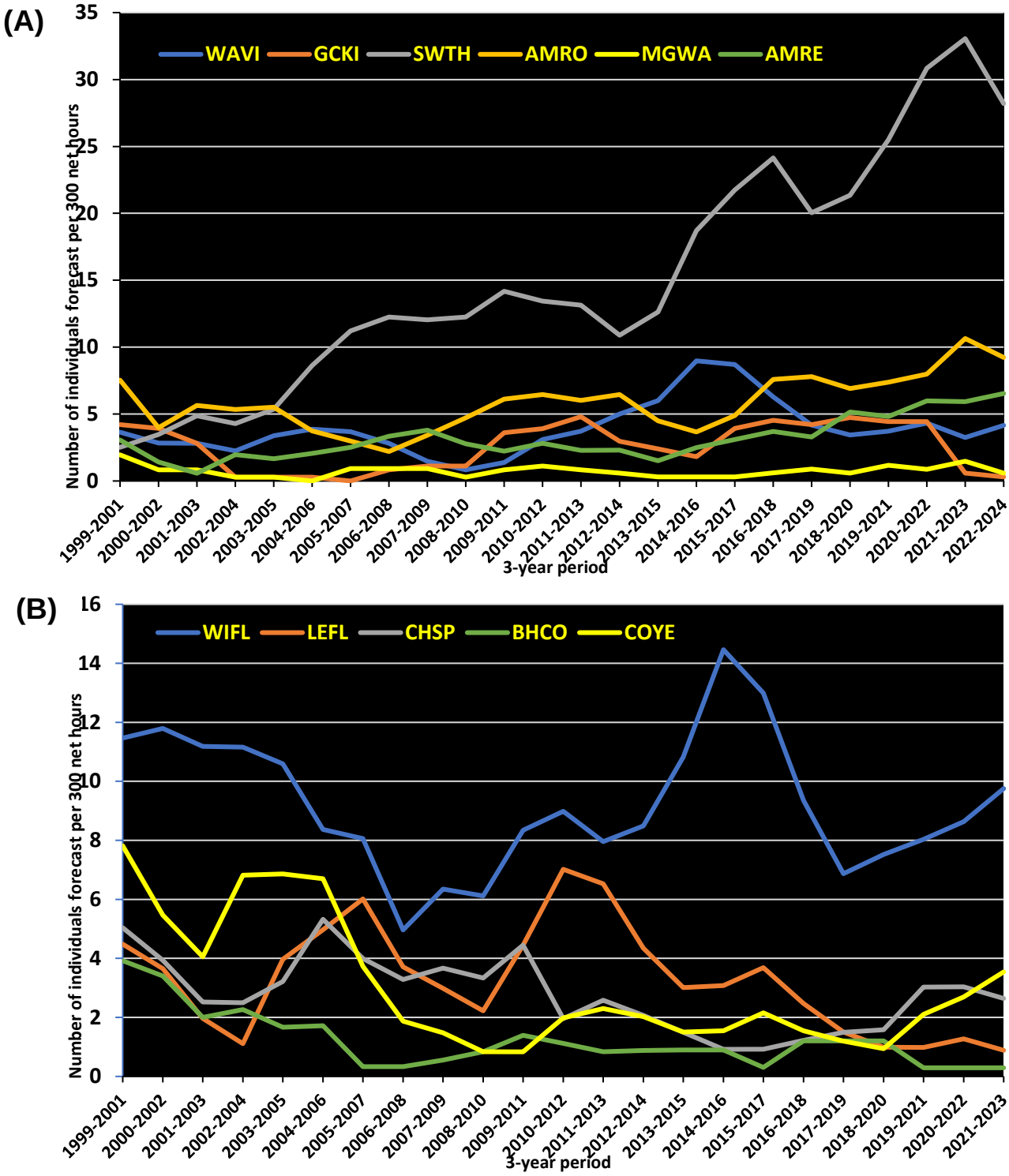

Figure 9. Population trend (1999-2024) of 11 species whose numbers are predicted to increase under climate change predictions, at Ranger Creek MAPS station in Banff National Park. (A) WAVI = Warbling Vireo, GCKI = Golden-crowned Kinglet, SWTH = Swainson's Thrush. AMRO = American Robin, MGWA = MacGillivray's Warbler, AMRE = American Redstart. (B) WIFL = Willow Flycatcher, LEFL = Least Flycatcher, CHSP = Chipping Sparrow, BHCO = Brown-headed Cowbird, COYE = Common Yellowthroat.

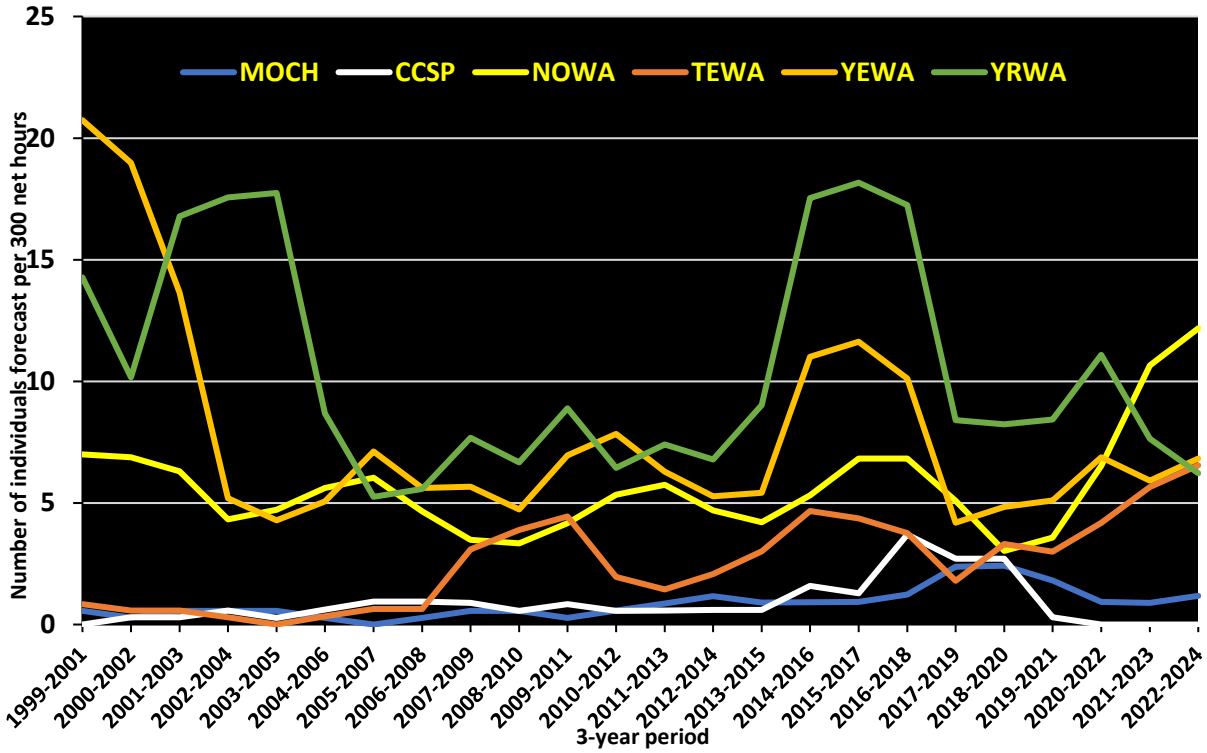

Figure 10. Population trend (1999-2024) of six species whose numbers are predicted to remain stable under climate change predictions, at Ranger Creek MAPS station in Banff National Park. MOCH = Mountain Chickadee, CCSP = Clay-colored Sparrow, NOWA = Northern Waterthrush, TEWA = Tennessee Warbler, YEWA = Yellow Warbler, YRWA = Yellow-rumped Warbler.

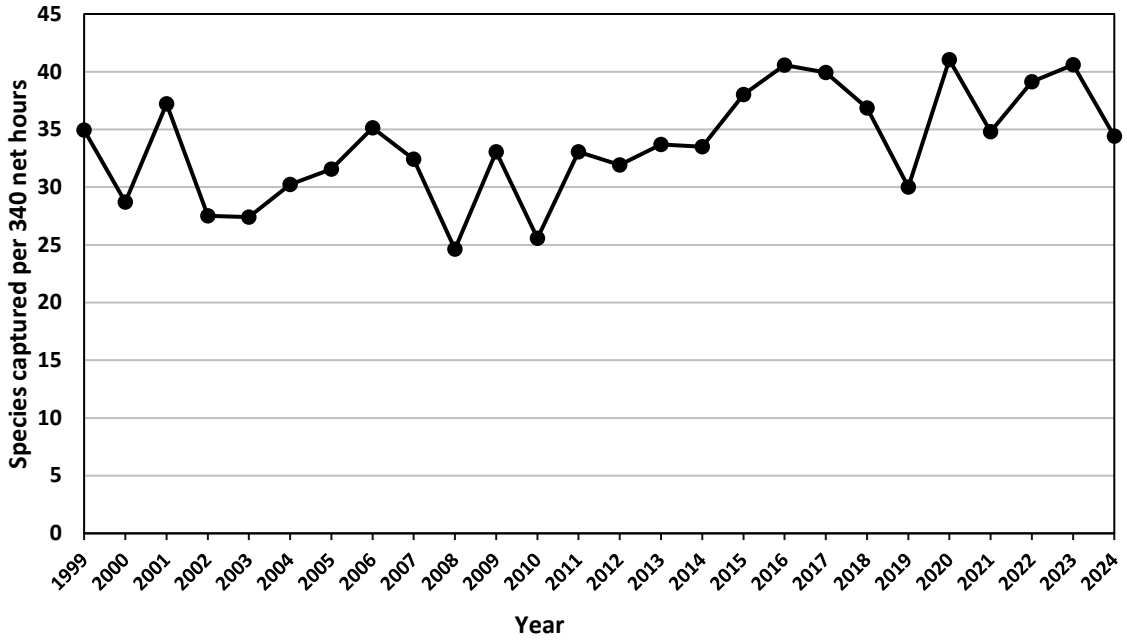

Figure 11. Species richness (number of species per 340 net hours) at Ranger Creek (1999-2024). Three hundred and forty is the average number of net hours per year at the site.

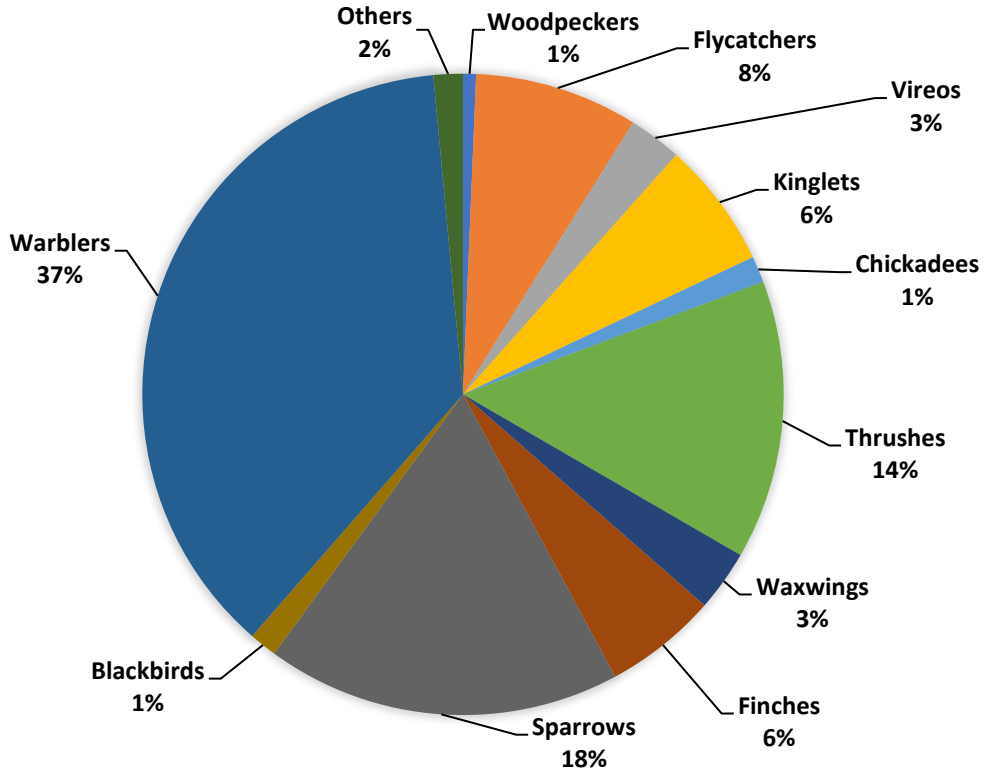

Figure 12. Bird families banded at Ranger Creek (1999-2024). Total individuals banded = 4,022.

Table 1. Captures at Ranger Creek (2024), by species, period and date.

		20-Jun			26-Jun			06-Jul		15-Jul		27-Jul			04-Aug			
CODE	COMMON NAME	N	R	U	N	R	U	N	R	N	R	N	R	U	N	R	U	TOT
RUHU	Rufous Hummingbird													3				3
CAHU	Calliope Hummingbird			1														1
RNSA	Red-naped Sapsucker		1			4			2	1								8
NOFL	Northern Flicker							1										1
FLIN	Flicker Intergrade							2										2
WIFL	Willow Flycatcher	1			1			1	1	1			2		4	3		14
WAVI	Warbling Vireo				2			1		1	1							5
CAJA	Canada Jay							1										1
MOCH	Mountain Chickadee									1								1
RCKI	Ruby-crowned Kinglet									5	1	2	1	1	5	3		18
SWTH	Swainson's Thrush	2			2	3			7	7	7				5			33
AMRO	American Robin	4	3		3		1			1								12
CEDW	Cedar Waxwing							3		1								4
PISI	Pine Siskin	2								2	1							5
FOSP	Fox Sparrow					1				1								2
DEJU	Dark-eyed Junco											2			2			4
ORJU	Oregon Junco	1				1		1			1				1			5
WCSP	White-crowned Sparrow				1							3	1		1		1	7
MWCS	Mtn White-crowned Sparrow				1				1		1							3
WTSP	White-throated Sparrow				1				1	2	1							5
SOSP	Song Sparrow									1		2						3
LISP	Lincoln's Sparrow	1	1			1		1	2	1	3	1			1			12
NOWA	Northern Waterthrush				2	2		3		1		1			3	2		14
TEWA	Tennessee Warbler				1							1			2			4
OCWA	Orange-crowned Warbler	1				1			2	1	2							7
COYE	Common Yellowthroat							5		1	1				7		1	15
AMRE	American Redstart	2						1			1	1			2			7
YEWA	Yellow Warbler	1	1		1			3	2		1				1			10
BLPW	Blackpoll Warbler														1			1

N = new banding, R = recapture, U = unbanded.

Table 1, con't. Captures at Ranger Creek (2024), by species, period and date.

		20-Jun			26-Jun			06-Jul		15-Jul		27-Jul			04-Aug			
CODE	COMMON NAME	N	R	U	N	R	U	N	R	N	R	N	R	U	N	R	U	TOT
AUWA	Audubon's Warbler										1							1
YRWA	Yellow-rumped Warbler							1		4	3				1			9
TOWA	Townsend's Warbler				1													1
WIWA	Wilson's Warbler	2		1	1	4		2	8	2	4	4	1		4			33
WETA	Western Tanager									1								1
	# Birds/category	17	6	2	17	17	1	26	26	35	29	17	5	4	40	8	2	252
	Total (ave.) no. birds/day	25			35			52		64		26			50			42
	Total no. species	12			18			18		23		11			15			34
	Total Net Hours	35			61			60		60		60			60			336
	Captures/100 net hours	71			58			87		107		43			83			75

N = new banding, R = recapture, U = unbanded.

Table 2. Adults banded at Ranger Creek, 1999-2024, by species and/or subspecies, and year. Species by code can be found in Appendix A.

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	*TOT*
WISN	1		1															1	1								*4*
SSHA			1	1										1													*3*
RNSA					1		1										2			1	2		2	1	2	1	*13*
ATTW				1																							*1*
DOWO																					1						*1*
YSFL																			1								*1*
FLIN																									1	2	*3*
OSFL								1	1														1				*3*
WEWP									2																		*2*
YBFL										1	1		2														*4*
ALFL																				2							*2*
TRFL	16		9						8											1							*34*
WIFL		5		15	6	9	10	3		2	10	7	8	8	1	11	6	8	1	3	8	2	5	10	8	6	*152*
LEFL	3	3	4			4	3	2	7	2		5	9	9	1	2	3	2	3	1			1	1	1		*66*
HAFL	1																										*1*
CAVI																							1				*1*
BHVI							1	1			1	1												1	1		*6*
WAVI	4	3	5	1	3	4	3	1	3	2		1	3	4	2	5	7	7	6	1	6	4	2	5	1	4	*87*
REVI											1																*1*
CAJA											1								2					1		1	*5*
STJA																					1						*1*
TRES														1													*1*
NRWS	2																										*2*
BCCH	1		1			2	1	1				2			1												*9*
MOCH	1		1		1	1					1			1	1	1	1	1		1	2			2			*15*
BOCH	1			6	3																			1			*11*
RBNU	1	1	3		2	1			1				3	1													*13*
BRCR				1								2									2						*5*
GCKI	1	1	1							1								1		2			1		1		*9*
RCKI	6	5	8	3	1	3	4	9	2		2	2	2	3	2	3	10	1	3	8	5	5	2	4	11	8	*112*
TOSO									1		1		1														*3*
SWTH	3		1	6		3	5	7	9	9	10	8	12	4	5	3	13	6	17	9	10	13	27	9	20	11	*220*
HETH																							1				*1*
AMRO	14	4	6	3	5	6	1	2	3	1	7	7	4	7	5	6	1	1	10	8	4	5	7	5	11	8	*141*
VATH	1													2							1						*4*
CEDW		3	2	1	2	4	1	7	5	1	1	1	2	13	3	2	9	12	5	14	3	2	2	7	9	4	*115*
EVGR																	3										*3*
PIGR	1																										*1*
RECR			4																								*4*
WWCR			6																					4	2		*12*

Table 2, con't. Adults banded at Ranger Creek, 1999-2024, by species and/or subspecies, and year. Species by code can be found in Appendix A.

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	*TOT*
PISI	5	10	27		4	1	5		18		4	4	3	31	1	4	8	2	2	12		15	12	10	6	4	*188*
CHSP	4	6	5		1	6	2	4	2		9		2	2	2	2		1	1	1	2	2	2	1			*57*
CCSP				1		1		1	2		1	1	1		1	1		4		5	1						*20*
FOSP	3	7	6	3	5	7	5	2								1		1		1	2	1			2		*46*
DEJU		4		2						2		1		1								2	2			1	*15*
SCJU														1			1				1		1				*4*
ORJU	4		4		1	8	2	3	5	3	6	1		2	3	4	3	3	6	2	1			2	3	3	*69*
WCSP				1							3									1						1	*6*
MWCS								2		1	1		2	1	1		2		1	2	1			1		1	*16*
GWCS	3								4	4	2	4	2	1	5	1	3		1		4	3	2	2			*41*
WTSP				1													1	2	1	1	1	1	2	4	3	3	*20*
SAVS						1		1																			*2*
SOSP									4	2								4		1		1			1	3	*16*
LISP	7	2	4	3	3	4	5	6	7	4	4	3	7	4	2	4	6	8	5	3	10	11	2	4	5	3	*126*
RWBL			2		4	4	2																	4	1		*17*
COGR																									1		*1*
BHCO	2	3	2	2		4		1			2	1	2	1		1				4			1				*26*
NOWA	8	3	7	4	1	4	5	4	4	2	2	4	6	4	3	1	5	6	6	2	2	1	4	10	6	7	*111*
TEWA	2		1	1				1	1		8	4	2		2	4	4	7	3	1	1	5	1	3	7	1	*59*
OCWA	6	2	4	1		2	3	1		3	2	4	3	4	8	8	6	15	6	1	5	9	10	4	4	2	*113*
NAWA	1																							1			*2*
MGWA	4	1	2		1				3			1	2	1					1	1	1		1		1		*20*
COYE	16	6	4	6	3	13	4		3	1	1	1	1	5	2		3	2	2	1		1	5	2	3	6	*91*
AMRE	8	3		1		5		2	6	3	5	3	1	3	1	1	3	3	3	5	3	6	2	6	3	5	*81*
MAWA		2											2	1													*5*
YEWA	14	15	13	6	1	6	5	4	9		3	11	6	4	2	4	5	9	6	3	4	4	3	5	4	5	*151*
BLPW	3	1		1	1		1		1		5		1		3		2	1				1		1	1		*23*
YRWA		2	3	1	6	2	1	1	3	2	2		1	2		1		1			1	2	9	7	5	6	*58*
MYWA	3	2	1			2					2	1	2	1	2	2	3	1	2	1			1				*26*
AUWA	11	8	3		5	7	1		3		11	2	9	2	3	5	8	5	6	6	2	4	1				*102*
TOWA	1	1	3	1		3		5		1			4		1	1	2	5		1		3		3	2	1	*38*
WIWA	22	8	19	9	6	6	12	7	12	10	2	14	14	16	11	6	4	9	7	10	13	7	8	11	3	8	*254*
WETA																	1						1	1		1	*4*
# adults	*183*	*111*	*162*	*82*	*66*	*123*	*83*	*79*	*129*	*57*	*111*	*96*	*119*	*141*	*74*	*84*	*125*	*128*	*107*	*116*	*100*	*110*	*122*	*133*	*129*	*106*	*2876*
# spp	*36*	*25*	*33*	*25*	*23*	*29*	*24*	*26*	*28*	*21*	*31*	*27*	*31*	*32*	*27*	*26*	*29*	*30*	*27*	*34*	*30*	*25*	*32*	*33*	*31*	*27*	*73*

Table 3. Juveniles banded at Ranger Creek, 1999-2024, by species and/or subspecies, and year. Species by code can be found in Appendix A.

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	*TOT*
RNSA					1													2		1			1	1			*6*
YSFL				1																							*1*
NOFL																								1		1	*2*
FLIN																1											*1*
WEWP																									1		*1*
YBFL								1																			*1*
TRFL			1																								*1*
WIFL		7			7								1	1			9	2	3	2		6	2		5	2	*47*
LEFL		1	2				3	1			1				1		1	1	1			2					*14*
WEFL																									1		*1*
WAVI								3						2		2	1	5						3			*16*
CAJA											1										1	1			1		*4*
BCCH		2			1												1										*4*
MOCH										1									1	1	2	1			1	1	*8*
BOCH			1													1	1	1	2			1					*7*
RBNU		1																	1				1	1			*4*
BRCR			2		2			1											1		3	1					*10*
GCKI		2	9			1			1	2	1		12	2	3	5			12	1		12					*63*
RCKI	1	1	8	1	2	1	1			4				6		1	5	1	6		3	6		16	10	5	*78*
SWTH			5		4	1	3	6	9	3		3	6	6	4	5	4	20	5	12	2	10	11	28	10	5	*162*
HETH							2																1				*3*
AMRO	2		1		5		1		1		2	1	2	2				2	1	2		2	6	1	6		*37*
CEDW												1	1					1		4				2			*9*
RECR																								1			*1*
WWCR			1																								*1*
PISI		1	15						1					1								1	1		2		*22*
CHSP		1	2		1	1		2			2		1		1				1				3	1	1		*17*
CCSP								1												3							*4*
FOSP		3	7	2	6	3	2						1	2		1			1						4	1	*33*
DEJU		2	1		3	3	1	2	5	8	4	4	2		1	2	2	6	2	2	1	3	1		18	3	*76*
ORJU			10																1								*11*
WCSP			1							6	1	1						4	2	1		6	1	2	7	4	*36*
GWCS									1						1												*2*
WTSP																	2	2			1		1	2	2		*10*
SOSP									4		1		1					2			1			2			*11*
LISP	2	1			6	3	3	1	3	5	1	5	6	2		4	4	18	2	3	1	1	2	6	3	2	*84*
BHCO	2	3	2		1	1										1	1										*11*

Table 3, con't. Juveniles banded at Ranger Creek, 1999-2024, by species and/or subspecies, and year. Species by code can be found in Appendix A.

Species	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	*TOT*
NOWA		1	2		1		1	1	2	1	1			2						1			1	4	9	3	*30*
TEWA											2			1						1		2		2	6	3	*17*
OCWA													2		1	7	2	7	1	2		2			3		*27*
NAWA		1																									*1*
MGWA																1							2		1		*4*
COYE		1		1		1	1	1													1			1	1	7	*15*
AMRE		1												1				1				2		1	5	1	*12*
YEWA	2	1	18	1		1			7	1	2		3	3	1	1	2	10				4		5	1	1	*64*
BLPW																		2						3	3	1	*9*
YRWA		4	7	1	27	7		5	4	2	1			1	1		3	25	4	4		4	1	7	3		*111*
MYWA	1	1								1																	*3*
AUWA	3		1		3			1								2		1									*11*
TOWA		2	1					2					0			4		2				3		2			*16*
WIWA		2	1		10		3	4			1	2	1	2	3	3	4		2	1		5	1	8	7	7	*67*
# young	*13*	*39*	*98*	*7*	*80*	*23*	*21*	*32*	*38*	*34*	*21*	*17*	*39*	*34*	*17*	*41*	*42*	*##*	*49*	*41*	*16*	*75*	*36*	*##*	*111*	*47*	*1186*

Table 4. Number of individuals banded in a previous year and recaptured (number of species in parentheses) at Ranger Creek, 1999-2024.

Year of recapture	Year Banded																									
	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	No./yr
2000																									11 (9)	11
2001																								13 (9)	7 (5)	20
2002																							7 (5)	6 (6)	4 (2)	17
2003																						2 (2)	3 (3)	1 (1)	1 (1)	7
2004																					6 (5)	-	1 (1)	1 (1)	-	8
2005																				13 (11)	1 (1)	-	2 (2)	-	-	16
2006																			3 (2)	7 (7)	1 (1)	-	-	-	-	11
2007																		3 (1)	2 (2)	-	-	-	-	-	-	5
2008																	5 (5)	1 (1)	-	-	-	-	-	-	-	6
2009																6 (4)	3 (3)	-	-	1 (1)	-	-	-	-	-	10
2010															6 (5)	6 (5)	1 (1)	-	-	-	-	-	-	-	-	13
2011														13 (8)	3 (3)	2 (2)	-	-	-	-	-	-	-	-	-	18
2012													12 (9)	3 (2)	3 (3)	-	-	-	-	-	-	-	-	-	-	18
2013												5 (8)	6 (6)	5 (4)	2 (2)	1 (1)	-	-	-	-	-	-	-	-	-	19
2014											8 (6)	5 (3)	5 (3)	-	1 (1)	-	-	-	-	-	-	-	-	-	-	19
2015										4 (4)	5 (5)	1 (1)	3 (2)	3 (1)	1 (1)	-	-	-	-	-	-	-	-	-	-	17

Table 4, con't. Number of individuals banded in a previous year and recaptured (number of species in parentheses) at Ranger Creek, 1999-2024.

Year of recapture	Year Banded																									No./yr
	2023	2022	2021	2020	2019	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	
2016									17 (11)	1 (1)	2 (2)	-	1 (1)	-	1 (1)	-	-	-	-	-	-	-	-	-	-	22
2017								4 (4)	2 (3)	-	1 (1)	2 (2)	-	-	1 (1)	-	-	-	-	-	-	-	-	-	-	10
2018							12 (4)	1 (1)	2 (2)	-	-	-	-	-	1 (1)	-	-	-	-	-	-	-	-	-	-	16
2019						8 (4)	6 (4)	1 (1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	15
2020					8 (6)	1 (1)	1 (1)	-	-	-	-	1 (1)	-	-	-	-	-	-	-	-	-	-	-	-	-	11
2021				10 (6)	2 (2)	1 (1)	-	1 (1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14
2022			8 (6)	6 (5)	1 (1)	-	-	-	1 (1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16
2023		5 (4)	6 (4)	1 (1)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12
2024	16 (9)	3 (3)	1 (1)	1 (1)	2 (2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	23

Table 5. Return rate of banded adults that have been recaptured at least once in subsequent years at Ranger Creek, 1999-2024.

Code	Common Name	Adult new	Recaps	% recaptured	Males	Recaps	% recaptured	Females	Recaps	% recaptured
SSHA	Sharp-shinned Hawk	2	1	50	2	1	50	0	0	0
RNSA	Red-naped Sapsucker	13	4	31	5	2	40	8	2	25
TRFL[1]	Traill's Flycatcher[c]	102	36	35	50	15	30	52	21	40
LEFL	Least Flycatcher	47	4	9	16	0	0	31	4	13
WAVI	Warbling Vireo	31	5	16	16	4	25	15	1	7
BCCH	Black-capped Chickadee	5	2	40	1	0	0	4	2	50
MOCH	Mountain Chickadee	9	1	11	3	0	0	6	1	17
BOCH	Boreal Chickadee	11	0	0	1	0	0	10	0	0
RCKI	Ruby-crowned Kinglet	108	5	5	63	2	3	45	3	7
SWTH	Swainson's Thrush	172	56	33	89	39	44	83	17	20
AMRO	American Robin	136	8	6	73	5	7	63	3	5
CEDW	Cedar Waxwing	108	1	1	60	1	2	48	0	0
WWCR	White-winged Crossbill	11	0	0	7	0	0	4	0	0
PISI	Pine Siskin	168	1	1	89	0	0	79	1	1
CHSP	Chipping Sparrow	49	4	8	25	4	16	24	0	0
CCSP	Clay-coloured Sparrow	20	0	0	11	0	0	9	0	0
FOSP	Fox Sparrow	42	11	26	24	8	33	18	3	17
DEJU[2]	Dark-eyed Junco[b]	87	10	11	48	9	19	39	1	3
WCSP[3]	White-crowned Sparrow[a]	59	17	29	36	10	28	23	7	30
WTSP	White-throated Sparrow	19	1	5	13	1	8	6	0	0
SOSP	Song Sparrow	12	2	17	7	0	0	5	2	40
LISP	Lincoln's Sparrow	116	32	28	67	25	37	49	7	14
RWBL	Red-winged Blackbird	17	0	0	6	0	0	11	0	0
BHCO	Brown-headed Cowbird	25	0	0	9	0	0	16	0	0
NOWA	Northern Waterthrush	78	31	40	46	23	50	32	8	25
TEWA	Tennessee Warbler	54	0	0	34	0	0	20	0	0
OCWA	Orange-crowned Warbler	108	28	26	54	22	41	54	6	11
MGWA	MacGillivray's Warbler	20	0	0	13	0	0	7	0	0
COYE	Common Yellowthroat	90	5	6	63	4	6	27	1	4
AMRE	American Redstart	75	6	8	44	3	7	31	3	10
YEWA	Yellow Warbler	143	20	14	81	15	19	62	5	8
BLPW	Blackpoll Warbler	23	4	17	10	3	30	13	1	8
WIWA	Wilson's Warbler	243	31	13	149	25	17	94	6	6
YRWA[4]	Yellow-rumped Warbler[d]	177	14	8	100	11	11	77	3	4
TOWA	Townsend's Warbler	35	0	0	13	0	0	22	0	0
	Totals	*2415*	*340*	14	*1328*	*232*	17	*1087*	*108*	10

[a] includes GWCS & MWCS [b] includes ORJU & SCJ U [c] includes ALFL & WIFL [d] includes AUWA & MYWA

Table 6. Mortalities and injuries at Ranger Creek, 1999-2024.

Year	# stressed recovered	# injured released	# mortalities	Total #	# captured	% stressed	% injured	% mortalities	Total %
1999	0	0	2	2	284	0.00	0.00	0.70	0.70
2000	0	1	0	1	233	0.00	0.43	0.00	0.43
2001	0	0	0	0	356	0.00	0.00	0.00	0.00
2002	0	1	1	2	152	0.00	0.66	0.66	1.32
2003	1	2	1	4	204	0.49	0.98	0.49	1.96
2004	0	2	0	2	221	0.00	0.90	0.00	0.90
2005	0	2	0	2	173	0.00	1.16	0.00	1.16
2006	0	0	0	0	154	0.00	0.00	0.00	0.00
2007	0	2	2	4	238	0.00	0.84	0.84	1.68
2008	0	3	0	3	129	0.00	2.33	0.00	2.33
2009	0	1	1	2	203	0.00	0.49	0.49	0.99
2010	0	2	1	3	182	0.00	1.10	0.55	1.65
2011	0	0	2	2	283	0.00	0.00	0.71	0.71
2012	0	1	1	2	273	0.00	0.37	0.37	0.73
2013	0	0	0	0	166	0.00	0.00	0.00	0.00
2014	1	0	0	1	174	0.57	0.00	0.00	0.57
2015	2	0	1	3	254	0.79	0.00	0.39	1.18
2016	1	0	5	6	337	0.30	0.00	1.48	1.78
2017	1	3	2	6	229	0.44	1.31	0.87	2.62
2018	0	1	0	1	241	0.00	0.41	0.00	0.41
2019	1	0	1	2	179	0.56	0.00	0.56	1.12
2020	2	0	1	3	252	0.79	0.00	0.40	1.19
2021	7	0	1	8	225	3.11	0.00	0.44	3.56
2022	1	3	2	6	301	0.33	1.00	0.66	1.99
2023	6	3	4	13	312	1.92	0.96	1.28	4.17
2024	8	0	0	8	252	3.17	0.00	0.00	3.17
sums	*31*	*27*	*28*	*86*	*6007*				
averages	*1.2*	*1.0*	*1.1*	*3.3*		*0.52*	*0.45*	*0.47*	*1.43*

Table 7. New bandings of adults and juveniles at Ranger Creek by net and species, 2024. Nets 1 and 6 were last used in 2002; nets 11 and 12 were opened in 2004.

CODE	SPECIES	2	3	4	5	7	8	9	10	11	12	*Totals*
RNSA	Red-naped Sapsucker										1	*1*
NOFL	Northern Flicker						1					*1*
FLIN	Flicker Intergrade						1			1		*2*
WIFL	Willow Flycatcher	3	1	1	1	1		1				*8*
WAVI	Warbling Vireo	1				2			1			*4*
CAJA	Canada Jay						1					*1*
MOCH	Mountain Chickadee	1										*1*
RCKI	Ruby-crowned Kinglet	4	2	2	3	1					1	*13*
SWTH	Swainson's Thrush	4	2	1	1	1	2	3	1		1	*16*
AMRO	American Robin				1	1	1	1	2		1	*7*
CEDW	Cedar Waxwing				3		1					*4*
PISI	Pine Siskin	1		3								*4*
FOSP	Fox Sparrow										1	*1*
DEJU	Dark-eyed Junco	1		2					1			*4*
ORJU	Oregon Junco			2							1	*3*
WCSP	White-crowned Sparrow			3	1							*4*
MWCS	Mtn White-crowned Sparrow			1								*1*
WTSP	White-throated Sparrow		1							2		*3*
SOSP	Song Sparrow	2							1			*3*
LISP	Lincoln's Sparrow				2		1		2			*5*
NOWA	Northern Waterthrush	6	1		2						1	*10*
TEWA	Tennessee Warbler	2	1	1								*4*
OCWA	Orange-crowned Warbler				1	1						*2*
COYE	Common Yellowthroat		1		9	1			2			*13*
AMRE	American Redstart	5									1	*6*
YEWA	Yellow Warbler	3	2		1							*6*
BLPW	Blackpoll Warbler	1										*1*
YRWA	Yellow-rumped Warbler	2		1	2					1		*6*
TOWA	Townsend's Warbler			1								*1*
WIWA	Wilson's Warbler	2	3	1	6		1		2			*15*
WETA	Western Tanager				1							*1*
	All species pooled	*38*	*14*	*19*	*34*	*8*	*9*	*5*	*12*	*4*	*8*	*151*
	Ranking	*1*	*4*	*3*	*2*	*7*	*6*	*8*	*5*	*9*	*7*	*.*

* For the years 1999-2002, net #1 is included with net #2. It was then replaced by net #11 in 2004.
** For the years 1999-2002, net #6 is included with net #5. It was then replaced by net #12 in 2004.

Table 8. New bandings of adults and juveniles at Ranger Creek by net, 1999-2024. Nets 1 and 6 were last used in 2002; nets 11 and 12 were opened in 2004.

Year / Net no.	2*	3	4	5**	7	8	9	10	11	12	*Totals*
1999	36	11	25	42	23	19	20	20			*196*
2000	37	5	10	19	23	13	18	25			*150*
2001	69	20	17	44	27	25	28	37			*267*
2002	29	4	12	13	3	4	11	12			*88*
2003	20	4	24	51	10	8	15	15			*147*
2004	25	14	22	12	13	10	22	14	10	4	*146*
2005	24	12	11	4	8	5	13	14	9	4	*104*
2006	19	15	20	5	8	7	11	10	4	12	*111*
2007	28	14	16	9	13	9	20	24	17	17	*167*
2008	26	6	13	4	7	4	10	6	2	13	*91*
2009	23	14	9	10	6	6	19	13	15	15	*130*
2010	21	16	17	4	8	2	7	15	7	15	*112*
2011	42	19	26	8	5	6	12	19	6	16	*159*
2012	45	12	18	17	19	8	16	18	10	12	*175*
2013	28	6	8	9	7	3	11	4	4	11	*91*
2014	34	5	19	13	8	4	9	15	4	13	*124*
2015	36	26	18	18	13	6	18	10	4	18	*167*
2016	53	22	17	44	13	21	21	29	6	19	*245*
2017	47	29	26	28	24	13	16	11	13	21	*228*
2018	27	16	23	20	13	8	16	20	2	12	*157*
2019	21	13	23	18	1	9	13	10	3	5	*116*
2020	45	13	19	38	11	13	14	18	7	7	*185*
2021	30	20	13	28	13	13	15	10	7	9	*158*
2022	37	15	27	44	18	18	13	26	17	18	*233*
2023	31	20	36	37	30	20	12	26	10	18	*240*
2024	38	14	19	34	8	9	5	12	4	8	*151*
All years pooled	*871*	*365*	*488*	*573*	*332*	*263*	*385*	*433*	*161*	*267*	*4138*
Ranking	*1*	*6*	*3*	*2*	*7*	*9*	*5*	*4*	*10*	*8*	

Table 9. Number of individuals (adult and juvenile) of MAPS target species captured at Ranger Creek, by year and mean, 1999-2024.

Species	DUFL	WEFL	WAVI	SWTH	AMRO	ORJU	SOSP	LISP	OCWA	YEWA	MGWA	WIWA	*TOTAL*
1999			4	3	16	4	0	10	6	16	4	22	*85*
2000			3	0	4	6	0	5	2	17	1	10	*48*
2001			5	6	7	17	0	4	4	32	2	23	*100*
2002			1	6	3	2	0	3	1	7	0	9	*32*
2003			3	5	10	4	0	13	0	1	1	16	*53*
2004			4	4	6	11	0	9	2	7	0	6	*49*
2005			3	8	2	3	0	9	3	5	0	17	*50*
2006			7	13	2	5	0	7	1	4	0	12	*51*
2007			3	18	4	10	7	10	0	16	3	12	*83*
2008			2	12	1	13	2	9	3	1	0	10	*53*
2009			0	10	8	10	1	5	2	5	0	3	*44*
2010			1	12	8	6	0	8	4	11	1	17	*68*
2011			3	18	6	0	2	8	5	9	2	15	*68*
2012			6	10	9	2	0	6	4	4	1	17	*59*
2013			2	9	5	4	0	2	9	3	0	14	*48*
2014			7	8	6	6	0	8	15	5	1	9	*65*
2015			8	17	1	6	0	10	8	7	0	0	*57*
2016			12	26	3	9	6	26	22	19	0	9	*132*
2017			6	22	11	9	0	7	7	6	1	9	*78*
2018			1	21	9	4	1	6	3	3	1	11	*60*
2019			6	19	4	3	1	12	5	4	1	14	*69*
2020			4	23	7	5	1	12	11	8	0	12	*83*
2021			2	38	13	4	0	4	10	3	3	9	*86*
2022			8	37	6	2	2	10	4	10	0	19	*98*
2023		1	1	30	17	21	2	8	7	5	2	10	*104*
2024			4	16	8	7	3	5	2	6	0	15	*66*
Total	*0*	*1*	*106*	*391*	*176*	*173*	*28*	*216*	*140*	*214*	*24*	*320*	*1723*
Average	*0*	*1*	*4*	*15*	*7*	*7*	*1*	*8*	*5*	*8*	*1*	*12*	*6*

Table 10. Population trend (1999-2024) of species whose numbers are predicted to change or remain stable due to climate change, at Ranger Creek MAPS station in Banff National Park. Values are new captures per 300 net hours. Significant increase or decrease in P(3) r^2 value shown in bold type.

Species	1999-2001	2000-2002	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010	2009-2011	2010-2012	2011-2013	2012-2014	2013-2015	2014-2016	2015-2017	2016-2018	2017-2019	2018-2020	2019-2021	2020-2022	2021-2023	2022-2024	P(3) r^2
Species predicted to decrease																									
RCKI	5.8	5.1	15.2	3.6	2.5	3.3	6.4	9.0	1.8	3.3	1.7	1.7	2.5	10.3	1.8	3.6	13.6	3.9	8.1	8.1	7.1	11.4	12.8	16.3	**0.8015**
FOSP	2.5	8.4	17.7	6.3	15.0	8.3	11.8	3.0	0.9	0.0	0.0	0.0	0.8	1.7	0.0	1.8	0.0	1.0	0.9	0.9	1.8	1.0	1.8	2.4	**-0.8240**
WIWA	18.3	9.3	19.4	9.9	15.0	5.8	20.4	13.0	11.1	8.4	4.2	15.0	14.2	17.1	16.2	9.0	9.1	9.7	8.1	11.7	12.4	12.4	11.5	13.4	-0.1501
LISP	8.3	5.1	3.4	2.7	10.8	8.3	9.6	7.0	6.5	8.4	5.8	6.7	15.0	7.7	2.7	9.9	10.9	27.1	7.2	6.3	10.6	12.4	7.4	7.4	-0.4298
WCSP	2.5	0.0	0.8	0.9	0.0	0.0	0.0	2.0	4.6	9.2	5.8	6.7	5.8	3.4	7.2	2.7	5.4	4.8	5.4	3.6	5.3	9.3	4.7	5.4	**0.6774**
OCWA	7.5	2.5	5.9	2.7	0.0	1.7	4.3	3.0	5.5	12.5	8.3	10.9	8.3	6.8	14.4	10.7	11.8	20.3	11.7	7.2	9.7	18.6	8.5	5.1	**-0.8626**
BLPW	2.5	0.8	0.0	0.9	0.8	0.0	1.1	0.0	0.9	0.0	4.2	0.0	0.8	0.9	3.6	0.0	1.8	3.9	0.0	0.0	0.0	1.0	2.7	3.0	0.2514
Species predicted to increase																									
WIFL	12.5	13.5	8.4	13.5	11.7	8.3	11.8	5.0	7.4	2.5	9.2	6.7	9.2	11.1	3.6	10.7	18.1	14.5	6.3	7.2	7.1	8.3	9.8	9.5	-0.3229
LEFL	2.5	5.1	5.9	0.0	0.0	3.3	8.6	3.0	6.5	1.7	0.8	4.2	8.3	8.5	2.7	1.8	4.5	2.9	3.6	0.9	0.0	2.1	0.9	0.6	-0.4475
CHSP	3.3	5.9	5.9	0.0	1.7	5.8	2.1	8.0	1.8	0.0	9.2	0.8	3.3	1.7	2.7	1.8	0.0	1.0	1.8	0.9	1.8	2.1	2.6	0.9	**-0.5497**
BHCO	3.3	5.1	3.4	1.8	0.8	4.2	0.0	1.0	0.0	0.0	1.7	0.8	1.7	0.9	0.0	1.8	0.9	0.0	0.0	3.6	0.0	0.0	0.3	0.0	**-0.8545**
COYE	13.3	6.7	3.4	6.3	2.5	11.7	6.4	2.0	2.8	0.8	0.8	0.8	0.8	4.3	1.8	0.0	2.7	1.9	1.8	0.9	0.9	1.0	3.5	5.9	**0.7296**
WAVI	3.3	2.5	5.1	0.9	2.5	3.3	4.3	4.0	2.8	1.7	0.0	0.8	3.3	5.1	2.7	7.2	8.2	11.6	6.3	0.9	5.3	4.1	3.2	4.1	-0.4072
GCKI	0.8	3.4	8.4	0.0	0.0	0.8	0.0	0.0	0.0	2.5	0.8	0.0	10.0	1.7	2.7	4.5	0.0	1.0	10.8	1.8	0.0	12.4	0.6	0.3	**-0.6482**
SWTH	2.5	0.0	5.1	5.4	4.2	3.3	8.6	14.0	11.1	11.7	13.3	11.7	17.5	11.1	10.8	10.7	16.3	29.0	19.9	23.5	16.8	23.8	33.1	28.2	**0.9281**
AMRO	13.3	3.4	5.9	2.7	8.3	5.0	3.2	3.0	2.8	0.8	6.7	6.7	5.0	7.7	5.4	6.3	1.8	2.9	9.9	9.9	3.5	7.2	10.6	9.2	**0.6440**
MGWA	3.3	0.8	1.7	0.0	0.8	0.0	0.0	0.0	2.8	0.0	0.0	0.8	1.7	0.9	0.0	0.9	0.0	0.0	0.9	0.9	0.9	0.0	1.5	0.6	0.2112
AMRE	5.8	3.4	0.0	0.9	0.8	4.2	0.0	2.0	5.5	2.5	3.3	2.5	0.8	5.1	0.9	0.9	2.7	3.9	2.7	4.5	2.6	8.3	5.9	6.5	**0.7889**
Species predicted to remain stable																									
MOCH	0.8	0.0	0.8	0.0	0.8	0.8	0.0	0.0	0.0	0.8	0.8	0.0	0.0	1.7	0.9	0.9	0.9	1.0	0.9	1.8	4.4	1.0	0.9	1.2	**0.6426**
CCSP	0.0	0.0	0.0	0.9	0.0	0.8	0.0	1.0	1.8	0.0	0.8	0.8	0.8	0.0	0.9	0.9	0.0	3.9	0.0	7.2	0.9	0.0	0.0	0.0	-0.3688
NOWA	6.7	5.1	9.3	6.3	3.3	3.3	7.5	6.0	4.6	3.3	2.5	4.2	5.8	6.0	5.4	2.7	4.5	8.7	7.2	4.5	3.5	1.0	10.7	12.2	**0.5201**
TEWA	1.7	0.0	0.8	0.9	0.0	0.0	0.0	1.0	0.9	0.0	8.3	3.3	1.7	0.9	1.8	3.6	3.6	6.8	2.7	1.8	0.9	7.2	5.6	6.5	**0.6478**
YEWA	13.3	17.7	31.2	8.1	1.7	5.8	5.4	4.0	12.0	0.8	4.2	9.2	7.5	6.8	4.5	4.5	7.3	21.3	6.3	2.7	3.5	8.3	5.9	6.8	**-0.6789**
YRWA	15.0	14.3	13.5	2.7	34.2	15.8	3.2	7.0	5.5	4.2	13.3	2.5	10.8	6.0	5.4	9.0	12.7	31.0	10.8	9.9	4.4	10.3	7.6	6.2	-0.2718

Table 11. Yearly and cumulative breeding status of species detected at Ranger Creek, 1999-2024.

SPECIES	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Status*
Canada Goose	T	T	T	T	T	T	-	T	-	-	T	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Blue-winged Teal	B	-	-	-	B	B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	O
Mallard	T	T	L	L	B	B	B	L	L	B	B	L	T	L	T	T	T	L	L	T	B	-	L	L	B	L	U
Common Goldeneye	T	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	B	T	-	-	-	O
Common Merganser	-	-	-	-	-	-	-	-	-	-	-	-	-	T	T	-	-	-	-	-	-	-	-	-	-	-	T
Ruffed Grouse	T	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Dusky Grouse	-	T	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Mourning Dove	-	-	-	T	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	T
Black Swift	-	-	T	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Calliope Hummingbird	-	B	L	T	B	T	T	-	-	-	T	L	L	T	-	-	T	-	T	T	-	-	-	-	L	L	O
Rufous Hummingbird	T	B	B	T	T	T	-	L	L	-	B	-	L	B	B	L	T	L	-	T	B	B	B	B	B	B	U
Virginia Rail	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Sora	B	B	-	B	B	B	B	-	-	-	-	-	L	B	-	B	B	B	L	-	-	-	B	B	B	B	U
Wilson's Snipe	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Spotted Sandpiper	-	-	T	-	-	-	-	T	T	B	B	B	B	-	T	B	-	L	L	T	-	-	T	-	-	-	O
Lesser Yellowlegs	M	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	M
Common Loon	T	-	-	-	T	-	T	-	-	T	-	T	T	T	T	T	-	T	T	-	-	-	T	T	-	-	T
Great Blue Heron	T	B	L	T	L	L	L	-	T	-	-	T	-	T	-	-	-	-	-	-	-	-	-	-	T	-	T
Osprey	T	T	-	T	T	T	-	T	T	T	T	T	T	T	T	-	T	T	-	-	-	-	L	L	T	T	T
Golden Eagle	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Sharp-shinned Hawk	T	T	T	T	-	-	T	T	-	T	-	-	-	T	T	-	-	T	-	-	-	-	-	-	-	-	T
Cooper's Hawk	-	T	-	T	-	T	-	-	-	-	-	T	T	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Bald Eagle	T	T	-	T	T	-	-	T	-	-	T	-	-	T	-	-	T	-	-	-	-	-	T	-	-	-	T
Red-tailed Hawk	-	T	-	T	-	T	T	T	T	T	T	T	T	T	-	-	T	T	T	T	T	T	-	T	-	-	T
Belted Kingfisher	T	T	T	L	T	T	T	L	T	T	T	T	-	T	L	-	T	B	T	-	T	L	L	L	-	-	O
Red-naped Sapsucker	-	-	-	-	T	-	T	-	-	-	-	-	-	L	-	-	B	B	-	B	B	-	B	B	B	B	O
American 3-toed Wood	-	-	-	T	T	T	-	-	-	-	T	L	T	-	B	-	-	-	-	-	-	-	-	-	-	T	O
Downy Woodpecker	-	-	-	-	-	-	-	B	T	-	-	-	-	-	-	-	-	-	-	-	L	-	-	-	-	-	O
Hairy woodpecker	-	-	T	-	-	-	-	-	-	-	-	T		-	-	T	-	-	-	T	-	-	-	-	-	-	T
Northern Flicker*	-	-	-	-	-	-	-	-	L	-	-	L	B	T	B	L	T	L	L	B	L	B	B	B	B	B	O
Yellow-shafted Flicker	T	-	T	-	-	-	-	-	-	L	-	-	-	-	-	-	-	-	L	-	-	-	-	-	-	-	O
Flicker Intergrade	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	L	-	-	-	-	-	-	-	-	T	B	O
Red-shafted Flicker	-	-	-	T	B	T	T	L	T	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	L	O
Pileated Woodpecker	T	-	T	T	T	-	-	-	-	-	T	-	-	-	-	-	-	T	L	L	T	-	L	L	-	-	O
American Kestrel	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	T
Merlin	-	-	-	-	-	-	-	-	-	T	T	-	-	-	-	-	-	-	-	-	T	-	T	-	T	-	T

* These species only counted when neither of separate species or subspecies were differentiated.

** A=altitudinal disperser, B=breeders, L=likely breeders, T=transients, M=migrants, U=usual breeder (> ½ of yrs), O=occasional breeder (≤ ½ of yrs)

Table 11, con't. Yearly and cumulative breeding status of species detected at Ranger Creek, 1999-2024.

SPECIES	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Status*
Eastern Kingbird	T	-	-	T	T	T	-	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Olive-sided Flycatcher	-	-	-	-	T	-	-	T	T	-	-	T	-	T	T	T	-	T	-	-	-	T	B	-	-	-	T
Western Wood-Pewee	T	-	T	T	T	T	T	T	L	L	L	T	-	L	-	-	-	-	L	-	T	-	-	L	L	-	O
Yellow-bellied Fly.	-	-	-	-	-	-	-	M	-	M	M	-	M	-	-	-	-	-	-	-	-	-	-	-	-	-	M
Alder Flycatcher	B	B	B	B	B	B	B	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	B	B	B	B
Traill's Flycatcher*	B	B	B	B	B	B	B	B	B	B	B	B	B	B	-	-	B	B	B	B	B	B	B	-	B	B	B
Willow Flycatcher	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Least Flycatcher	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	L	B	B	B	B	L	B
Hammond's Fly.	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Western Flycatcher	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	B	-	T
Cassin's Vireo	B	-	L	-	-	-	-	L	L	-	-	-	-	B	-	-	-	-	-	-	-	-	L	-	-	B	O
Blue-headed Vireo	-	M	-	-	M	M	M	M	M	M	M	M	M	-	B	B	-	-	-	-	-	-	-	T	L	-	O
Warbling Vireo	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	L	B	B	B	B	B	B	B
Red-eyed Vireo	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	B	-	-	-	-	-	-	O
Canada Jay	-	T	T	T	L	T	T	-	T	T	L	L	L	T	-	T	T	T	B	B	B	-	B	B	B	T	O
Steller's Jay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	T	T
Clark's Nutcracker	-	-	-	-	T	-	-	T	-	T	-	T	-	-	-	-	T	T	-	-	T	T	T	T	T	T	T
Black-billed Magpie	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	T	T
American Crow	T	T	T	-	-	T	-	T	T	T	-	T	-	T	-	-	T	-	T	-	-	-	L	L	-	-	T
Common Raven	T	T	T	B	L	T	T	L	T	T	T	L	T	T	L	T	T	-	T	B	T	B	T	T	B	B	O
Tree Swallow	-	-	-	-	L	T	T	L	L	-	T	T	-	L	T	-	T	T	-	-	-	-	-	-	-	-	O
Northern Rough-winged Sw.	T	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	T	T
Barn Swallow	T	T	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	T
Cliff Swallow	-	T	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Black-capped Chick.	B	B	B	B	B	B	B	B	B	L	B	L	L	L	T	-	T	B	B	B	-	-	L	L	-	-	U
Mountain Chickadee	T	T	B	-	L	L	L	L	-	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Boreal Chickadee	T	-	T	B	B	T	T	L	L	B	B	-	L	-	B	L	L	B	B	-	-	B	-	B	B	L	U
Red-breasted Nuthatch	L	B	B	B	B	B	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	L	B
White-breasted Nut.	-	-	T	-	-	-	-	-	-	-	-	-	L	L	-	-	-	-	-	-	-	-	-	-	-	-	O
Brown Creeper	T	-	L	T	T	T	-	L	-	-	-	T	-	-	-	-	-	-	L	-	B	B	-	-	-	-	O
Golden-crowned King.	T	B	B	-	-	B	-	-	-	B	L	-	L	L	L	L	-	B	B	B	B	B	B	-	B	-	U
Ruby-crowned Kinglet	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Townsend's Solitaire	-	-	-	-	-	-	T	-	-	T	T	T	T	-	T	-	-	-	-	-	-	-	-	-	-	-	T
Swainson's Thrush	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Hermit Thrush	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	L	-	-	-	T
American Robin	B	B	B	B	B	B	B	B	-	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B

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SPECIES	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Status*
Varied Thrush	T	-	-	-	T	T	T	T	B	-	T	B	B	B	L	B	-	L	B	B	L	-	B	B	-	L	O
Gray Catbird	-	-	-	-	T	-	-	T	-	-	-	-	-	-	-	-	T	-	-	T	-	-	-	-	-	-	T
Cedar Waxwing	T	B	L	B	B	B	B	L	B	B	L	B	B	B	B	B	B	B	B	B	B	L	B	B	B	B	B
Evening Grosbeak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	-	T
Pine Grosbeak	L	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Red Crossbill	-	-	T	-	-	-	-	-	T	-	-	-	-	-	-	-	L	-	T	-	-	-	-	T	L	-	T
White-winged Crossbill	-	-	T	T	-	T	-	-	T	T	-	L	T	T	L	-	T	-	T	B	-	-	-	L	L	L	O
Pine Siskin	B	B	B	T	B	B	B	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
American Goldfinch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	L	-	-	-	-	-	-	T
Chipping Sparrow	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	T	L	B	B	B	B	B	B	-	B	B
Clay-coloured Sparrow	-	-	-	T	-	T	-	T	-	-	T	B	T	-	B	L	-	B	-	B	B	-	-	-	B	-	O
Fox Sparrow	B	B	B	B	B	B	B	B	B	-	-	-	B	B	B	B	T	B	L	B	B	L	-	-	B	B	U
Dark-eyed Junco	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Slate-coloured Junco															L	-	M	-	M	-	L	-	M	-	-	-	M
Oregon Junco*	B	-	B	-	T	B	B	L	B	B	B	-	-	B	B	B	B	B	B	B	B	-	-	B	B	B	U
White-crowned Sp.*	B	-	B	T	-	-	-	L	B	L	-	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	U
Mountain White-cr Sp.	-	-	-	-	-	-	-	T	-	L	-	-	T	B	L	-	L	-	B	B	B	B	-	B	-	L	O
Gambel's White-cr Sp.	B	-	-	-	-	-	-	-	B	B	B	L	B	B	B	B	B	B	B	-	B	B	B	B	-	-	U
White-throated S.	-	-	-	M	-	-	-	-	-	-	-	-	-	-	-	-	B	B	B	B	B	B	B	B	B	B	O
Savannah Sparrow	T	-	-	-	-	T	-	T	-	-	-	L	-	-	-	-	-	-	L	-	-	-	-	-	-	-	O
Song Sparrow	B	B	-	L	B	-	-	-	B	B	B	-	B	B	B	B	L	B	B	B	B	B	B	B	B	B	U
Lincoln's Sparrow	B	B	B	T	B	B	B	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Yellow-headed Black.	-	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Red-winged Blackbird	B	B	B	B	B	B	B	L	B	L	-	-	-	B	T	B	B	-	-	-	-	-	B	B	B	B	U
Brown-headed Cow.	B	B	B	B	B	B	L	L	B	L	B	L	B	B	B	B	B	-	L	B	-	-	L	B	B	B	U
Brewer's Blackbird	T	-	-	T	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T
Common Grackle																									T	-	T
Northern Waterthrush	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Tennessee Warbler	T	-	L	T	-	-	-	T	L	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	U
Orange-crowned Warb.	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Nashville Warbler	M	M	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	-	-	-	T	-	-	M
MacGillivray's Warbler	T	T	L	-	T	-	-	-	B	L	-	B	L	B	B	B	B	-	L	L	L	-	L	-	B	-	U
Common Yellowthroat	B	B	B	B	B	B	B	B	B	B	L	L	B	B	B	B	B	B	B	B	B	L	B	B	B	B	B
American Redstart	T	T	-	B	B	B	-	L	B	B	B	B	L	B	L	B	T	B	B	B	B	B	B	B	B	B	U
Magnolia Warbler	-	T	-	-	-	-	-	-	-	-	-	-	L	B	-	-	-	-	-	-	-	-	-	-	-	-	O
Yellow Warbler	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B

* These species only counted when neither of separate species or subspecies were differentiated.

** A=altitudinal disperser, B=breeders, L=likely breeders, T=transients, M=migrants, U=usual breeder (> ½ of yrs), O=occasional breeder (≤ ½ of yrs)

Table 11, con't. Yearly and cumulative breeding status of species detected at Ranger Creek, 1999-2024.

SPECIES	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Status*
Blackpoll Warbler	B	B	B	B	B	L	T	-	B	-	B	B	B	B	B	B	T	B	B	L	B	L	-	B	B	B	U
Yellow-rumped Warb.*	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Myrtle's Warbler	B	B	L	-	B	B	-	-	-	L	B	L	B	B	B	L	L	T	B	L	-	-	B	B	-	-	U
Audubon's Warbler	B	B	B	B	B	B	B	L	B	-	B	B	B	B	B	B	L	B	B	B	L	B	B	B	-	-	U
Townsend's Warbler	T	B	B	B	L	L	-	B	L	B	L	L	B	L	B	L	L	B	B	B	B	B	B	B	B	B	B
Wilson's Warbler	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B
Western Tanager	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	T	-	-	-	-	-	L	L	-	L	T
Total spp	*70*	*55*	*58*	*59*	*65*	*59*	*48*	*59*	*58*	*56*	*58*	*63*	*59*	*65*	*60*	*49*	*61*	*55*	*60*	*54*	*55*	*45*	*60*	*58*	*56*	*56*	*115*
Total spp breeding	*33*	*35*	*32*	*30*	*36*	*33*	*27*	*21*	*33*	*31*	*34*	*30*	*35*	*40*	*38*	*36*	*31*	*39*	*39*	*43*	*39*	*36*	*40*	*42*	*44*	*44*	

* These species only counted when neither of separate species or subspecies were differentiated.
** A=altitudinal disperser, B=breeders, L=likely breeders, T=transients, M=migrants, U=usual breeder (> ½ of yrs), O=occasional breeder (≤ ½ of yrs)

Appendix A. Common name, American Ornithological Union (AOU) code and scientific name of all species detected at Ranger Creek MAPS station (1999-2024), arranged alphabetically (Pyle and DeSante 2023).

COMMON NAME	CODE	SCIENTIFIC NAME
Alder Flycatcher	ALFL	*Empidonax alnorum*
American Crow	AMCR	*Corvus brachyrhynchos*
American Goldfinch	AGOL	*Spinus tristis*
American Kestrel	AMKE	*Falco sparverius*
American Redstart	AMRE	*Setophaga ruticilla*
American Robin	AMRO	*Turdus migratorius*
American Three-toed Woodpecker	ATTW	*Picoides dorsalis*
Audubon's Warbler	AUWA	*Setophaga coronata auduboni*
Bald Eagle	BAEA	*Haliaeetus leucocephalus*
Barn Swallow	BARS	*Hirundo rustica*
Belted Kingfisher	BEKI	*Megaceryle alcyon*
Black Swift	BLSW	*Cypseloides niger*
Black-billed Magpie	BBMA	*Pica hudsonia*
Black-capped Chickadee	BCCH	*Poecile atricapilla*
Blackpoll Warbler	BLPW	*Setophaga striatus*
Blue-headed Vireo	BHVI	*Vireo solitarius*
Blue-winged Teal	BWTE	*Spatula discors*
Boreal Chickadee	BOCH	*Poecile hudsonicus*
Brewer's Blackbird	BRBL	*Euphagus cyanocephalus*
Brown Creeper	BRCR	*Certhia americana*
Brown-headed Cowbird	BHCO	*Molothrus ater*
Calliope Hummingbird	CAHU	*Selasphorus calliope*
Canada Goose	CANG	*Branta canadensis*
Canada Jay	CAJA	*Perisoreus canadensis*
Cassin's Vireo	CAVI	*Vireo cassinii*
Cedar Waxwing	CEDW	*Bombycilla cedrorum*
Chipping Sparrow	CHSP	*Spizella passerina*
Clark's Nutcracker	CLNU	*Nucifraga columbiana*
Clay-coloured Sparrow	CCSP	*Spizella pallida*
Cliff Swallow	CLSW	*Petrochelidon pyrrhonota*
Common Goldeneye	COGO	*Buchephala clangula*

Appendix A, con't. Common name, American Ornithological Union (AOU) code and scientific name of all species detected at Ranger Creek MAPS station (1999-2024), arranged alphabetically (Pyle and DeSante 2023).

COMMON NAME	CODE	SCIENTIFIC NAME
Common Grackle	COGR	*Quiscalus quiscula*
Common Loon	COLO	*Gavia immer*
Common Merganser	COME	*Mergus merganser*
Common Raven	CORA	*Corvus corax*
Common Yellowthroat	COYE	*Geothlypis trichas*
Cooper's Hawk	COHA	*Accipiter cooperii*
Dark-eyed Junco	DEJU	*Junco hyemalis*
Downy Woodpecker	DOWO	*Dryobates pubescens*
Dusky Grouse	DUGR	*Dendragapus obscurus*
Eastern Kingbird	EAKI	*Tyrannus tyrannus*
Evening Grosbeak	EVGR	*Coccothraustes vespertinus*
Fox Sparrow	FOSP	*Passerella iliaca*
Gambel's White-crowned Sparrow	GWCS	*Zonotrichia leucophrys gambelii*
Golden Eagle	GOEA	*Aquila chrysaetos*
Golden-crowned Kinglet	GCKI	*Regulus satrapa*
Gray Catbird	GRCA	*Dumetella carolinensis*
Great Blue Heron	GBHE	*Ardea herodias*
Hairy woodpecker	HAWO	*Dryobates villosus*
Hammond's Flycatcher	HAFL	*Empidonax hammondii*
Hermit Thrush	HETH	*Catharus guttatus*
Least Flycatcher	LEFL	*Empidonax minimus*
Lesser Yellowlegs	LEYE	*Tringa flavipes*
Lincoln's Sparrow	LISP	*Melospiza lincolnii*
MacGillivray's Warbler	MGWA	*Geothlypis tolmiei*
Magnolia Warbler	MAWA	*Setophaga magnolia*
Mallard	MALL	*Anas platyrhynchos*
Merlin	MERL	*Falco columbarius*
Mountain Chickadee	MOCH	*Poecile gambeli*
Mountain White-crowned Sparrow	MWCS	*Zonotrichia leucophrys oriantha*
Mourning Dove	MODO	*Zenaida macroura*
Myrtle's Warbler	MYWA	*Setophaga coronata coronata*

Appendix A, con't. Common name, American Ornithological Union (AOU) code and scientific name of all species detected at Ranger Creek MAPS station (1999-2024), arranged alphabetically (Pyle and DeSante 2023).

COMMON NAME	CODE	SCIENTIFIC NAME
Nashville Warbler	NAWA	*Leiothlypis ruficapilla*
Northern Flicker	FLIN	*Colaptus auratus*
Northern Rough-winged Swallow	NRWS	*Stelgidopteryx serripennis*
Northern Waterthrush	NOWA	*Parkesia noveboracensis*
Olive-sided Flycatcher	OSFL	*Contopus cooperi*
Orange-crowned Warbler	OCWA	*Leiothlypis celata*
Oregon Junco	ORJU	*Junco hyemalis oreganus*
Osprey	OSPR	*Pandion haliaetus*
Pacific-slope Flycatcher	PSFL	*Empidonax difficilis*
Pileated Woodpecker	PIWO	*Dryocopus pileatus*
Pine Grosbeak	PIGR	*Pinicola enucleator*
Pine Siskin	PISI	*Spinus pinus*
Red Crossbill	RECR	*Loxia curvirostra*
Red-breasted Nuthatch	RBNU	*Sitta canadensis*
Red-eyed Vireo	REVI	*Vireo olivaceus*
Red-naped Sapsucker	RNSA	*Sphyrapicus nuchalis*
Red-shafted Flicker	RSFL	*Colaptes auratus cafer*
Red-tailed Hawk	RTHA	*Buteo jamaicensis*
Red-winged Blackbird	RWBL	*Agelaius phoeniceus*
Ruby-crowned Kinglet	RCKI	*Corthylio calendula*
Ruffed Grouse	RUGR	*Bonasa umbellus*
Rufous Hummingbird	RUHU	*Selasphorus rufus*
Savannah Sparrow	SAVS	*Passerculus sandwichensis*
Sharp-shinned Hawk	SSHA	*Accipiter striatus*
Slate-colored Junco	SCJU	*Junco hyemalis hyemalis*
Song Sparrow	SOSP	*Melospiza melodia*
Sora	SORA	*Porzana carolina*
Spotted Sandpiper	SPSA	*Actitis macularius*
Steller's Jay	STJA	*Cyanocitta stelleri*
Swainson's Thrush	SWTH	*Catharus ustulatus*
Tennessee Warbler	TEWA	*Leiothlypis peregrina*

Appendix A, con't. Common name, American Ornithological Union (AOU) code and scientific name of all species detected at Ranger Creek MAPS station (1999-2024), arranged alphabetically (Pyle and DeSante 2023).

COMMON NAME	CODE	SCIENTIFIC NAME
Townsend's Solitaire	TOSO	*Myadestes townsendi*
Townsend's Warbler	TOWA	*Setophaga townsendi*
Traill's Flycatcher	TRFL	*Empidonax alnorum/traillii*
Tree Swallow	TRES	*Tachycineta bicolor*
Varied Thrush	VATH	*Ixoreus naevius*
Virginia Rail	VIRA	*Rallus limicola*
Warbling Vireo	WAVI	*Vireo gilvus*
Western Flycatcher	WEFL	*Empidonax difficilis*
Western Tanager	WETA	*Piranga ludoviciana*
Western Wood-Pewee	WEWP	*Contopus sordidulus*
White-breasted Nuthatch	WBNU	*Sitta carolinensis*
White-crowned Sparrow	WCSP	*Zonotrichia leucophrys*
White-throated Sparrow	WTSP	*Zonotrichia albicollis*
White-winged Crossbill	WWCR	*Loxia leucoptera*
Willow Flycatcher	WIFL	*Empidonax traillii*
Wilson's Snipe	WISN	*Gallinago delicata*
Wilson's Warbler	WIWA	*Cardellina pusilla*
Yellow Warbler	YEWA	*Setophaga petechia*
Yellow-bellied Flycatcher	YBFL	*Empidonax flaviventris*
Yellow-headed Blackbird	YHBL	*Xanthocephalus xanthocephalus*
Yellow-rumped Warbler	YRWA	*Setophaga coronata*
Yellow-shafted Flicker	YSFL	*Colaptes auratus auratus*

Appendix B. History of individual birds that were banded in one year and recaptured in a subsequent year at Ranger Creek, 1999-2024.

Species	Band No.	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
AMRE	226086611				B	r																					
AMRE	241018916																				B	x	r	r			
AMRE	241018986																						B	r	r		
AMRE	283097470																							B	x	r	
AMRO	087219819					B	r																				
AMRO	087219825						B	r	r																		
AMRO	087219869														B	x	r										
AMRO	087219870														B	r	r										
AMRO	087219888																B	r									
AMRO	092289924																			B	r						
AMRO	092289959																							B	r		
AUWA	212013310		B	x	r																						
AUWA	212013320		B	r																							
AUWA	228078578					B	r	r																			
AUWA	228078602					B	r																				
AUWA	244033151											B	x	x	x	r											
AUWA	256029012												B	r													
AUWA	256029051													B	r												
AUWA	272013041																				B	r					
AUWA	272013128																						B	x	x	x	r
AUWA	272013043																				B	r					
BCCH	212013165	B	x	r																							
BCCH	228078650						B	r	r																		
BLPW	248017141																								B	r	
BLPW	256029062													B	r	r											
BLPW	269054846																	B	r								
CEDW	247153278																								B	r	
CHSP	212013316		B	r																							
CHSP	244033148											B	r	r													
CHSP	272013090																					B	r				
COYE	212013169	B	r																								
COYE	228078660						B	r																			
COYE	228078661						B	x	r																		
COYE	272013155																							B	r		
DEJU	212013380		B	x	r																						
FOSP	146114935						B	r																			
FOSP	146114936						B	r	r	r																	

B = banded in that year, R = recaptured in that year, x = not detected but survival deduced from re-encounter in subsequent year.

Appendix B, con't. History of individual birds that were banded in one year and recaptured in a subsequent year at Ranger Creek, 1999-2024.

Species	Band No.	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
FOSP	168165311			B	r																						
FOSP	805165215				B	r																					
FOSP	805165235						B	r																			
FOSP	805165280																									B	r
FOSP	805189015		B	r	r																						
FOSP	805189016		B	r																							
GWCS	139186707													B	r												
GWCS	139186759															B	r										
GWCS	139186795																	B	r	r							
GWCS	224125559											B	x	r													
GWCS	224125577												B	r													
GWCS	224125578												B	r													
GWCS	247153212																						B	r			
GWCS	258168578															B	r	r	x	r							
LEFL	212013194	B	r																								
LEFL	212013393		B	r																							
LEFL	228078628						B	r																			
LEFL	233015551												B	r													
LEFL	264034152														B	r											
LEFL	267065202																B	r									
LISP	167157511					B	r																				
LISP	167157580									B	r	r	x	r													
LISP	167157592										B	r															
LISP	167185836			B	x	x	x	r																			
LISP	222121417																					B	r	r			
LISP	222121440																						B	r	r		
LISP	222121444																						B	r			
LISP	222139011																									B	r
LISP	222139013																									B	r
LISP	232120510												B	r													
LISP	232120512												B	r													
LISP	232120513												B	r													
LISP	232120524													B	r	r	r										
LISP	232120525													B	r	x	r	r									
LISP	232120529													B	r	x	r	r									
LISP	232120559														B	x	x	r									
LISP	232120595																	B	r								

B = banded in that year, r = recaptured in that year, x = not detected but survival deduced from re-encounter in subsequent year.

Appendix B, con't. History of individual birds that were banded in one year and recaptured in a subsequent year at Ranger Creek, 1999-2024.

Species	Band No.	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
LISP	252189723																		B	r							
LISP	252189770	B	r																	B	r	r					
LISP	311156703	B	r																								
MOCH	244033149											B	x	x	r												
MOCH	272013051											B	x	x	r						B	r					
MWCS	139186715													B	r	r											
MWCS	277174607													B	r	r					B	r					
MWCS	277174654																					B	r				
MYWA	212013162	B	r																								
NOWA	167157518					B	x	x	x	r																	
NOWA	167157524						B	r																			
NOWA	167157536							B	x	x	r																
NOWA	167157546							B	r	r																	
NOWA	167157588										B	x	r														
NOWA	167157592										B	r															
NOWA	167185809			B	x	r																					
NOWA	167185810			B	r																						
NOWA	167185813			B	r																						
NOWA	222121485																								B	x	r
NOWA	222139019																									B	r
NOWA	232120508												B	r													
NOWA	232120521													B	r	r	r										
NOWA	232120549														B	x	x	x	x	r							
NOWA	232120550														B	r											
NOWA	232120551														B	r	x	x	x	x	x	x	r				
NOWA	232120567															B	r										
NOWA	232120569															B	x	r									
NOWA	232120588																	B	x	x	r	r	x	r	r		
NOWA	232120589																	B	r								
NOWA	252189703																	B	r								
NOWA	252189722		B	r	r														B	x	r						
NOWA	252189734																		B	r	x	x	x	r			
NOWA	252189772																			B	x	r					
NOWA	311156714	B	r	r	x	r																					
NOWA	311156728		B	r	r																						
OCWA	212013179	B	r	r	r																						
OCWA	212013308		B	r																							

B = banded in that year, r = recaptured in that year, x = not detected but survival deduced from re-encounter in subsequent year.

Appendix B, con't. History of individual birds that were banded in one year and recaptured in a subsequent year at Ranger Creek, 1999-2024.

Species	Band No.	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
OCWA	228078653						B	r	x	r	r	r															
OCWA	241018937																					B	r				
OCWA	241018949																					B	r	r	r		
OCWA	244033119										B	x	r														
OCWA	264034185															B	r	r									
OCWA	269054881																	B	r								
OCWA	272013005																			B	r	x	r				
OCWA	272013015																			B	r						
OCWA	272013024																			B	r						
OCWA	272013111																						B	r	r		
OCWA	272013163																							B	x	r	
OCWA	273071099																									B	r
OCWA	278081631																		B	r							
OCWA	283097465																							B	x	r	r
ORJU	228078635						B	r	r																		
ORJU	244033083									B	r																
ORJU	244033133											B	r														
ORJU	252189705																	B	r								
ORJU	264034171															B	r										
ORJU	264034172															B	x	r									
PISI	272013159																							B	r		
RCKI	206029444		B	r																							
RCKI	228078630						B	r																			
RCKI	257020105													B	r												
RCKI	248017196																									B	r
RCKI	283097486																								B	r	
RNSA	805165255																	B	r								
RNSA	805165256																	B	r								
RNSA	805165276																									B	r
RNSA	805165281																									B	r
SSHA	087219880														B	r											
SCJU	256029092														B	r	r										
SOSP	224125513									B	r	r															
SWTH	139186732														B	x	r										
SWTH	139186745														B	x	r										
SWTH	139186749															B	r										
SWTH	139186760															B	r										

B = banded in that year, r = recaptured in that year, x = not detected but survival deduced from re-encounter in subsequent year.

Appendix B, con't. History of individual birds that were banded in one year and recaptured in a subsequent year at Ranger Creek, 1999-2024.

Species	Band No.	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
SWTH	139186787																	B	r								
SWTH	139186796																	B	r								
SWTH	143155304			B	r																						
SWTH	146114940						B	x	r																		
SWTH	146114970								B	r	r																
SWTH	146114986								B	r	x	r															
SWTH	146114988								B	r																	
SWTH	224125503									B	r	r	r														
SWTH	224125510									B	x	r															
SWTH	224125540										B	r															
SWTH	224125543										B	x	r														
SWTH	224125544										B	r	x	r	x	r											
SWTH	224125557											B	r														
SWTH	224125558											B	x	x	r												
SWTH	224125579												B	r	x	r											
SWTH	224125584												B	r													
SWTH	224125585												B	x	r												
SWTH	224125596													B	r	r	x	r	r								
SWTH	247153214																							B	r		
SWTH	247153218																							B	x	r	
SWTH	247153222																							B	r	r	
SWTH	247153230																							B	r		
SWTH	247153280																								B	r	r
SWTH	258168507																	B	r								
SWTH	258168572																			B	r	r					
SWTH	258168581																			B	r						
SWTH	258168583																			B		r					
SWTH	258168584																			B		r					
SWTH	258168586																			B	r						
SWTH	258168589																			B	r						
SWTH	258168596																			B	r						
SWTH	277174604																				B	r					
SWTH	277174618																				B	r					
SWTH	277174623																				B	r					
SWTH	277174637																				B	r					
SWTH	277174655																					B	r	r	r	r	r
SWTH	277174686																						B	r			

B = banded in that year, r = recaptured in that year, x = not detected but survival deduced from re-encounter in subsequent year.

Appendix B, con't. History of individual birds that were banded in one year and recaptured in a subsequent year at Ranger Creek, 1999-2024.

Species	Band No.	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
SWTH	277174689																						B	r			
SWTH	277174692																						B	x	r		
SWTH	298175729																									B	r
SWTH	298175735																									B	r
SWTH	298175737																									B	r
SWTH	298175743																									B	r
SWTH	298175760																									B	r
SWTH	298175768																									B	r
TRFL	212013143	B	x	r	x	r																					
TRFL	212013148	B	x	r	r																						
TRFL	212013168	B	x	r	r																						
TRFL	212013185	B	r	x	r																						
TRFL	222019212			B	x	r																					
TRFL	233015401							B	r																		
TRFL	233015474									B	r																
TRFL	233015474									B	r																
WAVI	212013334		B	r																							
WAVI	222121418																					B	x	x	x	x	r
WAVI	228078684						B	r																			
WAVI	232120537													B	x	x	r										
WAVI	232120553														B	x	x	x	x	r							
WAVI	232120579																B	r									
WAVI	256029034												B	r	x	r											
WCSP	139186707													B	r												
WCSP	224125549										B	x	r														
WCSP	224125563											B	r														
WCSP	224125564											B	r														
WCSP	224125577												B	r													
WCSP	224125578												B	r													
WCSP	139186784																	B	r								
WIFL	228078553					B	r																				
WIFL	233015509										B	r															
WIFL	233015552												B	r	r	r	x	r									
WIFL	233015570												B	x	x	r	x	r									
WIFL	244033147											B	r	r	r	r	r	r	r	r	r						
WIFL	248017190																									B	r
WIFL	256029039												B	x	r	x	x	r									

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Appendix B, con't. History of individual birds that were banded in one year and recaptured in a subsequent year at Ranger Creek, 1999-2024.

Species	Band No.	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WIFL	256029053													B	r												
WIFL	267065217																B	r	r								
WIFL	269054845																	B	r								
WIFL	269054852																	B	r	r							
WIFL	269054868																	B	r	r	r						
WIFL	272013091																					B	r	r			
WIFL	272013106																						B	r			
WIFL	272013134																						B	r			
WIWA	206029426	B	r																								
WIWA	206029441		B	x	r	x	x	r																			
WIWA	226086601					B	r	x	r																		
WIWA	233015504										B	r	r														
WIWA	233015507										B	r	r	r													
WIWA	233015550												B	r													
WIWA	233015581													B	r	r											
WIWA	241018948																					B	r				
WIWA	241018963																					B	r				
WIWA	257020126														B	r	x	r									
WIWA	257020138														B	r											
WIWA	257020141														B	r											
WIWA	257020173															B	x	r	r								
WIWA	257020181															B	r										
WIWA	272013009			B	r															B	r						
WIWA	272013021			B	r															B	r	r					
WIWA	283097461																							B	r	r	
WIWA	350089807			B	r																						
WIWA	350089813			B	x	r																					
WIWA	350089850			B	x	x	r	r																			
YEWA	212013110	B	r	r																							
YEWA	212013155	B	r																								
YEWA	212013307		B	r	r																						
YEWA	212013329		B	r																							
YEWA	212013347		B	r																							
YEWA	212013351		B	r	x	r																					
YEWA	222019411			B	r																						
YEWA	222019422			B	r																						
YEWA	244033021							B	x	r																	

B = banded in that year, r = recaptured in that year, x = not detected but survival deduced from re-encounter in subsequent year.

Appendix B, con't. History of individual birds that were banded in one year and recaptured in a subsequent year at Ranger Creek, 1999-2024.

Species	Band No.	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
YEWA	256029023												B	x	x	r											
YEWA	264034190															B	x	r	r								
YEWA	269054859																	B	r								
YEWA	272013126																						B	x	r		
YEWA	278081630																		B	r							
YEWA	281064822																									B	r
YEWA	283097491																								B	x	r
YRWA	283097471																							B	r		
YRWA	283097479																								B	r	

B = banded in that year, r = recaptured in that year, x = not detected but survival deduced from re-encounter in subsequent year.

Appendix C. Story of Pine Siskin banded in Ontario and recaptured at Ranger Creek in 2016. Excerpted from the Fall 2018 Newsletter of the Bow Valley Naturalists, with permission.

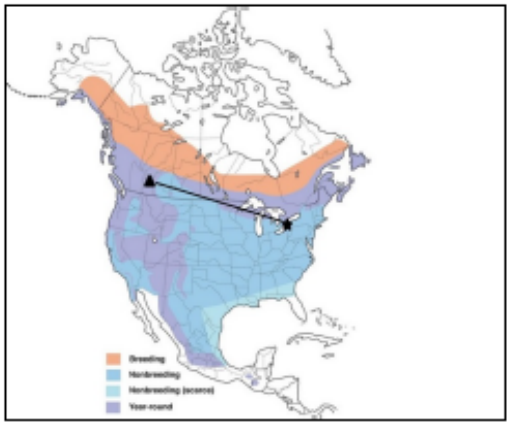
THE AMAZING SISKIN

Foreign Recapture of Pine Siskin (Spinus pinus) at Ranger Creek MAPS Station. *Cyndi Smith*

Pine Siskin *(Spinus pinus). Cyndi Smith Photo.*

The Monitoring Avian Productivity and Survivorship (MAPS) station at Ranger Creek has been operated by BVN since 1999. In that time we have captured 4,491 birds, of which 1,308 have been recaptures of birds banded at the site in previous years or earlier in the same year (or day). However, on 26 June 2016 we finally had a "foreign recapture" … a bird banded elsewhere! On that day, bander-in-charge Ken Symington captured a male Pine Siskin (#2780-67607) that had been banded on 19 February 2016 at Long Point Bird Observatory in southern Ontario. The straight line distance between the two locations is approximately 2,850 kilometres in a northwesterly direction as indicated by the black line on the adjacent map. Of course, this would not likely represent the true path of movement, so the distance this bird travelled is likely much greater. He has not been recaptured since.

As their name suggests, Pine Siskins feed predominantly on conifer seeds, but also eat seeds of deciduous trees, shrubs, grasses and forbs, and insects. They are also frequent visitors to bird feeders. Pine Siskins are known as "irruptive winter finches" because of their erratic, continental scale movements, following the conifer seed crops year to year. As seed crops fail in their normal winter range, Pine Siskins may be found as far south as Florida and Mexico. From continental banding records it appears that birds encountered in south central and southeastern states came from, and returned to, the north-central portion of the continent, while birds encountered in the northeastern US and southeastern Canada came from, and returned to, western provinces and states (Cornell Lab of Ornithology 2018, Yunick 1997).



Pine Siskin Range Map. *Source: Cornell Lab of Ornithology. 2017*

References:

Cornell Lab of Ornithology. 2017. All about birds: Pine Siskin.

Cornell Lab of Ornithology. 2018. Project Feederwatch: Tracking Pine Siskin movements.

Yunick, R. P. 1997. Geographical distribution of re-encountered Pine Siskins captured in upstate, eastern New York during the 1989-1990 irruption. North American Bird Bander 22(1):10-15.

APPENDIX D. Bird handling protocol (adopted 2019, with minor revisions since)

In order to minimize mortality and injury rates of birds caught in our mist nets, we have established protocols that have been informed by the following publications and discussions with fellow banders:

1. DeSante, D.F., K.M. Burton, P. Velez, D. Froehlich, D. Kaschube, and S. Albert. 2018. MAPS manual 2018 protocol: instructions for the establishment and operation of constant-effort bird-banding stations as part of the Monitoring Avian Productivity and Survivorship (MAPS) program. Institute for Bird Populations, Point Reyes Station, CA. [Available from: http://www.birdpop.org/docs/misc/MAPSManual18.pdf]
2. Mackenzie, S.A. and M.A. Gahbauer. 2014. Guidelines for prioritizing bird safety during high capture events. *North American Bird Bander* 39:61-65. [Available from: http://www.nabanding.net/wp-content/uploads/2012/04/Mackenzie-and-Gahbauer.-Guidelines-for-prioritizing-bird-safety.pdf]
3. Ralph, C.J. 2005. Body grasp technique: a rapid method of removing birds from mist nets. *North America Bird Bander* 30(2):65-70. [Available from: https://okologia.files.wordpress.com/2010/11/ralph_removing_birds_mist_net_05.pdf]
4. Smith, H., J. McCracken, D. Shepherd, and P. Velez. 1997. The mist netter's bird safety handbook: a bird bander's guide to safe and ethical mist netting and banding procedures. Institute for Bird Populations, Point Reyes Station, CA. [Available from: https://www.birdpop.org/docs/pubs/Smith_et_al_1997_Mist_Netters_Bird_Safety_Handbook.pdf]
5. Spotswood, E.N., K.R. Goodman, J. Carlisle, R.L. Cormier, D.L. Humple, J. Rousseau, S.L. Guers and G.G. Barton. 2011. How safe is mistnetting? evaluating the risk of injury and mortality to birds. Methods in Ecology and Evolution. doi: 10.1111/j.2041-210x.2011.00123.x.

"Red flag" or "sensitive" species, are those that should be extracted from the net first if there are multiple birds, and warrant closer monitoring (more prone to hypoglycemia, stress, hypothermia, net entanglement, tonguing):

- American Robin
- Fox Sparrow
- Lincoln's Sparrow
- Northern Waterthrush
- Swainson's Thrush
- Tennessee Warbler
- White-throated Sparrow
- Wilson's Warbler
- hummingbirds (always released at net unless showing signs of stress)
- kinglets, especially juveniles
- hatch-year birds, especially if in heavy body moult
- any bird that was badly tangled, injured or shows signs of stress
- legally listed Species at Risk

Specifically, we apply the following methods:

1. Nets are checked a minimum of every 30 minutes, or every 15-20 minutes during periods of colder or hotter temperatures or during light mist, and left alone between visits. This minimizes injury rates, while maximizing capture rates.
2. Birds are placed in separate bags and kept near the bander. This may be in the shade if it is hot, or sometimes in weak sunlight during cooler temperatures. Birds that are extremely active in the bag, jumping and struggling constantly, will be elevated in priority.
3. When sustained winds or frequent strong wind gusts push out the net panels in consistent "half-moon" arcs, the net is closed.
4. The nets are closed if mist or rain is heavy enough so that water droplets collect on the mesh of the net, or if feathers stick to the fingers during extraction.
5. If a predator is noticed in the vicinity of a net, there are a number of options to be taken depending on whether it is a bird or mammal: 1) check the net more frequently to deter predation, 2) raise the bottom panel so that captured birds are not accessible, or 3) close the net.
6. Ambient air temperature will be at least +4 C for the nets to be opened (this may require nets to be closed after they have been opened, as the temperature often dips just after sun rise). As the temperature may vary across the site depending on tree cover, it is the bander's discretion to only open some nets.

7. Birds will not be kept in holding bags for more than one net run or 30 minutes prior to 07:30 and two net runs or one hour for the remainder of the banding period. When approaching this limit, a second bander will be used and/or nets will be closed.
8. If the capture rate has the potential of exceeding the above, the bander will minimize the amount of data that is collected, focusing on just the basics of species, age and sex, in order to process birds more quickly.
9. All "red flag" species (see list above) are identified with a coloured peg attached to their bags so they are processed first from that net run (implemented in 2017).
10. Birds that have been tangled badly and appear to be stressed may be released at the net and not banded. As much information as possible from this individual is recorded on the unbanded datasheet.
11. Immediately after banding, hatch year birds are returned to the vicinity of the net where they were captured, to enable the parents to find them.
12. If a bird is tangled badly and is stressed the net may be cut in order to quickly release the bird.
13. All hummingbirds are released immediately at the net. As much information as possible is recorded on the unbanded datasheet.
14. Extractors are taught the "body grasp" technique for removing birds from the net. This is a faster technique than the earlier leg-hold technique and results in far fewer leg and wing strains.
15. People extracting birds are mentored by senior extractors, prior to them extracting birds without oversight, until at least two senior extractors are satisfied with their skill level.
16. All net teams carry a radio so that a senior extractor or bander can be called to deal with difficult removals.
17. In response to changes in humidity, nets are constantly adjusted to maintain proper tension, which reduces potential for injury.
18. Holes and tears in nets are repaired the same day they are discovered, and if they are too large to do on-site then the net is replaced.
19. Net storage bags are numbered with their net lane, and all bags are accounted for at the end of each banding day.
20. A recovery box (a padded lunch box), with the option of heat pack and sugar water are available for birds that appear stressed (shivering, lethargic, cold, wet) or who don't fly immediately upon release (sometimes evidence of wing strain). When a heat pack is used it is wrapped in a small piece of fleece so that it does not directly contact the bird.
21. The use of the recovery box is recorded with links to the individual bird, total time in captivity and ambient air temperature (to be implemented in 2019).
22. Any bird that shows signs of stress, lethargy or injury will be given 3-4 drops of electrolyte solution (1 tbsp. sugar and 1 tsp. of salt dissolved in water) applied to the beak using a medicine dropper.
23. A bird first aid kit is kept in the banding box, including heat packs, sugar water, veterinarian blood stopper gel, and splinting material (tape, vet wrap, toothpicks). Blood stopper gel is applied to wounds that are bleeding. Broken legs are splinted in a flexed position (similar to a perching bird). Dislocated legs that have been reduced may also be splinted.
24. Injured or ill birds that are not immediately considered terminal but that cannot be released will be taken to the Alberta Institute for Wildlife Conservation (AIWC) (ph: 403-946-2361).
25. If a bird has to be euthanised the only acceptable means is by cervical dislocation. Injuries that would likely require euthanasia include broken wing and severe wounds that do not stop bleeding.
26. When a bird dies the following data will be collected: species, age, sex, time, ambient air temperature, total captivity time, injuries, body condition, mass, and any contributing factors (will implement all categories in 2019).
27. In the event of a mortality or injury necessitating euthanasia, the body will be submitted to the Canadian Wildlife Health Centre (CWHC) node at the University of Calgary, Faculty of Veterinary Medicine for necropsy.