Proposal to shift MAPS Periods

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SUMMARY

Operating the last period of MAPS (Period 10: July 30 to August 8) is exceedingly challenging due to staffing constraints and is dangerous to birds and staff since Period 10 is in the early peak of fall migration. MAPS stations' larger size and the unpredictably high capture rates common in late July and early August forces staff to have to rush over narrow, uneven trails. Normally only one person must both extract and band, such that more than a couple birds captured per check can quickly overwhelm the MAPS site operator. Since other staff are concurrently managing the busier Migration Monitoring, often no additional help is available. **Period 10 of MAPS should no longer be run at the LSLBO and instead MAPS operations should begin in Period 4** (May 31 to June 9). By period 10 very few birds are actively breeding, and Period 10 mostly captures the same migrants already being captured in the LSLBO's Fall Migration Monitoring Program which begins July 12 annually. Freeing up more observers for peak migration will make both programs safer for birds and ensure better data collection since capture rates in both programs over the shifted dates are typically low enough to be easily managed by a single bander. If a sample of migrants are required for various projects that will be missing from Period 10 of MAPS moving forward, analysists need look no further than our 30 years of Fall Migration Monitoring. Operating in Period 4, however, will provide key data on the early breeding window that is likely shifting earlier with climate change.

INTRODUCTION

MAPS objectives and protocols

Monitoring Avian Productivity and Survivorship (MAPS) is a continent-wide program coordinated by the Institute for Bird Populations (IBP). Constant-effort mist netting and visual observations combine to give various estimates of local songbird populations. By banding during the breeding season, population parameters such as productivity (young produced), recruitment (young returning to breed), and survival (adults returning to breed) may be estimated.

MAPS stations are generally an array of ten nets that are operated six times per summer, once roughly every ten days as outlined in the MAPS Manual (DeSante et al. 2022; Table 1). The MAPS Manual defines the breeding season as when most breeding songbird species have established territories and individuals on their northward migration are no longer passing through the area (DeSante et al. 2022).

Table 1. Annual start and end dates for MAPS periods.

Period	1	2	3	4	5	6	7	8	9	10
Dates	May 1-10	May 11-20	May 21-30	May 31 - Jun 9	Jun 10-19	Jun 20-29	Jun 30 - Jul 9	Jul 10-19	Jul 20-29	Jul 30 - Aug 8

Like most of Canada, the recommended starting period for our MAPS program is Period 5 (Figure 1; Table 1). However, as shown in the next sections, the breeding window is tight and potentially shifting earlier in northern Canada. These seemingly arbitrary divides are potentially flawed.

Regional nesting periods

If we consider instead regional nesting periods as defined by the Government of Canada (Figure 1), we can see the breeding windows in Canada are much more complex.

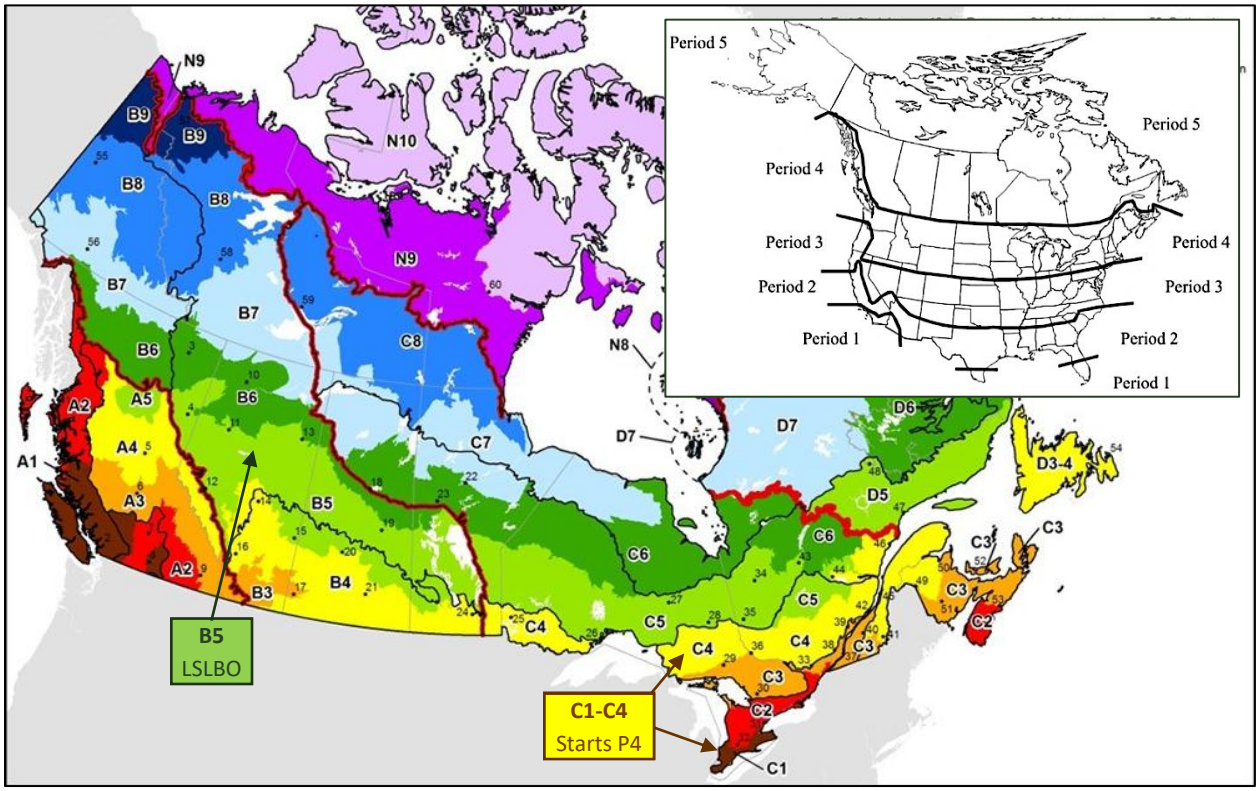


Figure 1. Recommended starting periods from MAPS protocols (top right, DeSantes et al. 2023) and nesting zones for regional nesting calendars (Canada 2023).

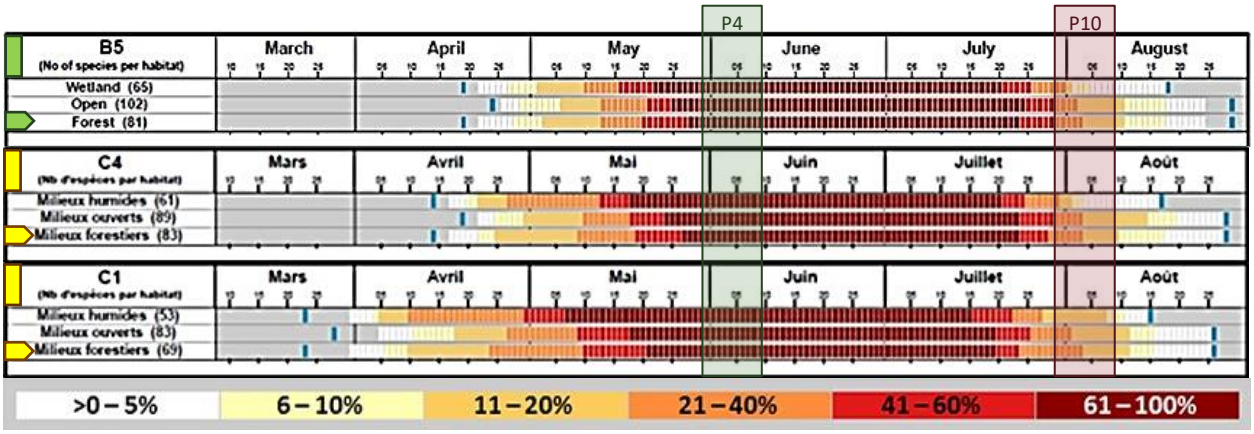


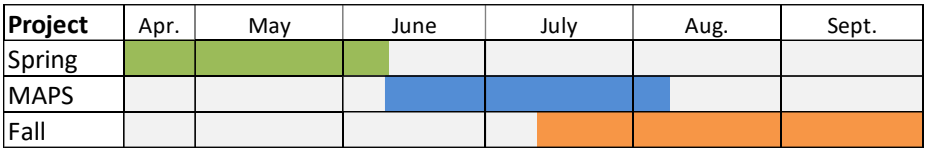
Figure 2. Nesting calendar for the Slave Lake area (B5) and south-eastern Ontario (C4-C1; Canada 2023). While MAPS protocols state we should run P5 to P10, stations in nesting region C4 are to run P4 to P9. The difference in the high intensity nesting period is just two days earlier for C4 in forest habitats than for us. All nesting periods end at roughly the same time, even at the southern most point of the regions (C1) who are recommended to run P4 to P9. See Appendix A for species break downs.

Changes in spring phenology and nesting periods due to climate change

Recent studies using our data (Lehikoinen et al 2019; Oliver et al. 2019) indicate that there is plasticity in migratory behaviour and several species are advancing their spring migration timing, especially short-distance migrants. However, just because a species may be arriving earlier, does not necessarily mean they begin nesting earlier (Ahola et al. 2004). Models from eastern Quebec based on observations of food carrying did not show advancements in the nesting season (Boukherroub et al. 2024). In Fennoscandia, some species are contracting their breeding period with the end of breeding advancing more than the start (Hällfors et al. 2020), which may create more competition in the early breeding season that requires more investigation. Other Fennoscandian species are expanding their breeding season (Halupka 2017). Clearly more data is needed for the early nesting season which is currently lacking from our MAPS operations since by Period 5, most species have well established territories and nests filled with eggs or nestlings. By Period 5, some species have even stopped singing for the year.

MAPS at the LSLBO

We have contributed to MAPS since 1994. Four MAPS stations are operated by the LSLBO: Far and Away (FAWA), Fern Gully (FEGU), Roadside (ROAD), and Residential (RESI). Currently, the last three (of the six) MAPS period overlap with Fall Migration Monitoring, which has also been operated since 1994.



PROPOSAL

Currently **Periods 5 to 7** (June 10 to July 9) are easily managed since they fall neatly into the break between spring and fall migration and we can often devote two staff to each site. If we can get all four sites done between July 10 to 11 before Fall starts, **Period 8** is often easy to manage. While **Period 9** (July 20 to 30) can be challenging to find staff for, captures are often low enough in both sites to be managed by a single highly experienced bander. If we shift the entire MAPS window to drop **Period 10** (July 30 – August 8) and instead have a week of overlap with late spring migration by starting monitoring in **Period 4** (May 31 - June 9), MAPS will become much more manageable, burnout could be better prevented, and better breeding and migration data may be collected.

Table 2. Operationally, it would work better to start at P4, rather than 5 and scrap P10.

Period	1	2	3	4	5*	6	7	8	9	10
Dates	May 1-10	May 11-20	May 21-30	May 31 - Jun 9	Jun 10-19	Jun 20-29	Jun 30 - Jul 9	Jul 10-19	Jul 20-29	Jul 30 - Aug 8

Management challenges of Period 10

Due to the large size of MAPS stations, fewer birds can be safely captured per day than in the migration monitoring station. Typical staffing at the LSLBO is: two permitted banders and one novice extractor. Since the Migration Monitoring station has higher capture rates and involves more intense observational monitoring protocols, it is preferred that one bander and the novice extractor run that site during overlap. That means MAPS sites are typically managed by one bander. This situation spreads staff very thin and burns them out just when Fall Migration Monitoring is beginning to peak during Period 10 which is more likely to exceed the capture rates that can be safely managed by a single bander (Table 3).

Table 3. The max is under unrealistically perfect conditions where captures are evenly spread between checks, no one is too tangled such that all extractions take 45 seconds, and there are no challenges during banding and all birds take 45 seconds to process. Since some birds are especially difficult to extract or band, the minimum assumes extractions are 5 minutes and banding may take 3 minutes. Walking speeds were estimated using a GPS data logger as fast as I could go and at a leisurely pace.

Site	Operation	Trail loop length (m)	Check travel time (mins)	Estimated safe capture rate / check (min – max)	Estimated safe capture rate / day (min – max)
FAWA	1994-present (31 years)	780	11.5 - 15.4	6 (2 - 12)	70 (22 - 148)
FEGU	1994-2000, 2003-present (31 years)	1,000	13.3 - 18.3	5 (1 - 11)	56 (18 - 133)
ROAD	1994-present (31 years)	900	12.5 - 17	5 (2 - 12)	62 (20 - 140)
RESI	2000-present (23 years)	Short: 800 Long: 1,020 Full: 1,700	11.7 - 15.7 13.5 - 18.6 20.2 - 29.3	6 (2 - 12) 5 (1 - 11) 2 (1 - 7)	69 (22 - 147) 55 (17 - 132) 16 (1 - 79)
Migration	1994-present (31 years)	700	10.8 - 14.3 (+ 5 min vis-migs every 2nd check)	6 (2 - 10)	79 (25 - 146)

Period 10 captures are more erratic, and we are guaranteed fewer staff on-hand since migration takes priority (if it is busy in MAPS, it is definitely busy in migration; Figure 3).

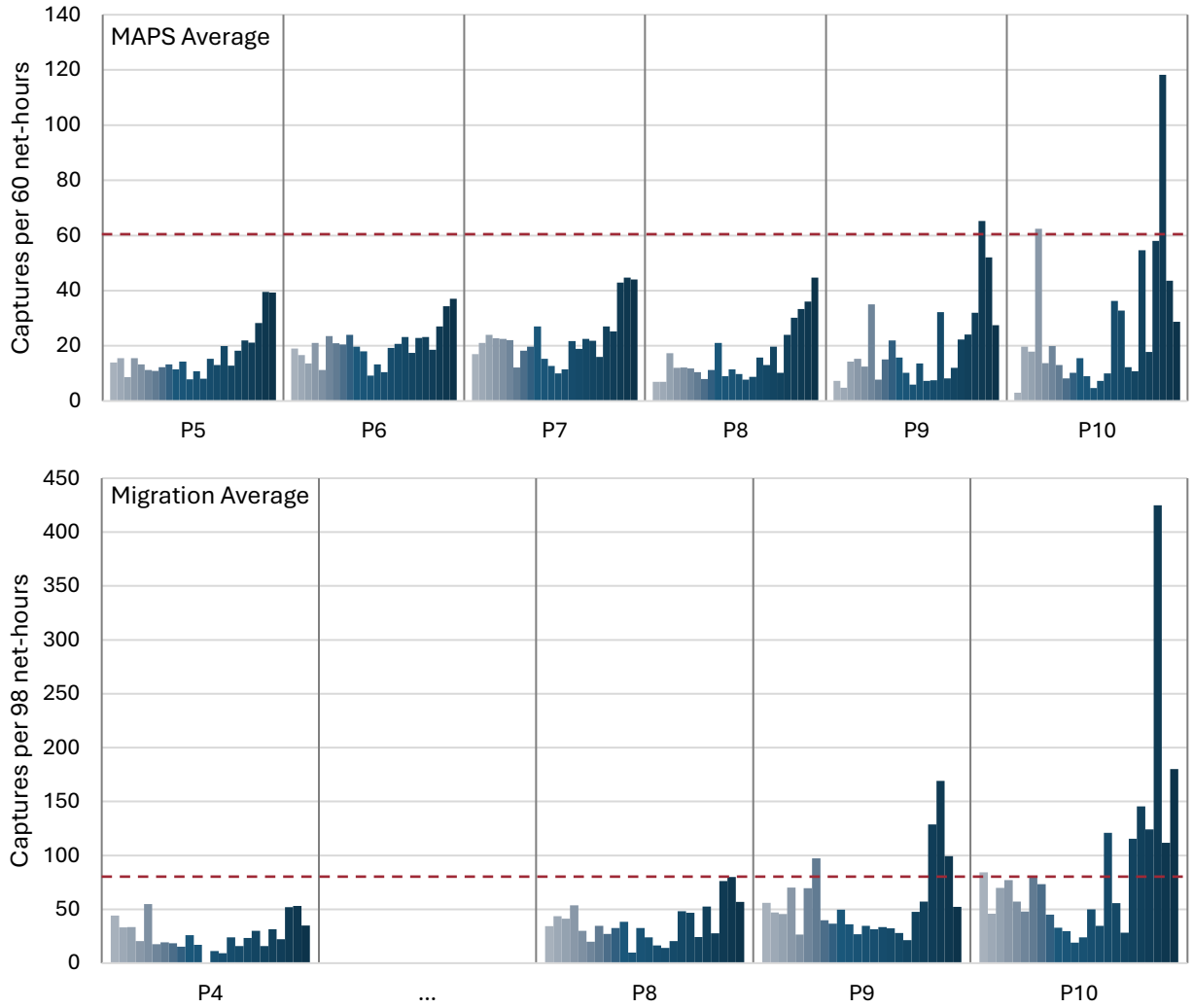


Figure 3. Average capture rate standardized to net-hours of a full day of operation by MAPS period for the LSLBO's MAPS stations (60 net-hours; 1994-2023) and the migration monitoring station (98 net-hours; 2000-2023) with red dashed line indicating the station-dependant capture rate that can be comfortably managed by a highly experienced single operator.

Risk to data: When do males establish their territories?

By Period 4, nearly half of all birds encountered are listed as Probably Known Stopovers during Spring Migration Monitoring (Figure 4). This is an estimate we use to remove birds we strongly suspect to be breeding in the area from our estimation of the number of birds migrating through. This is a very conservative estimate and the true proportion of breeding birds by Period 4 is certainly higher. The only species still moving through by this period are Cedar Waxwings and Pine Siskin in larger flocks and the last of the long-distance migrants: Alder Flycatcher, Canada Warbler, and Mourning Warbler.

Most males captured by Period 4 also have large, swollen cloacae which are few and far between by Period 10 as nesting has already concluded (Figure 5). By Period 10, adult songbirds are also often captured performing their prebasic moult in preparation to migrate south.

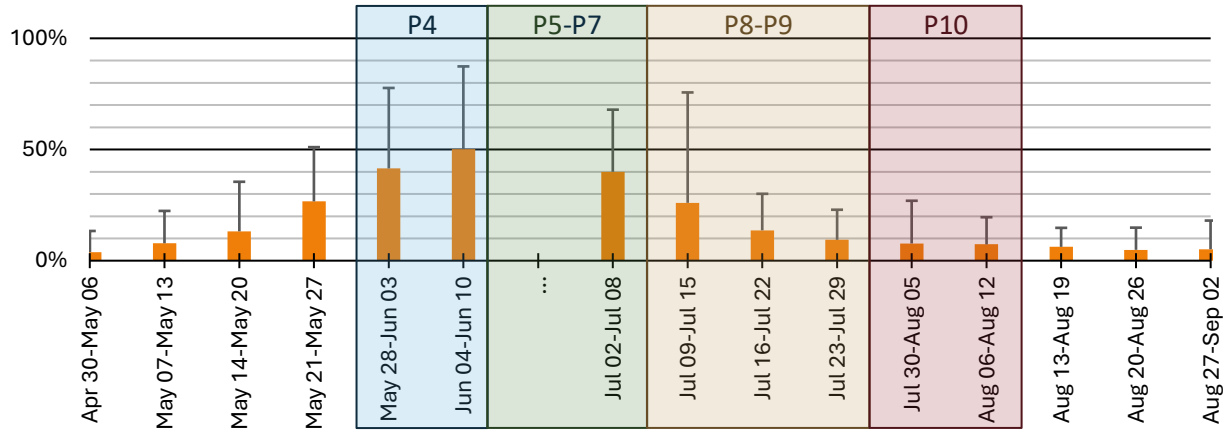


Figure 4. Average proportion and maximum of encounters designated as probable known stopovers (PKS), 2000-23. In most cases these are resident species or local breeders. Observers must have a very high certainty a bird is likely a PKS.

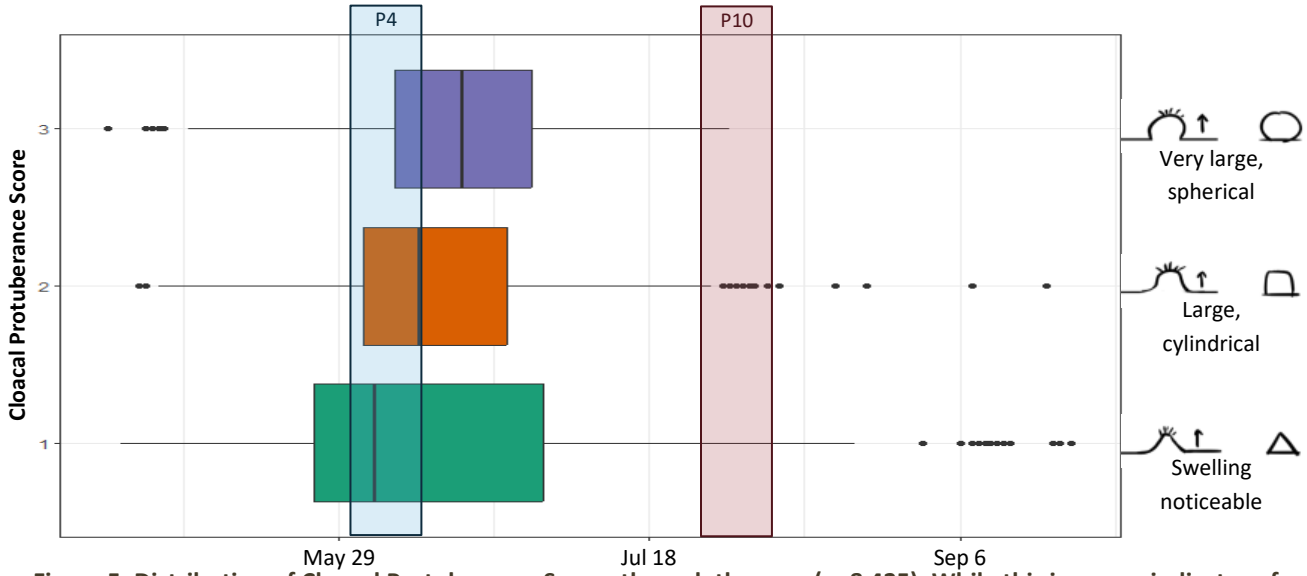


Figure 5. Distribution of Cloacal Protuberance Scores through the year (n=8,425). While this is a poor indicator of the nesting period or breeding success, it provides evidence that males have normally begun breeding attempts by P4.

Risk to data: When does nesting start?

A better indicator of the nesting window is brood patch development. During Period 4 is when brood patches are most frequently given a score of 1, indicating that females are preparing to actively incubate their eggs. By Period 10, the last of the peak of Brood Patches scored as 5 occurs, which is when females regrow the feathers lost from their abdomen and are often beginning their prebasic moults.

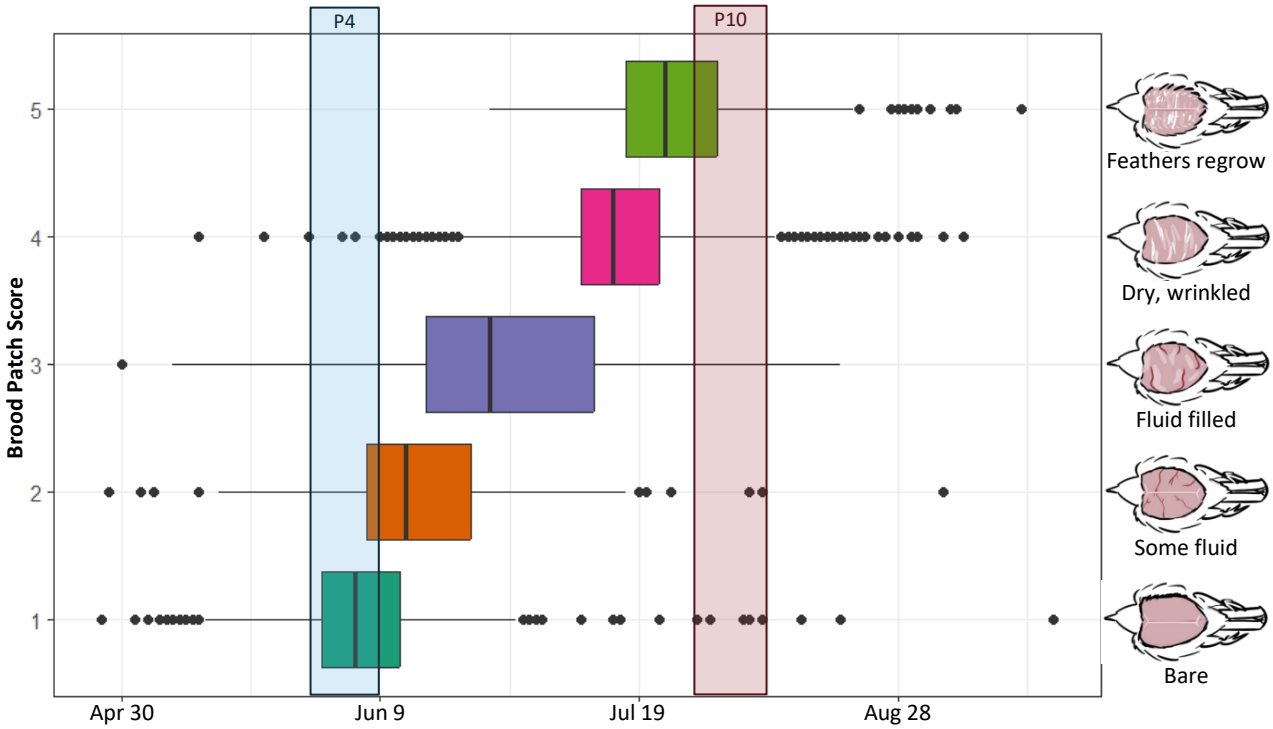


Figure 6. Brood patch box plot – territories established, and nests built by P4 – brood patches mostly deflated and in pin by P10 (n=7,326). Illustration from MAPS Manual (2023).

CONCLUSIONS

Benefits

- Improve bird safety when staff are spread thin (Period 4 through 9 tend to have low capture rates).
- Reduce same-day processing of captures (fewer birds are being captured so fewer birds are likely to be captured on the same day in either MAPS or Migration stations).
- Reduce staff burn out (shortens the period of unpredictable, weather-dependant scheduling in fall when all staff are required to work the same days and still need days off).
- Improve understanding of breeding status of more species.
- Capture the entire breeding window more confidently.
- Reduce data that should probably be discarded (Period 10) in analysis of breeding activity locally since mostly migrants are captured which certainly inflates estimates of local productivity within each site without omitting most P10 captures.

Potential Drawbacks

- Breeding adults captured earlier in the season may increase net avoidance.
- MAPS Protocols state the potential advantage of Period 10 data is to get migration data from farther north breeders, but that is redundant when Fall Migration Monitoring has already begun.

Anticipated Costs

Since there are no anticipated changes to staffing and equipment necessary, no additional costs are expected for this change in schedule. If anything, since it will be easier to craft predictable schedules in the fall, it may reduce currently unavoidable overtime.

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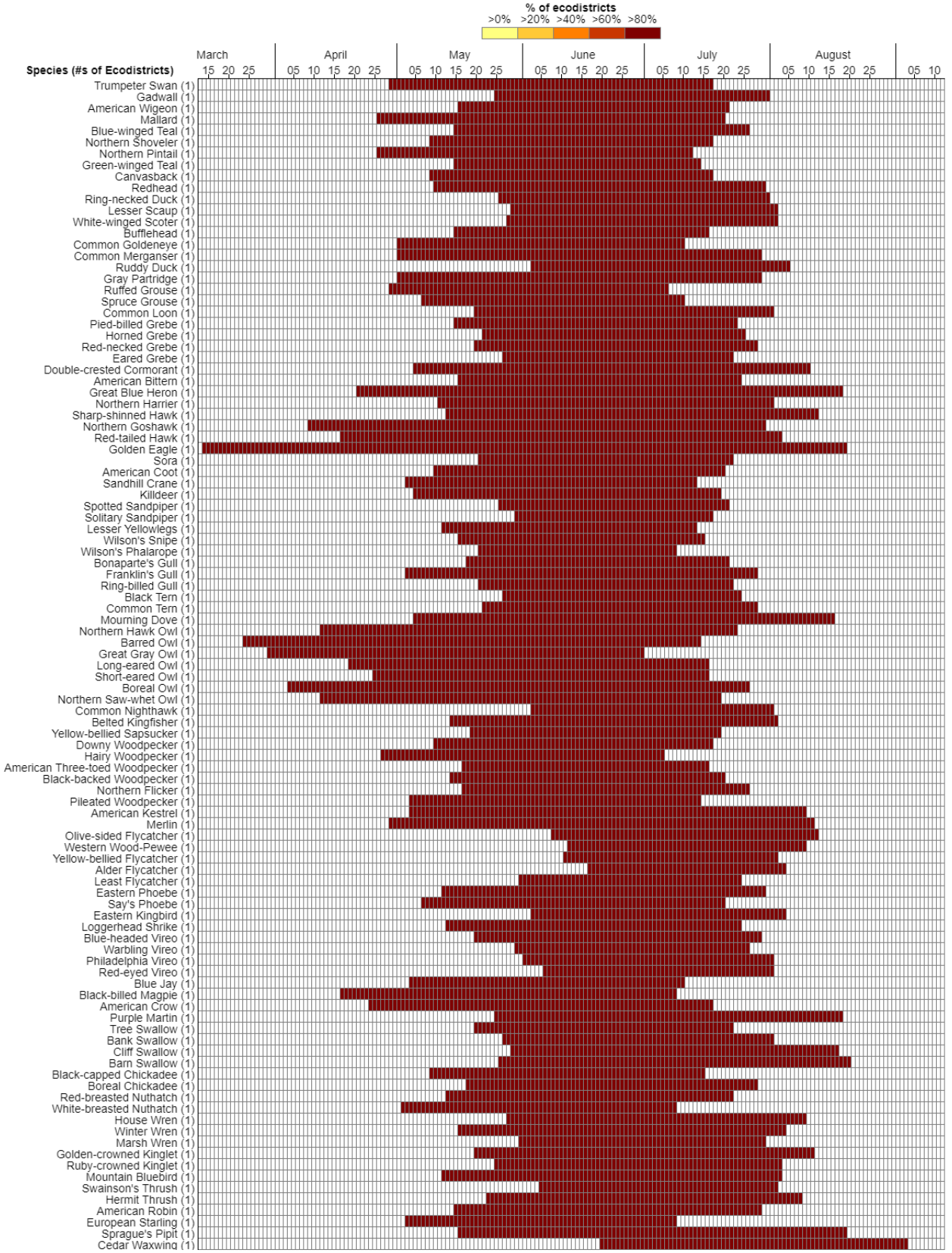
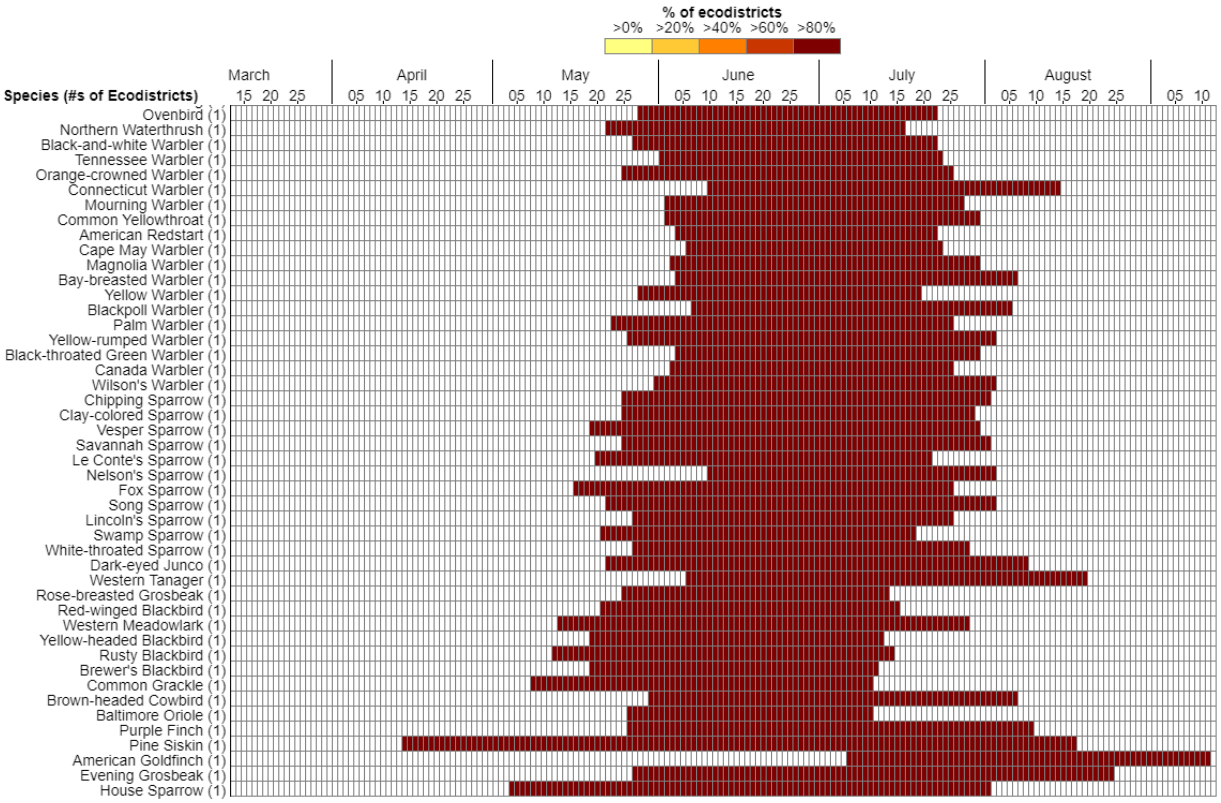
APPENDIX 1: LSLBO NESTING CALENDAR (BIRDS CANADA 2024)




% of ecodistricts
>0% >20% >40% >60% >80%
Species (#s of Ecodistricts)
March
April
May
June
July
August
Ovenbird (1)
Northern Waterthrush (1)
Black-and-white Warbler (1)
Tennessee Warbler (1)
Orange-crowned Warbler (1)
Connecticut Warbler (1)
Mourning Warbler (1)
Common Yellowthroat (1)
American Redstart (1)
Cape May Warbler (1)
Magnolia Warbler (1)
Bay-breasted Warbler (1)
Yellow Warbler (1)
Blackpoll Warbler (1)
Palm Warbler (1)
Yellow-rumped Warbler (1)
Black-throated Green Warbler (1)
Canada Warbler (1)
Wilson's Warbler (1)
Chipping Sparrow (1)
Clay-colored Sparrow (1)
Vesper Sparrow (1)
Savannah Sparrow (1)
Le Conte's Sparrow (1)
Nelson's Sparrow (1)
Fox Sparrow (1)
Song Sparrow (1)
Lincoln's Sparrow (1)
Swamp Sparrow (1)
White-throated Sparrow (1)
Dark-eyed Junco (1)
Western Tanager (1)
Rose-breasted Grosbeak (1)
Red-winged Blackbird (1)
Western Meadowlark (1)
Yellow-headed Blackbird (1)
Rusty Blackbird (1)
Brewer's Blackbird (1)
Common Grackle (1)
Brown-headed Cowbird (1)
Baltimore Oriole (1)
Purple Finch (1)
Pine Siskin (1)
American Goldfinch (1)
Evening Grosbeak (1)
House Sparrow (1)

APPENDIX 2: PERIOD CAPTURE RATES PER STATION