

## **2020 Eastern Loggerhead Shrike Recovery Program - Summary Report**

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## **1.0 COVID-19 PROGRAM IMPACTS**

This year, certain projects and initiatives related to the Loggerhead Shrike Recovery Program have been impacted as a result of the coronavirus disease (COVID-19) pandemic. This section lists initiatives that have been affected and postponed indefinitely due to measures taken to mitigate the spread of the virus.

### **1.1 Field staffing**

Two field biologists were hired in early March with contracts slated to start on April 27. These initial contracts were subsequently cancelled, however, with the Board decision in late March to suspend non-essential fieldwork. The candidate chosen for Napanee was ultimately rehired with a June 1 start date, and her contract will continue through the winter. The original candidate for Carden declined the new employment offer, so the position went to Alisa Samuelson, who was the Carden biologist in 2015 and is embarking on a PhD at Queens University studying shrike. This was a short, 3-month contract (June – August) intended only to complete fieldwork, and conduct limited releases of captive-bred juveniles at the Carden field site. No field assistants were hired this year.

### **1.2 Conservation breeding and release program**

#### ***1.2.1 Cross-border transfer restrictions for U.S. facilities***

Due to uncertainties surrounding border restrictions and closures, U.S. facilities were only able to breed for a small number of juveniles that they had the capacity to hold over winter, to be retained in the captive population. The Smithsonian Conservation Biology Institute (SCBI) and Nashville Zoo at Grassmere had seven and two holding spaces for retained juveniles after September, respectively. Four high-priority pairs at SCBI were consequently bred for a total of 10 young (9 future breed birds and one hand-reared education bird), now retained in the captive population at SCBI and Nashville Zoo. Two temporary spaces at SCBI are currently holding HY retainees destined for the National Aviary in Pittsburgh, PA (see Section 4.5.2 for details).

#### ***1.2.2 Breeding restrictions for Ontario facilities***

Due to uncertainties surrounding seasonal field staffing and government recommendations on non-essential activities, it was decided that Ontario facilities would only breed a small number of pairs, with priority going towards juveniles that could be retained in the captive population. The Toronto Zoo implemented a 12.5% reduction in keeper hours in the spring and was not able to hire seasonal assistants for the summer, so only had the capacity and resources to breed a small number of pairs for the season. African Lion Safari (ALS) was keen to start breeding in the spring, but given the high number of mortalities that occurred in breeding pods (see Section 4.3.1), program staff were reluctant to breed high priority birds onsite. As such, two high-priority pairs that resided at ALS were transferred to Toronto Zoo to breed, while ALS prepared their field enclosures to accommodate low priority pairs. Two lower-priority pairs were eventually given the opportunity to breed in field enclosures at ALS, but did not produce any eggs (see Section 4.2.2).

#### ***1.2.3 Juvenile releases***

Though captive breeding was limited this year, some juveniles were released, since they were excess lower-priority young after desired retention numbers were reached. Though some aspects of juvenile releases were able to be completed by a single staff person (day-to-day care, the releases

themselves, post-release monitoring), others were not be able to be completed, or required involvement from senior LOSH staff or other team members, as detailed below:

- Enclosure preparation needed a team (i.e. field biologist and a senior staff person), so required the use of PPE and social distancing as much as possible
- Banding was conducted independently by senior LOSH staff, so no training opportunities were afforded to field staff
- Radio-tagging was not conducted this year, as it required close contact by two staff people, and would also require a subsequent handling of birds for a pre-release check; efforts were made to reduce bird handling as much as possible, to reduce risk to birds and staff.

A COVID-19 Health and Safety document was drafted to provide clear guidelines to employees while taking into consideration the health and welfare of animals in care.

#### **1.2.4 Napanee release enclosure construction**

New enclosures were to be erected in Napanee on June 9<sup>th</sup> and 10<sup>th</sup> with the assistance of Nature Conservancy of Canada volunteers, but this date has been postponed to next season given the government's recommendations for social distancing. See Section 4.5.5 for more details.

#### **1.2.5 New partner facility involvement**

The National Aviary (Pittsburgh, PA) was eager to become involved with the program late last year, expressing interest in housing multiple breeding pairs as early as spring 2020. Hazel Wheeler and Jane Hudecki conducted a site visit to assess the facility at the beginning of March, at which time it was determined that temporary enclosures could be set up for use in the fall while offsite pod designs were erected for spring of 2021. Since the site visit and onset of the COVID-19 pandemic, the National Aviary has had to reassess its involvement in the program. Plans for erecting breeding pods are now postponed indefinitely, and housing capacity has been reduced. The National Aviary will be able to house one breeding pair for the spring of 2021 in a temporary breeding enclosure. Granby Zoo (Granby, QC) has also expressed interest in becoming involved with the breeding program, but owing to complications resulting from the COVID-19 pandemic is unable to commit to taking on breeding pairs for the foreseeable future.

### **1.3 Wild population surveys and monitoring**

#### **1.3.1 Volunteer surveys**

The community science "Adopt-A-Site" program uses volunteers to survey assigned patches of LOSH habitat three times from April 15 to June 30. Twenty-four volunteers had expressed interest in the program in early March, but WPC made the decision to cancel the program in early April, and all volunteers were contacted on April 9 with that notice. Though a restart of field work in June may have allowed for volunteers to survey during the final window (June 15-30), the Lead Biologist prioritized work with field staff, so volunteers were not redeployed this year.

#### **1.3.2 Staff surveys and monitoring**

Field biologists typically begin surveys of the wild LOSH population at the start of May, but this activity was delayed until June, with a single biologist working in each core. As such, data collection this year was limited relative to what would be achieved in a typical season. Once staff were in place, surveys focused on the highest priority sites and gathering data on reproductive status and success, given the

shortened season. Surveys also had to be reduced in Carden when captive juveniles were transferred to field enclosures, since there was only a single staff person on site. In Napanee, gaps exist in surveys and monitoring on the week of July 20 when the Napanee biologist was on medical leave, and from August 10 onwards, when the field biologist left the field to focus solely on data entry and reporting. The remaining priority fieldwork in Napanee (surveys of solar generation sites and habitat enhancement sites) were completed by the Lead Biologist, with limited nest monitoring on other sites as time allowed.

### **1.3.3 *Trapping and banding***

Trapping and banding of wild birds could be completed independently by both Hazel Wheeler and Amy Chabot, so this activity was not halted by physical distancing measures. As a certain level of monitoring is required to inform timing of trapping attempts, this activity was not commenced until field staff were working, and attempts were dictated by the results of survey and monitoring efforts. As such, though trapping was still able to occur, it was on a smaller scale than a typical field season (see Section 3.2 for details).

### **1.3.4 *Survey agreements with solar developers***

WPC has contracts with two solar companies (BluEarth Renewables and Kingston Solar) to conduct surveys and monitoring on their lands, with those contracts totaling approximately \$35K of program funding with opportunities for the work to continue in future years. Both companies were contacted in April by the Lead Biologist and made aware of the delayed nature of this year's fieldwork. BluEarth Renewables (who manage the Loyalist Solar Project) contacted the Ministry of Environment, Conservation, and Parks (MECP) to alert them to the impacts of COVID-19 on the timing of field activities, and WPC provided the province with a modified workplan for post-construction monitoring this year. In a normal year, habitat enhancement sites would be visited weekly in May, twice more in June, and then once a month in July in August (assuming no birds are found—any shrikes observed will cause a shift to more frequent visits). Since the field season was delayed, the modified workplan included weekly habitat enhancement site visits in June, two more visits in July, and one in August—again, unless shrikes are found. MECP confirmed that this workplan would still meet monitoring requirements for BluEarth's Overall Benefit Permit, so fieldwork for this contract was initiated as soon as the Napanee biologist was in the field.

Kingston Solar did not contact MECP, but independently approved the delayed workplan for WPC.

## **1.4 Public education and outreach**

The majority of scheduled outreach events were cancelled this year as they in-person displays or presentations. See Section 5.0 for details.

## **2.0 HIGHLIGHTS FROM THE 2020 FIELD SEASON**

### **Wild population**

- 16 wild pairs (11 in Napanee, 4 in Carden, 1 in Smiths Falls)

- 41 wild young fledged (28 in Napanee, 13 in Carden)

- 2 unmated single birds, both in Napanee

- At least 24% of all birds detected in the wild this year were captive-bred

### Captive population

- 9 initial pairs, and 0 repairing attempts
- 6 pairs fledged young
- 23 fledglings survived to release or retention
- 1 fledgling died while in captivity
- 15 fledglings retained
- 7 fledglings released; 0 with radio tags

### Status of the captive population (as of November 13, 2020)

- 66 birds in captivity
- 61 breeding adults
- 1 unreleasable non-breeding bird
- 1 retired breeding adult, housed at a U.S. facility
- 3 hand-reared education birds (2013HY bird at Carolina Raptor Centre, 2014HY bird at Toronto Zoo, 2020HY bird at Smithsonian Conservation Biology Institute)

## 3.0 WILD POPULATION

### 3.1 Monitoring

Sixteen pairs of Loggerhead Shrike (LOSH) were confirmed in Eastern Canada this season: 11 in Napanee, 4 in Carden, and 1 in Smiths Falls (Fig. 1). Napanee continues to hold steady at 11 pairs for the third year running, but Carden showed a slight contraction, decreasing by one pair compared to 2019. Sporadic isolated pairs are becoming something of a pattern near the Ontario-Quebec border, as at least one pair has been seen in that region in three of the last four years.

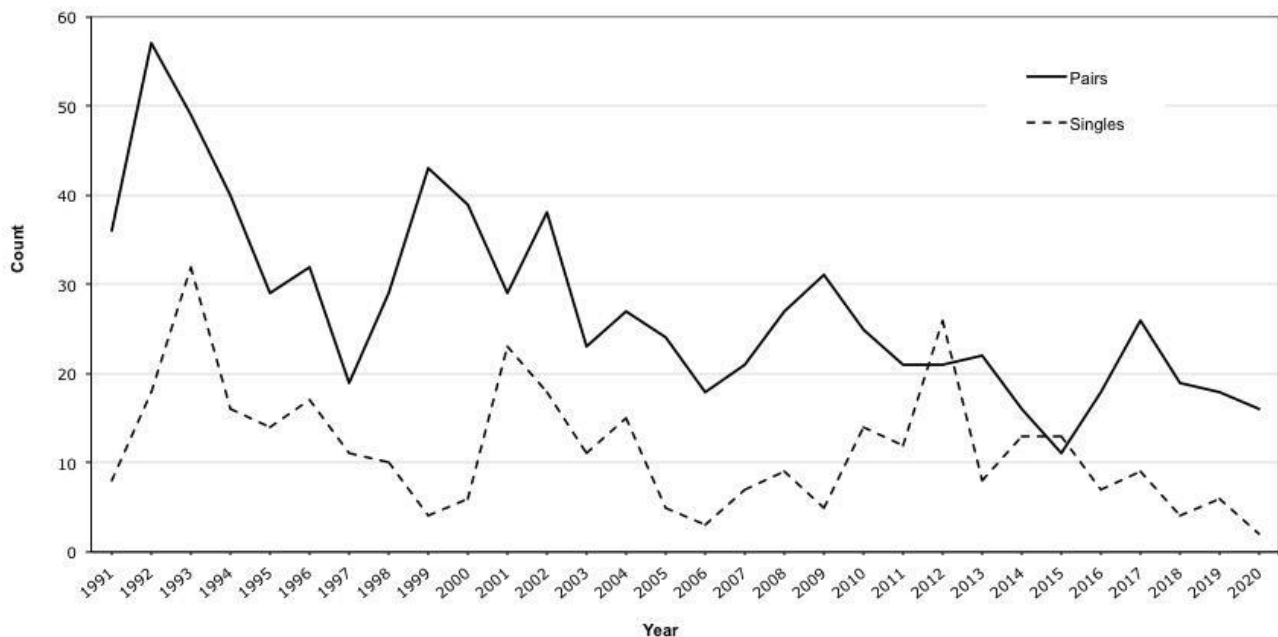


Figure 1. Number of Loggerhead Shrike pairs and single birds in Ontario and Quebec

All pairs observed in Carden this year fledged young, as did all but one pair in Napanee. Nesting success was also relatively high, with only one observed nest failure each of the Carden and Napanee cores (80% and 91% nest success rate, respectively). Forty-one fledglings were confirmed this year (28 in Napanee, 13 in Carden), and the average number of fledglings per successful nest (2.9) showed a modest increase from 2019 (2.4). This number is almost certainly an underestimate, however, as staff observation of one nest started after young had already fledged. Further, survey and monitoring effort was generally lower than usual this year because of the late start to the season and the lack of field assistants in each core. This is especially true in Napanee, where surveys and monitoring on patches associated with two solar developments had to be prioritized to meet WPC's contractual obligations.

The breeding status and outcome of the isolated pair in Smiths Falls was unknown this season as observations were largely completely by local volunteers. However, this pair did persist on territory until August, so though a nest tree was never confirmed there were likely breeding attempts.

There was one attempted double-brood this year, though the second nesting attempt of this pair in Carden failed at the egg-laying or early incubation stage (see Section 3.1.3).

In addition to breeding pairs, at least two single birds were confirmed this year, both in Napanee. Single birds were actually encountered on four different sites, but only one of these birds was banded, allowing definite identification. The remaining birds were all unbanded, or band status was undetermined; given the timing and location of the sightings they could not confidently be counted as three separate individuals, so they are conservatively counted as one.

Using conservative counts of confirmed pairs and single birds, the observed LOSH population in Ontario was 33 adults this year. This is a significant drop from the 42 seen in 2019, but as mentioned previously, this is likely an underestimate of actual population size.

### **3.1.1 *Returning captive-bred birds***

Eight captive-released birds were confirmed returning to Ontario breeding grounds this year (Table 1). These captive-origin birds made up 24% of the population of adult shrike in eastern Canada.

Five of these birds were observed as part of breeding pairs with wild birds, two paired with birds of unknown origin either because the mate was never seen or its band status was unconfirmed, and one was a single bird. Five of the seven birds in confirmed pairs bred successfully, with at least 12 fledglings confirmed (29% of all wild juveniles seen in Ontario); however, this fledgling count may be an underestimate, as one successful nest was confirmed after young had already fledged. Of the remaining two pairs, the outcome of one (in Smiths Falls) was unknown as regular monitoring by WPC staff was not possible, and the second pair's nest failed due to mammalian predation (see Section 3.1.3). The female of the latter pair was the one of captive origin, and she was not seen again following the nest failure.

Five of the returning birds were confirmed as 2019-releases (7.8% return rate), and the remaining three were 2018-releases. One of those 2018 birds was also seen in 2019, but with the addition of the two novel 2018-releases, the cumulative return rate for that year's cohort is 6.9% (up from 5.4% in 2019).

**Table 1.** Captive-bred birds observed in 2020

| Core         | Band combination        | Hatch year | Hatch site | Release site     | Sex | Paired? | Breeding outcome          |
|--------------|-------------------------|------------|------------|------------------|-----|---------|---------------------------|
| Napanee      | SI/DB:DB/WH             | 2018       | ALS        | Napanee          | M   | Y       | 2 fledglings              |
|              | DB/SI:WH/DB             | 2018       | TZ         | Napanee          | M   | Y       | 2 fledglings <sup>a</sup> |
|              | DB/SI:YE/? <sup>b</sup> | 2018       | MRC        | n/a <sup>b</sup> | F   | Y       | 2 fledglings              |
|              | LG/SI:OR/WH             | 2019       | SCBI       | Carden           | F   | Y       | 2 fledglings <sup>c</sup> |
|              | SI/LG:OR/DB             | 2019       | SCBI       | Carden           | F   | Y       | Nest predated             |
|              | SI/LG:WH/DG             | 2019       | TZ         | Napanee          | F   | Y       | 4 fledglings              |
|              | SI/LG:WH/OR             | 2019       | TZ         | Napanee          | F   | N       | --                        |
| Smiths Falls | LG/SI:OR/DG             | 2019       | NZG        | Carden           | U   | Y       | Unknown <sup>d</sup>      |

<sup>a</sup> Nest not located; fledgling count from seeing one adult with fledglings, so assumed to be an underestimate

<sup>b</sup> Final band either OR or RD, which were two females from the same clutch at MRC. YE/OR escaped at MRC just prior to transfer to release site; YE/RD released in Carden.

<sup>c</sup> Only seen once after fledging, so may have been predated post-fledge

<sup>d</sup> Pair observed by volunteers; nest location and breeding outcome never determined

### 3.1.2 Nest checks

Four nest checks were performed this year (three in Carden, one in Napanee). One of these checks in Carden was conducted at a nest in that was suspected to have failed, and revealed an empty nest that supported depredation of nestlings. However, two juveniles—less than one week out of the nest based on tail length—were observed at the next monitoring visit, so what was thought to be a predation event was simply a nest fledging earlier than expected.

The remaining three nest checks were conducted at two active nests to inform trapping attempts. Regular behaviour was observed following all checks, and both nests successfully fledged young. However, one nest that had six nestlings only fledged two young and fledge appeared to be premature based on the estimated nestling age, suggesting there may have been an incident that forced the young out of the nest early (see *Nest failures* for more details). Adult behaviour at this nest was normal one and four days after the nest check, so it is unlikely that this early fledge was related to that check. Full details of all nest checks can be found in the Carden and Napanee reports.

### 3.1.3 Nest failures

Two nest failures were observed this season, one each in Carden and Napanee. However, It should be noted that this number may be an underrepresentation of the actual number of nest failures that occurred, as the late start to the field season precluded any observation of early nesting attempts.

The nest failure in Napanee was due to mammalian predation, and was witnessed by the field biologist. The predator was either a red squirrel (*Sciurus vulgaris*) or small weasel (*Mustelidae* spp.), and though both adults were alarm calling and mobbing the predator as it approached the nest, it was not deterred. The adults continued to alarm call and mob the predator while it was at the nest, but eventually their activity slowed. The predator was not seen exiting the nest site during the observation period, and the adults were not seen on this territory on any follow-up observations. Field staff did not have permission to access this property, so only roadside observations were possible at this nest.

The nest failure in Carden also occurred on a site to which staff did not have access. This was the second nest of a pair that had previously fledged two young, and it appeared to have failed during the egg-laying or early incubation stage. Blue Jays (*Cyanocitta cristata*) were frequently seen and heard

nearby and are a potential cause of failure, but as site access was not permitted these suspicions could not be confirmed.

### **3.2 Banding**

Four wild LOSH were trapped and banded this year, all in Napanee by Amy Chabot. All birds were adults in breeding pairs. Additionally, one captive-origin adult was trapped in Napanee, but as this bird had a full band complement it was simply measured and released. All newly-caught birds were banded with OR/SI on right, to indicate wild birds caught in 2020. Regular behaviour was observed at all territories the day after trapping activities.

Following all trapping, 52% the observed adult LOSH population was banded. Band status was confirmed for all birds except two individuals. One of these may have been banded SI on the left, making it a captive-origin bird, but the lack of property access on this site made observations more challenging so it was never confirmed. The second bird was not directly observed, but presumed through observation of a single adult with fledglings on an isolated site later in the season. Though the nest was not located for this family group, the mate was assumed by virtue of the fledglings.

### **3.3 Development and critical habitat**

#### **3.3.1 Post-construction monitoring agreement with BluEarth Renewables**

This year marked the second year of a five-year agreement with BluEarth whereby WPC would conduct surveys of two Loyalist Solar Project Generation Sites (SGS), and four Habitat Enhancement Sites (HES) to assess if and how LOSH use these HES, and the areas in and around the generation site infrastructure. SGS surveys will continue for one more year, and HES surveys through the 2023 field season, with a contract fee of approximately \$22K per year through 2021, then approximately \$10K per year for the remaining two years. This contract will help support field activities in the Napanee core through the 2023 field season.

This second year of surveys again yielded a high level of LOSH activity on Loyalist Solar properties, with a pair holding a nesting territory just outside of each SGS. One of these family groups regularly used the perimeter fencing as hunting and impaling sites, and later in the season was also seen using the fencing of the second SGS, approximately 750 m from their nest site. Though the other family group was not seen using SGS infrastructure, impaled items were observed on the perimeter fencing adjacent to their territory, so some use can be assumed.

Two pairs nested on nearby HES, both of which successfully fledged young. Interestingly, the family group from the HES closest to one of the generation sites was regularly seen using the SGS perimeter fencing for hunting once the fledglings were independent. Ultimately, three family groups in the area were observed in and around the SGS, and using site infrastructure for hunting. Further, American Kestrels (*Falco sparverius*) were also regularly seen hunting over the panel areas, which suggests the SGS may create relatively good quality foraging habitat, either through increased prey abundance, or more efficient hunting because of the limited vegetative cover. This is a topic that could merit further study.

Full details of all activities related the Loyalist Solar Project can be found in the *Loyalist Solar Project – Post-construction Monitoring, Year 2020 Report*, available upon request.

### **3.3.2 *Renewed agreement with Kingston Solar***

The Kingston Solar Project, undertaken by Samsung and completed in 2016, impacted two shrike habitat patches that met both provincial and federal criteria for Critical Habitat. As part of the Overall Benefit Permit associated with this project, WPC was contracted to release 40 captive-bred LOSH in Ontario (completed in 2016), and to survey two habitat enhancement sites (HES), established by Kingston Solar in consultation with the MNRF, for five years after construction. Surveys were completed in 2016, after which point communication with the company halted, and as the signed survey agreement only applied to 2016, no further surveys took place.

John Woomert from Kingston Solar contacted WPC again in early 2020, and was of the understanding that surveys had continued in the intervening years. Following a discussion with Hazel Wheeler and Jessica Steiner, a new agreement was struck for WPC to recommence surveys in 2020, to be completed annually until 2023 to satisfy the requirement of five years of monitoring on HES. This contract is worth \$10K annually. No LOSH have been located on established HES thus far, and one of the sites (~15 ha), which was of questionable habitat quality at its inception has now become heavily overgrown. Intensive management has been recommended to re-establish this site as LOSH habitat.

In addition to the captive releases and establishment of HES, Kingston Solar is also required to support a research project on the species. WPC submitted a research proposal in January 2017, which was the last correspondence until 2020. A new research proposal was submitted in July 2020 that would attempt to identify LOSH wintering grounds, assess the quality of that wintering habitat, assess the level of threat from habitat loss and fragmentation on the breeding grounds, and evaluate factors affecting wild juvenile post-fledgling mortality. No response has yet been received, so attempts will be made to reignite discussion over the winter.

## **4.0 CAPTIVE POPULATION**

### **4.1 Status of the captive population**

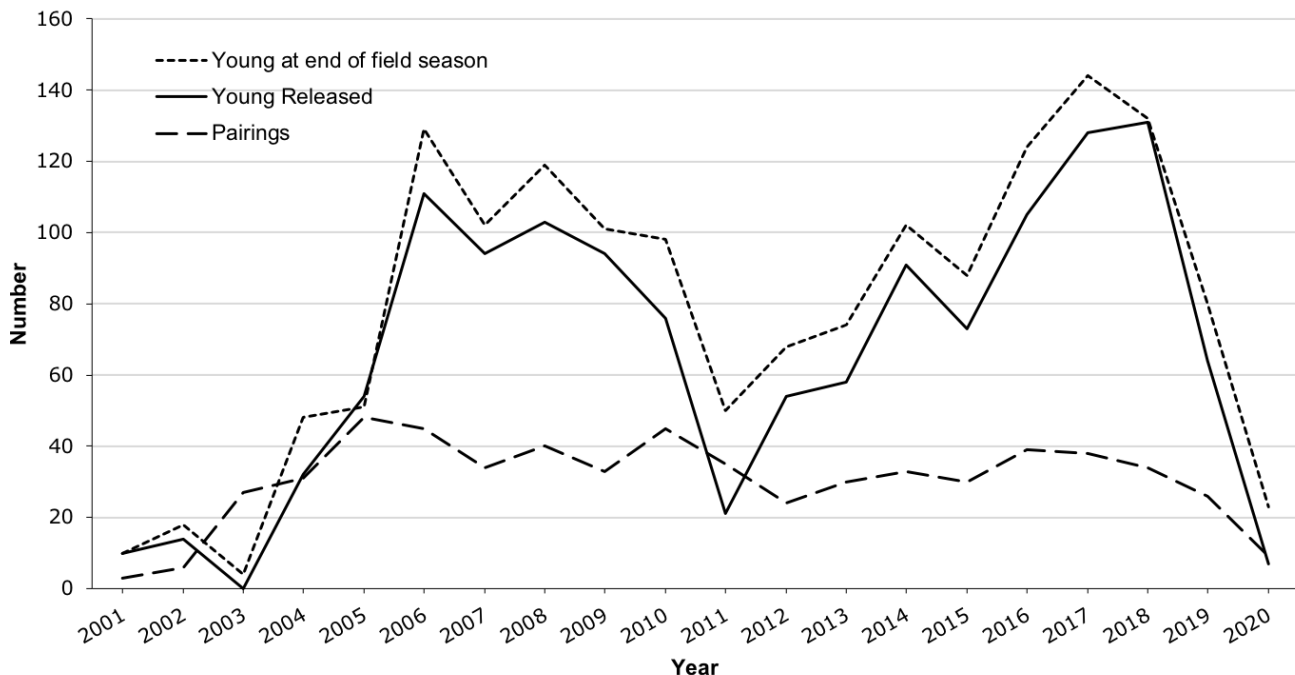
As of November 16 there were 66 birds in the captive population (including partner facilities in both Canada and the U.S.). Sixty-one of these birds are considered breeding stock, one is a retired bird that has aged out of the breeding population, three are education/exhibit birds, and one is a non-releasable non-breeding adult, retained from the 2019 breeding season. The current breeding stock includes: 48 birds that are 5 years or younger (HY 2015-2020), 12 birds that are 6-10 years old (HY 2010-2014), and one over 10 years old. Fifteen juveniles were retained this year following a decrease in breeding stock from off-season mortalities at African Lion Safari. One juvenile was hand-reared at the Smithsonian Conservation Biology Institute and will be housed there as an education and outreach ambassador.

### **4.2 Activities at partner facilities**

#### **4.2.1 *Captive breeding summary***

Owing to limitations caused by the COVID-19 pandemic, only 9 pairs (0 repairs) were introduced and given the opportunity to rear young across partner facilities. Six of these pairs produced 23 young that survived to release or retention (Fig. 2). Seven of these young were released into the wild at our Carden field site. Fifteen HY birds were retained, with priority going towards holding back males to rebalance the captive sex ratio following losses sustained in the off-season (see Section 4.3.1). One

bird was hand-reared to be retained as an education ambassador, and one fledgling died before the end of the season (see Section 4.3.2).



**Figure 2.** Captive LOSH pairings, young surviving to end of season, and young released

#### 4.2.2 Breeding facility results and wintering status

##### Ontario Facilities:

*African Lion Safari (ALS)*: 0 of 2 pairings fledged young this year. Pairs were introduced late in the season due to attempts to mitigate fatalities at the facility (see Section 4.3.1), as well as staffing limitations caused by the pandemic. While both introduced pairs exhibited courtship behaviour, neither laid eggs by the breeding cut-off date. ALS currently houses 13 breeding birds.

*Toronto Zoo (TZ)*: The Toronto Zoo implemented a 12.5% reduction in keeper hours in the spring with no ability to hire seasonal assistants due to the pandemic, so was only able to accommodate four breeding pairs for the summer. 3 of 4 pairings fledged 12 young (all from 1<sup>st</sup> clutches); seven were released in Carden. One retained fledgling died before the end of the season (see Section 4.3.2 for details). This facility is currently housing 18 breeding birds and one education bird on display.

##### U.S. Facilities:

*Smithsonian Conservation Biology Institute (SCBI)*: 3 of 3 pairs fledged 10 young (all from 1<sup>st</sup> clutches). All were retained in the captive population due to cross-border transfer limitations resulting from the COVID-19 pandemic. One of these birds was pulled at four days to hand-rear for use in outreach education. SCBI is currently housing 24 breeding birds.

*Nashville Zoo at Grassmere (NZG)*: Nashville Zoo did not have any high priority pairs, so no breeding occurred at this facility in 2020. This facility is currently housing 4 breeding birds, one retired non-breeding adult, and one unreleasable non-breeding bird.

#### **4.2.3 Non-breeding facility status**

*Carolina Raptor Centre (CRC):* 'Pierce'— the hand-reared education bird raised at Mountsberg Raptor Centre— was transferred to Carolina Raptor Centre in January after Mountsberg withdrew from the Recovery Program at the end of last year. 'Pierce' now lives at CRC as a permanent education ambassador.

### **4.3 Mortality**

#### **4.3.1 Adults**

We had 13 adult deaths in the captive population this year (as of November 13), all at Ontario facilities.

*African Lion Safari:* Two males and two females died in breeding pods and adjacent overwintering enclosures early in the year; one necropsy revealed head trauma as the likely cause of death, the others yielded no abnormal findings. Three additional males and one female died within a two-week period in the spring, all after sustaining various forms of head trauma in breeding pods and overwintering enclosures. It is suspected that these fatalities were all attributed to a local predator antagonizing the birds from outside their enclosures (no evidence of entry). Efforts are being made to identify the culprit through extensive camera surveillance and live trapping.

Supplementary visual barriers and refuge areas (cedar boughs and other evergreen branches) were added to enclosures in early spring to provide birds with extra cover, which did not seem to make a difference in mortality events. Birds were subsequently moved to field pens for the summer while breeding pods and overwintering enclosures were surveilled and modified, which resulted in a marked decrease in mortality numbers over the summer months. Foam and coroplast reinforcements were added to outdoor access doors in breeding pods and overwintering enclosures early this fall (Figure 4), since it is suspected that birds were sustaining collision injuries in a panicked attempt to access the inside portions of their enclosures when antagonized. These fixtures should encourage birds to slow to a safe speed upon entry and exit, while reinforced edges should prevent any collision injuries that might otherwise be sustained while flying through the doors. Birds were moved back to the fortified overwintering spaces in November and will be monitored carefully over the winter months. [Nite Guard](#) predator deterrent lights will be erected over the next several weeks near breeding pods and overwintering enclosures as an added precaution.

One additional male and one female were found on the ground of their field enclosures over the summer; necropsies did not reveal anything abnormal. A second female was found dead in late September; the necropsy revealed pulmonary aspergillosis as the likely cause of death.

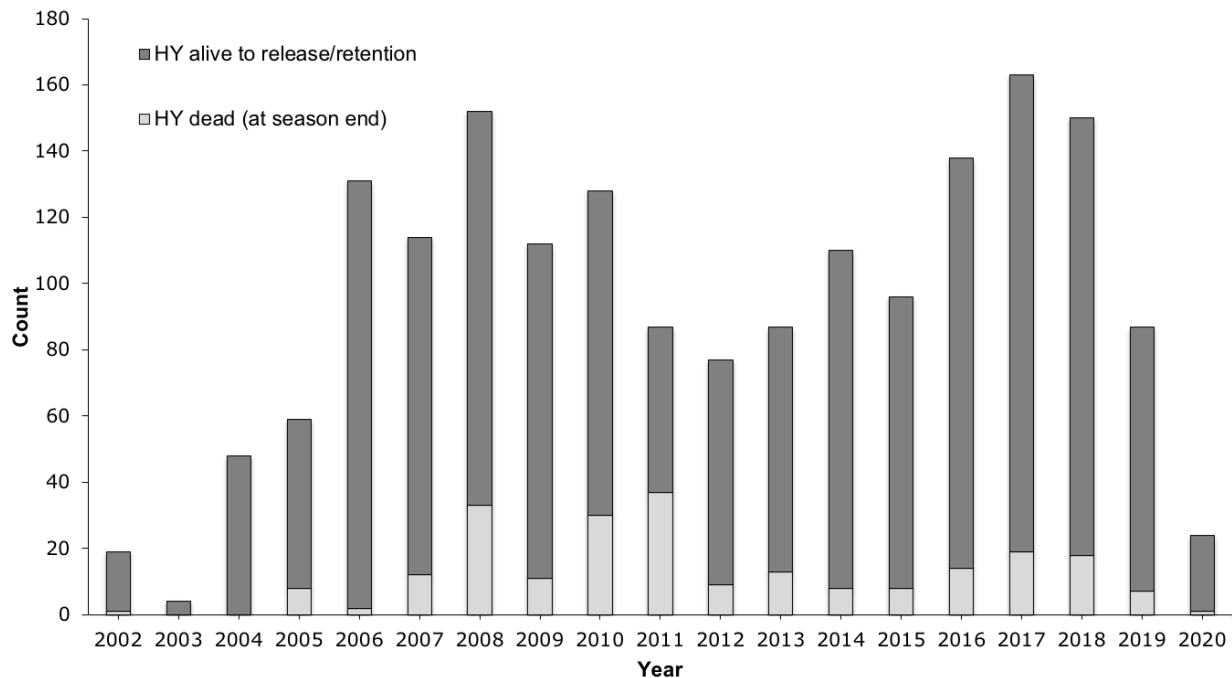


**Figure 3.** Foam and coroplast reinforcements to in/out access doors at ALS

*Toronto Zoo:* One male was found on the ground of its enclosure with severe bilateral conjunctivitis the morning after transfer from African Lion Safari. The bird was brought to the zoo's ICU and died later in care. The cause of the swelling has not yet been determined, but it was revealed during necropsy that the bird's body condition was extremely poor, which was likely a contributing cause of death. One additional female was removed for an enucleation procedure of her left eye and died in care during recovery.

#### **4.3.2 Fledglings**

One fledgling died during the breeding season this year, which is approximately 4% of all those produced. Although the total number of fledglings produced was low, this is the lowest within-season rate of mortality we've seen since 2006 (when it was approximately 1%; Fig. 3). The fledgling's death occurred at Toronto Zoo, when it was found on the ground of its enclosure during morning rounds. A necropsy was performed on-site, yielding no remarkable findings.



**Figure 4.** Annual number of fledglings that died or survived to release or retention

#### **4.4 Captive-bred releases**

##### **4.4.1 Banding**

Twenty-one captive juvenile shrikes received stainless steel bands this season (7 released young and 14 retained young). Released birds that received colour-bands were given a combination that included OR/SI on the left leg to identify them as a 2020 release bird. All birds received some sort of temporary colour-marking (Sharpie) to aid in individual identification while in the release enclosures and during post-release monitoring.

##### **4.4.2 Radio tags**

Radio-tagging was not conducted this year in an effort to prevent the spread of COVID-19. Radio-tagging requires close contact by two staff people and subsequent handling of birds for pre-release checks, and every effort was made to reduce bird handling as much as possible this season to reduce risk to birds and staff.

##### **4.4.3 Post-release movements**

Field staff did not see many released juveniles outside of the Carden field site this year, though one juvenile was spotted just south of Orillia on August 31st by a member of the public. The bird was identified as OR/SI:DB/RD, who had been released eleven days prior. Details on tracking results from last year's tagged birds can be found in Section 8.1.3.

#### **4.5 Population management**

Andrea Morgan (African Lion Safari) continued in her role of studbook keeper in 2020, and Colleen Lynch (Consulting Population Biologist with the Population Management Centre) was once again

contracted by WPC to produce a Breeding and Transfer Plan for the season, including release prioritization and repairing recommendations throughout the breeding season.

#### **4.5.1 Program capacity**

Mountsberg Raptor Centre ended its involvement in the program at the end of 2019; birds were redistributed to partner facilities in early 2020. Excluding holdings for education/outreach birds, holding capacity across all project partners heading in to 2021 will be 76 birds. Details for increasing program capacity through the addition of new partners can be found in Section 4.5.2.

#### **4.5.2 New partner facilities and changes at existing facilities**

Progress has been made over the past year with regards to expanding our network of breeding facilities with new partners. The National Aviary (Pittsburgh, PA) was eager to become involved with the program late last year, expressing interest in housing breeding pairs as early as spring 2020. Hazel Wheeler and Jane Hudecki conducted a site visit to assess the facility at the beginning of March, at which time it was determined that temporary enclosures could be set up for use in the fall while an offsite pod could be erected for spring of 2021. Since the site visit and onset of the COVID-19 pandemic, the National Aviary has had to reassess its involvement in the program, and is able to adjust their capacity to house one pair for the spring of 2021 in a temporary breeding enclosure. Transfer plans are currently underway and should take place in late 2020 or early 2021.

Granby Zoo (Granby, QC) has also expressed interest in becoming involved with the breeding program, but owing to complications resulting from the COVID-19 pandemic is unable to commit to taking on breeding pairs for the foreseeable future. Granby Zoo is still interested in collaborating with the Recovery Program and will help develop French outreach materials on Loggerhead Shrikes until they are able to house breeding pairs. Little Ray's Reptile Zoo (Ottawa, ON), which came on as an overwintering facility in 2014, expressed interest in housing breeding pairs for this year as they have recently moved to a new location with more outdoor space. Hazel Wheeler and Amy Chabot conducted a site visit last summer to assess the new location for this year, but owing to limited resources and complications resulting from the COVID-19 pandemic Little Ray's will be unable to commit to a partnership for the foreseeable future.

There may also be an opportunity to have breeding/wintering holdings at the Earth Rangers Centre (Woodbridge, ON) that would be managed by WPC staff, though these discussions are still quite preliminary. Additionally, after the death of their exhibit bird last summer, the Carolina Raptor Centre (Huntersville, NC) has taken 'Pierce', the hand-raised bird from Mountsberg, for use as an exhibit and education bird.

The Toronto Zoo is still waiting to fill their vacant head vet position, at which point there should be more clarity on Toronto Zoo veterinary involvement in the LOSH program. A permanent Lead Bird Keeper was hired this summer and will be working out of the Wildlife Health Centre under the direction of Tasha Long. The addition of a permanent staff member for shrikes at the Toronto Zoo will create many opportunities for addressing outstanding husbandry issues and allow for increased communication between Zoo personnel and WPC staff.

#### **4.5.3 Husbandry and studbook management tools**

Bird records for the captive population are now being maintained in the husbandry module of Species360's Zoological Information Management System (ZIMS). Wildlife Preservation Canada

became a Species360 member in the spring of this year for ZIMS access and will be paying a discounted annual membership fee of USD \$1100. WPC is currently taking on data management for African Lion Safari and any new facilities that do not want or need their own access to ZIMS; all other existing partner breeding facilities are Species360 members.

The studbook was also migrated from PopLink to ZIMS Studbooks in the summer of this year after WPC became a Species360 member. ZIMS Studbooks is a more powerful program than PopLink with greater integration capabilities as it can be accessed across all facilities with a Species360 membership. Andrea Morgan (the acting studbook keeper), Colleen Lynch (Consulting Population Biologist with the Population Management Centre), and WPC personnel are now able to access online studbook data simultaneously.

Becoming a Species360 member and gaining access to Species360's Zoological Information Management System has created innumerable opportunities to improve management of the captive population. Husbandry records and reports are easily generated and shared between partner breeding facilities, which has streamlined and improved inter-facility and cross-border transfers considerably. Medical records, measurements, enclosure histories, studbook data, and animal details are now all in one place, which can be accessed across facilities and by multiple users at the same time. Any information entered on Loggerhead Shrikes will now contribute to a shared global resource pool for the species, which will help to inform conservation practices and improve care and welfare for captive Loggerhead Shrikes.

#### **4.5.4 Husbandry manual updates**

The standard operation procedure document for the captive program, the "Husbandry manual for the care, breeding, and maintenance of captive Loggerhead Shrikes (*Lanius ludovicianus migrans*)", was updated in 2018 to include all captive-breeding protocols required for ex-situ breeding. However, the document had remained in draft form awaiting decisions on Toronto Zoo veterinary involvement in the program (see Section 4.5.2). In 2020, the decision was made to finalize husbandry manual as a working document that will be updated periodically as new information and techniques become available. The finalized document is now available through Google Drive, in the 'LOSH Captive partner files' shared folder.

#### **4.5.5 Napanee release cage construction**

The Napanee field site currently has two LOSH release cages, which limits the number of birds that can be released in that core. Work started in 2019 to identify locations for additional cages on this site, which would greatly increase the release capacity in Napanee and allow for greater parity between core areas, as Carden typically has four cages functioning for releases each year.

The Nashville Zoo at Grassmere has generously donated USD \$5000 to cover material costs for one new enclosure, and African Lion Safari has recently received funding from the Stephen L McDonough Family Wildlife Conservation Fund in the amount of USD \$8,891 to cover material costs for the second enclosure, food and accommodation for staff, and enclosure panel transport to the release site. African Lion Safari has also agreed to offer in-kind support by constructing panels and absorbing associated labour costs.

Enclosures were intended to be erected in Napanee on June 9<sup>th</sup> and 10<sup>th</sup>, 2020, with the assistance of Nature Conservancy of Canada volunteers, but this date has been postponed to spring 2021 at the

earliest given the government's recommendations for social distancing. Panel construction is scheduled to begin in the early spring of 2021, and the cage will be assembled in Napanee as soon as weather allows.

## **5.0 PUBLIC EDUCATION AND OUTREACH**

### **5.1 Public presentations**

The LOSH program was scheduled to be the subject of two public presentations this year:

- *Special Guest Presentation, Wildlife Rescue Exhibit* (Royal Botanical Gardens April 5<sup>th</sup>)
- *Special Guest Presentation, Avian Scientific Advisory Group* (Association of Zoo and Aquariums Midyear Meeting)

Both presentations were cancelled due to the COVID-19 pandemic.

### **5.2 Events**

LOSH program staff were scheduled to participate in the following events in the spring, which were cancelled due to the COVID-19 pandemic:

- Hawkwatch Open House (Beamer Memorial)
- Royal Botanical Gardens Special Biodiversity Celebration (Royal Botanical Gardens Arboretum)

One outreach event did occur, however: Hazel Wheeler, along with artists Richard Ibghy and Marilou Lemmens, was part of a panel discussion on July 21 hosted by the Wave Hill Public Garden and Cultural Centre in The Bronx, NY. The discussion followed a screening of Ibghy and Lemmens' video "Banding Young Eastern Loggerhead Shrikes in the Carden Alvar", which was recorded during the 2019 season, and included in their multimedia series, "The Violence of Care". The discussion was broadcast on Facebook live, and the recorded video remains accessible through the Wave Hill website (<https://www.wavehill.org/calendar/eco-urgency-ibghy-lemmens>).

### **5.3 Media**

The LOSH recovery Program was mentioned in the following media pieces:

- "Minimalist art that speaks for the birds" (Gregory Volk, January 18<sup>th</sup>, 2020) – A Brooklyn-based arts and culture website that covered the Nebraska exhibit by Ibghy and Lemmens, which featured WPC (mentioned above)  
<https://hyperallergic.com/537920/minimalist-art-that-speaks-for-the-birds/> [Accessed October 27 2020]
- "Rebuilding troubled species takes decades of patience and persistence" (Aanders Gyllenhaal, May 27<sup>th</sup>, 2020) –personal blog which examined lessons from the LOSH program. Both Jane Hudecki and Hazel Wheeler quoted.  
<https://flyinglessons.us/2020/05/27/rebuilding-species-takes-decades-of-patience-and-persistence/> [Accessed October 27 2020]
- Saving Animals From Extinction (SAFE) – North American Songbird Working Group newsletter (Leighann Cline) – Cline (LOSH keeper at SCBI) wrote an article about their hand-reared education bird, Barb, for this newsletter. Article mentions WPC and the LOSH program, and directs any with interest in joining the program to contact Hazel Wheeler.

Finally, independent journalist, Luke Fuending, attended the captive juvenile release in Carden this year, after which he wrote a piece about the LOSH program. It has not yet been published, but ON Nature has expressed interest.

## **6.0 HABITAT STEWARDSHIP**

Planning for stewardship projects is underway, with a focus this year on Napanee as several landowners with key areas of LOSH habitat have reached out about work that is needed on their properties. The following discussions are ongoing:

- 1) Matt Calver has purchased a large area of land adjacent to his property that most recently hosted single LOSH, but has had breeding pairs in past. The newly acquired properties are largely covered with mature red cedar, so Calver wants to clear the land for pasture or row cropping. The Lead Biologist met with Calver on November 5 to briefly discuss plans, and will develop a strategy for clearing the land near the area of recent LOSH; the remaining land is not currently considered LOSH habitat, so while the retention of some larger trees will be suggested to provide potential nest trees, developing a clearing strategy for all properties would be impractical.
- 2) Ralph Armstrong would like to thin an area of young red cedar growth on his property. This project would leave all larger trees, focussing solely on those smaller saplings that could be cut with the WPC bush hog (purchased new this year), and would create more open habitat adjacent to a 2020 breeding territory. This property is one that is included as a habitat enhancement site for the Loyalist Solar Project, however, so BluEarth Renewables has been contacted as the party currently responsible for this property's management.
- 3) The Nature Conservancy of Canada (NCC) has continuing maintenance needs on the Napanee Plain Alvar Nature Reserve that hosts the Napanee LOSH release site, and the adjacent Irene Ockenden Nature Reserve, which is a regular LOSH nesting site. They will already be clearing some woody encroachment on the Nature Reserve this fall/winter using funds from the Grassland Stewardship Initiative (administered by Forests ON), so any projects initiated with the NCC will likely be fencing or water-system focused.

WPC also purchased a new Bush Hog this year (model: BH516), as the machine we had was in need of repairs and the parts were no longer available to bring it up to provincial safety standards. The unit is currently being held by a landowner in Napanee (Carl Craigen), but the intention is to develop a protocol around use that will include some responsibility for damage incurred by the unit.

## **7.0 PROGRAM PERSONNEL**

### **7.1 Field staffing**

Field activities were carried out this year a single biologist in each core, due to the COVID-19 pandemic and considerations of physical distancing and social bubbles. Field biologists started on June 1, once non-essential fieldwork was approved by the WPC Board of Directors.

There has only been one other year where fieldwork was carried out by a single biologist (2015), and as in that year, it was made very clear in 2020 that having a single field person highly impacts the amount of data the LOSH program is able to collect. This is especially true in Napanee where WPC is

contractually obligated to prioritize work around solar developments, at the detriment to surveys and monitoring on other sites that would otherwise be considered high priority.

Further, though the decision to hire a single staff person was made to protect the physical health of contractors this year, if provincial conditions remained unchanged in 2021 this decisions should be re-examined with greater consideration of the mental health of staff as well. As detailed in Section 1.3.2, gaps exist in the survey and monitoring data in Napanee, and while expectations for 2020 field staff were certainly softened in the face of the pandemic, further strategies to maintain the well-being of staff should be developed if a second year of pandemic-related restrictions are expected.

## **8.0 RESEARCH**

### **8.1 Ongoing projects**

#### **8.1.1 *Migratory urge study***

The impact of environmental versus genetic factors on the expression of migratory urge in Loggerhead Shrike has become the basis of research by PhD student Alisa Samuelson at Queen's University this year. The study will assess the impact of environmental variation by electronically monitoring the behaviour of shrike in conservation breeding populations held in various geographic locations, including Ontario, Tennessee, and Virginia during spring and fall seasons when wild counterparts are undergoing migration. Ethovision, a machine learning software by Noldus Information Technology, will be used to monitor and quantify the behaviour of individual shrikes. These migratory values will be compared with environmental, epigenetic and genetic analyses to determine the influence of each of these factors on migratory behaviour in captive shrike. Whole genome re-sequencing will be conducted on blood samples obtained from captive and wild shrike in populations of obligate and facultative migrants and non-migratory shrike. Genomic variation will be compared between populations to determine if genetic divergence is correlated to migratory behaviour. Results will be aligned with the recently completed annotated reference genome for Loggerhead Shrike to identify genes corresponding to differential migratory activity. The potential use of candidate genes that can be used to determine the migratory behaviour of shrike with unknown migratory habits will also be assessed. Current research is focussed on reconfiguring enclosures for electronic monitoring with as few modifications as possible and refining methodology for sample collection during the spring migratory period.

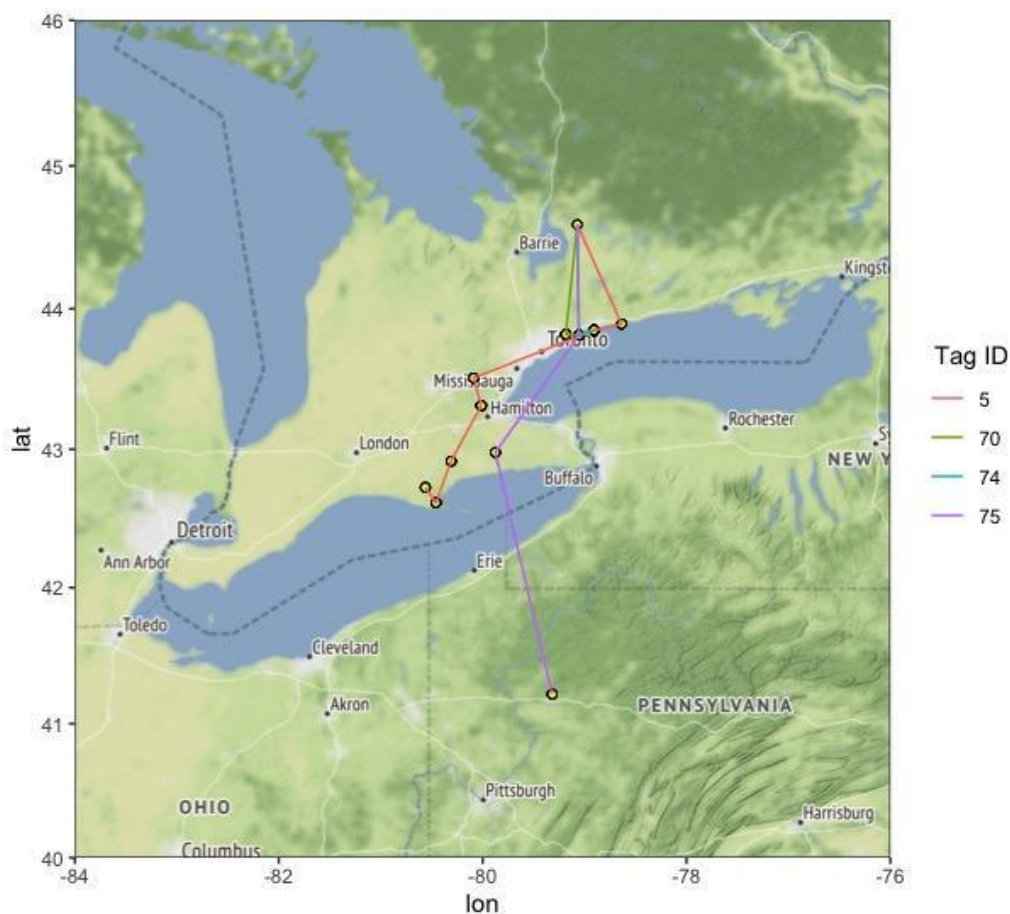
#### **8.1.2 *Diet analysis and food preference study***

LOSH diets are being analyzed following discussions from the 2019 captive subcommittee meeting, but progress has been slow due to communication challenges likely resulting from the pandemic. Mike Maslanka (Senior and Head Nutritionist for the Department of Nutrition Science at Smithsonian Conservation Biology Institute) will be profiling the caloric and nutritional content of several partner facilities' maintenance diets and comparing them to target ranges for the species. Methods for a food preference study were piloted at African Lion Safari this year, and it was determined that the freeware BirdOriTrack program would not provide the video analysis utility necessary to achieve meaningful results. Instead, video analysis will be completed in Ethnovision. Barring further delays from the pandemic, data collection at African Lion Safari will start in earnest in spring 2021.

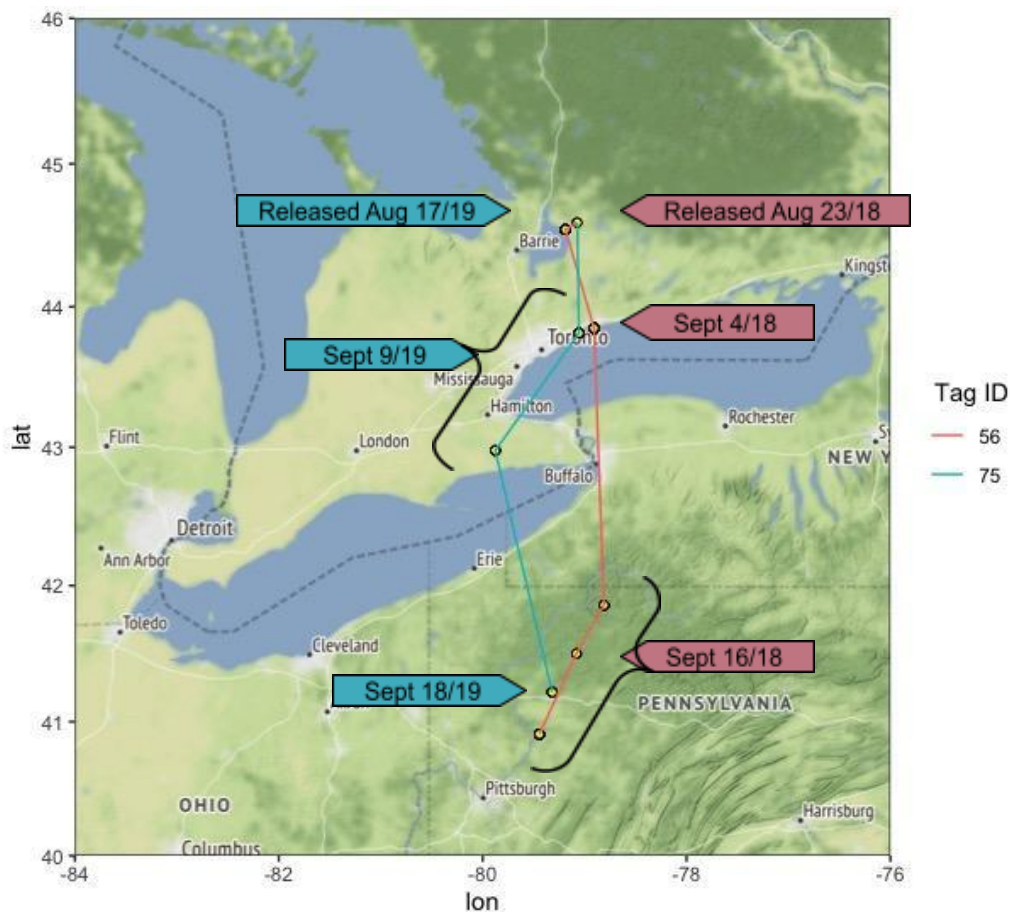
### 8.1.3 Identification of wintering grounds and migratory routes

Four of the 10 birds released in with radio-tags in 2019 were detected by the Motus network that fall; all originated from the Carden release site and were hatched at SCBI (Fig 3). Three of the birds were only detected on towers in Ontario, the fourth bird was picked up on a tower in Pennsylvania approximately one month after being released. This is the second consecutive year of birds being detected in PA, and interestingly all detections appear to be on a similar path (Fig 4). Three of the tags deployed in 2019 had a 10-month battery life (compared to 5 months for tags deployed to that point) that would allow for spring detections, but no 2020 hits have yet been uploaded. However, one captive-bred LOSH was resighted during spring migration: a 2018-release that returned to breed in Napanee in 2019 was spotted near Meadville, PA on April 9/20. It was only seen the one day, but the observer submitted a picture so band combination could be confirmed. This bird was not resighted by WPC staff in Ontario during the field season.

No juveniles were released with radio-tags this year, due to low release numbers and efforts to maintain distance between staff (see Section 1.2.3). Without any new deployments, we still have 17 tags in storage that can potentially be deployed next year. Though keeping tags for an extended period is not ideal, with proper off-season care and storage it is likely that the bulk of tags will remain functional until 2021, according to discussions with Lotek.



**Figure 5.** Fall 2019 Motus detections for birds released that year



**Figure 6.** All U.S. tag detections to-date. Release and detection dates are indicated in the colour of the corresponding tag path

#### **8.1.4 Genomic tools for species conservation and management**

Several genomic tools are available for use in the management of the conservation-breeding colony of Loggerhead Shrike, including a suite of nuclear genetic microsatellite (MSAT) markers, Single Nucleotide Polymorphic (SNP) markers, and Major Histocompatibility Complex (MHC) markers. In 2019, these tools were augmented by the creation of a high quality genome, fully annotated to chromosome level. These genetic tools will be incorporated in to the PHVA that will be completed in 2021, though the exact methods have yet to be determined. To date, analyses using these tools have suggested that: 1) inbreeding depression may be linked to reduced survivorship of offspring, 2) selection of mates is non-random in regards to MHC diversity, and 3) genetic variability has been maintained largely as a result of occasional recruitment from the wild population. Based on results to date, there has been an effort to include genetic information in captive management decisions, in addition to the pedigree assessment that has typically been used. However, caution must be exercised in incorporating genetic information in these decisions, as artificial selection could quickly and detrimentally affect the genetic health of our small captive population (C. Lynch, pers. comm.). Future work should focus on conducting additional analyses of existing data sets to guide these decisions, and inform the use of the annotated genome to design/identify markers to conduct regular screening of the captive colony to assess inbreeding levels, suitable mates, and to better quantify the impact of the breeding and release program on the wild population. Ideally, given the degree to which birds bred

in human care are supporting the wild population, the two should be managed as a metapopulation; to do so will require additional sampling of wild shrike and additional assays.

#### **8.1.5 Quantitative genetic techniques for species conservation and management**

In addition to genomic tools being used for management, existing data is being analyzed using quantitative genetic techniques. Quantitative genetic analyses allow measurement of plastic and evolutionary change in shrike phenotypes. Preliminary quantitative genetic results suggest that wild and captive populations differ in their morphology, evolutionary change is occurring in the captive population, and recruitment from the wild population reverses some of the evolutionary changes observed in captivity. A critical gap in knowledge is how captive individuals might be influencing wild phenotypes. Further sampling of genomic markers and phenotypes in wild and captive populations will expand these quantitative genetic analyses and provide an understanding of how gene flow between them might influence phenotypes and fitness of wild and captive individuals

#### **8.1.6 Endocrine correlates of fitness in captive-reared Eastern Loggerhead Shrikes**

Joshua Robertson, a PhD student at Trent University who is co-supervised by Gary Burness (Trent) and Gabriela Mastromonaco (Toronto Zoo; through the ReNewZoo program), has been working on validation of an infrared thermographic assay to measure acute, and chronic stress physiological profiles in wild birds. Following promising results seen in domestic pigeons and Black-capped Chickadees, Robertson intended to use thermal imaging to non-invasively quantify and compare the strength of the acute stress response between captive and wild LOSH, and ask whether juvenile stress responsiveness and condition are predictive of survival to fall migration, post-release. However, no updates have yet been received regarding the work completed this year.

#### **8.1.7 Presence and effects of parasites on captive breeding success in Loggerhead Shrikes**

Isabelle Zimmermann—an MSc student at Laurentian University who is co-supervised by Albrecht Schulte-Holstedde (Laurentian) and Gabriela Mastromonaco (Toronto Zoo; through the ReNewZoo program)—is investigating *Capillaria* loads in captive and wild populations of LOSH. Isabelle completed data collection in 2019, and is currently working on finalizing her thesis.

### **8.2 Manuscripts**

The following manuscripts were accepted for publication this year:

- Morgan, G., and A. Chabot. 2020. Visually Sexing Loggerhead Shrike (*Lanius Ludovicianus*) Using Plumage Coloration and Pattern. *Journal of Visualized Experiments* 157: e59713 doi:10.3791/59713
- Schutten, K., A. Chabot, and H. Wheeler. In press. West Nile virus seroconversion in Eastern Loggerhead Shrike (*Lanius ludovicianus spp.*) after vaccination with a killed vaccine. *Journal of Zoo and Wildlife Medicine* [Publication anticipated March 2021]

This manuscript was submitted for publication in July 2019, and is still in review:

- Hudecki, J., H. Wheeler, and A. Chabot. Evidence and impact of plastic use by the Loggerhead Shrike (*Lanius ludovicianus*). Revised manuscript submitted for publication.

Other manuscripts currently in development include:

- Analysis of environmental contaminants in LOSH eggs

- Stainless steel band removal protocol
- Use of geolocators to study LOSH movements
- The value of quantitative genetics for conservation breeding: a review

### **8.3 Subspecies designation**

Ontario's LOSH were found to be a separate subspecies, distinct from the rest of the *L.l. migrans* population found in the northeastern U.S., in 2011. Since then, the LOSH Recovery Program has been provisionally calling the Ontario subspecies *L.l. alvarensis*. However, following efforts by Amy Chabot to have the subspecies name officially changed, it was found that Ontario's LOSH cannot be renamed because it was a specimen from Kingston, ON that was used as the original holotype for *migrans*. As such, Ontario's LOSH will remain *L.l. migrans*, and those birds found outside of the Ontario breeding population that were considered *migrans* will now be called *L.l. centralis*.

## **9.0 PARTNERSHIPS AND COLLABORATION**

### **9.1 Loggerhead Shrike Working Group**

The 6<sup>th</sup> annual LOSH Working Group (WG) meeting was held over a series of Zoom meetings in March and April this year. An in-person meeting had been scheduled at the Nashville Zoo on March 24 and 25, but plans necessarily changed with the COVID-19 pandemic and the closure of the Canada-U.S. border. Rather than two full days, the agenda was broken up into five 3-hour segments. Topics covered: Planning for the LOSH PHVA, ShrikeForce pilot project, shrub delineation using LIDAR, tagging methods, and discussions of outreach and education material needs, development of Best Management Practices for LOSH habitat, and potential funding sources for all work. Attendance between sessions was variable, but engagement was high with up to 27 call participants. Amy Chabot, Jessica Steiner, and Hazel Wheeler attended all sessions to represent Ontario interests.

Full details of all topics discussed are available in the WG meeting minutes (available upon request). No discussions have yet been initiated about the 2021 meeting, but an online meeting can be assumed given the current state of Canada and the U.S. with regards to COVID-19. Monthly Working Group calls have continued throughout the year, to keep momentum in the group.

### **9.2 Building Regional Capacity**

#### **9.2.1 Regional networking**

WPC staff continue to hold the position of co-chair of the Napanee Plain Joint Initiative (NPJI), though the group was fairly inactive this year owing to the COVID-19 pandemic. Updating the Important Bird Area signage in the Napanee region remains a priority for the group, as the existing signs are quite weathered and out-of-date. WPC attempted to secure funds for this project through the provincial Species at Risk Stewardship Program, but no outreach initiatives were approved as they are not included in the LOSH Government Response Statement as a "government-supported action".

WPC also remains engaged in the Carden community through the Carden Forum, organized by the Couchiching Conservancy. Like the NPJI, the Carden Forum also did not meet this year because of the COVID-19 pandemic. There was an update on the proposed shooting range just north of Carden Alvar Provincial Park, however, in that the Nature Conservancy of Canada (NCC) has brokered a deal

for purchase of this property. Both NCC and Couchiching are currently fundraising for purchase of the area now known as the Cedarhurst Alvar (total cost: \$1 million), with a deadline of spring 2021.

### **9.2.2 Community Science programs**

The LOSH program's usual community science "Adopt-A-Site" program was cancelled this year due to the COVID-19 pandemic (see Section 1.3.1). However, LOSH program staff have been very involved in the development of the ShrikeForce community science program that has so far been piloted by several volunteers across the U.S. This program is modelled after the LOSH program survey and monitoring protocols, and deploys volunteers to collect occupancy and breeding data on LOSH using the Survey123 app (part of the ArcGIS suite of programs). A user manual and digital data collection forms were completed at the start of the year, and these have been used in the initial pilot. Both the protocol and data forms will be updated over the winter based on feedback from volunteers and LOSH Working Group members, with plans for a broader roll out in 2021.

### **9.2.3 Population and Habitat Viability Assessment**

The coming year will see the completion of a Population and Habitat Viability Assessment (PHVA) for LOSH, which will increase our understanding of the threats that are influencing the population, and lead to a more rigorous long-term conservation plan. The PHVA is a workshop process facilitated by the Conservation Planning Specialist Group (CPSG)—part of the International Union for Conservation of Nature (IUCN)—that will include numerous stakeholders, and incorporate existing demographic and spatial data in its modeling. The results will help: a) identify how and when the species is being limited; b) identify high priority habitat for stewardship and protection; c) determine if and how habitat needs vary outside of the breeding season; and d) adapt the conservation breeding and release program to ensure it best supports recovery of the wild population.

The PHVA steering committee, which is made up of Jessica Steiner, Hazel Wheeler, and Amy Chabot, have had several meeting with Phil Miller (Senior Program Officer, CPSG) to start the planning process. As of October 2020, stakeholder analysis for Ontario/Canada was nearly complete, and the LOSH Working Group was asked to provide input on U.S. stakeholders that should also be involved. To ensure a high level of cross-border collaboration, Jim Giocomo (American Bird Conservancy, Oaks & Prairies Joint Venture) was added to the steering committee in the fall, and he will be assisting with U.S. stakeholder engagement. The current timeline aims to have data compiled by the end of the year, the first Population Viability Analysis workshop held in February 2021, the second PHVA workshop held in September 2021, and the final report delivered by the end of 2021.

## **10.0 WPC FUNDRAISING**

WPC implemented the recovery program this year with funding from the following sources:

- Species at Risk Stewardship Program (\$83.1K; Year 1 of a 3-year agreement)
- BluEarth Renewables (\$21.8K; Year 2 of a 5 year post-construction monitoring agreement)
- Environment and Climate Change Canada (\$20K for MaxEnt Species Distribution Mapping output and report, and development of ShrikeForce user manual and digital data collection forms)
- Colleges and Institutes Canada Career Launcher Internship (\$12.7 to subsidize one field position)
- Kingston Solar LP (\$10K; Year 2 of a 5 year agreement)

Additional funding was secured through the Canada Emergency Wage Subsidy and the Temporary Wage Subsidy, though final amounts are still forthcoming. Small amounts of additional funding came from private foundations and private donors.

WPC did apply to the Canada Summer Jobs program to fund field staff, but notices of successful applications were not received until October, at which point the funds could not be used.