

2016 Eastern Loggerhead Shrike Recovery Program - Summary Report

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Wildlife Preservation Canada

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1.0 Highlights from the 2016 field season

Wild population

- 18 wild pairs (8 in Carden, 10 in Napanee)
- 64 wild young fledged (34 in Napanee, 30 in Carden)
- 0 wild young recruited for captive population
- 7 unmated single birds (4 in Carden, 2 in Napanee, 1 in Grey-Bruce)
- At least 28% of all birds detected in the wild this year were captive-bred

Captive population

- 30 initial pairs, and 9 repairing attempts
- 24 pairs fledged young
- 138 fledglings produced
- 14 fledglings died (as of Nov 1)
- 19 fledglings retained
- 105 fledglings released; 10 with radio tags

Status of the captive population (as of Nov 1)

- 84 birds in captivity
- 55 breeding adults
- 19 retained young
- 6 retired birds; two at SCBI, four to be moved to Nashville Zoo
- 3 hand-reared education birds (2013HY bird at Mountsberg, two 2014HY birds at Toronto Zoo)
- 1 exhibit bird (2004HY female at Little Ray's)

2.0 Wild Population

2.1 Monitoring

Eighteen pairs of Loggerhead Shrike were confirmed in Ontario this season: 8 in Carden, and 10 in Napanee. This number is a welcome change from the alarmingly low number in 2015, when only 11 pairs were found across the province (Figure 1). By core, Carden stayed relatively stable, whereas the number of birds found in Napanee was more than double 2015 counts. Breeding success was high this year, with 89% of observed pairs fledging young. There was one unsuccessful pair in each core: in Carden, a nest was predated, and there were no signs of renesting; in Napanee, one pair abandoned a territory following a failed attempt to trap one of the adults that was wearing a geolocator. Fledgling counts were high in 2016, with 64 fledglings confirmed across all cores (30 in Carden, 34 in Napanee). Again, this more than doubles the number of fledglings seen in 2015. There was one double clutch confirmed this year, from a pair in Carden.

In addition to breeding pairs, there were 7 unpaired birds confirmed this year: 4 in Carden, 2 in Napanee, and 1 in Grey-Bruce. Five of these birds were banded, allowing definite identification, and two unbanded birds could be counted with confidence based on the location and timing of their sightings. As in past years, there were numerous other sightings of unbanded birds, or birds where band status was not determined, but these were generally transient birds that were not reliably seen, so could not be counted as separate individuals.

Banding efforts in the past three years have been focused mainly on trapping birds carrying geolocators, with banding wild individuals only done opportunistically. However, 51% of birds seen in Ontario this year were unbanded, which has had the effect of decreasing the confidence in population counts, especially for single birds, and reducing the amount of long-term demographic data we can gather on the population. In light of this, and the a growing LOSH banding effort throughout their US range, a renewed investment in banding birds in Ontario should be considered.

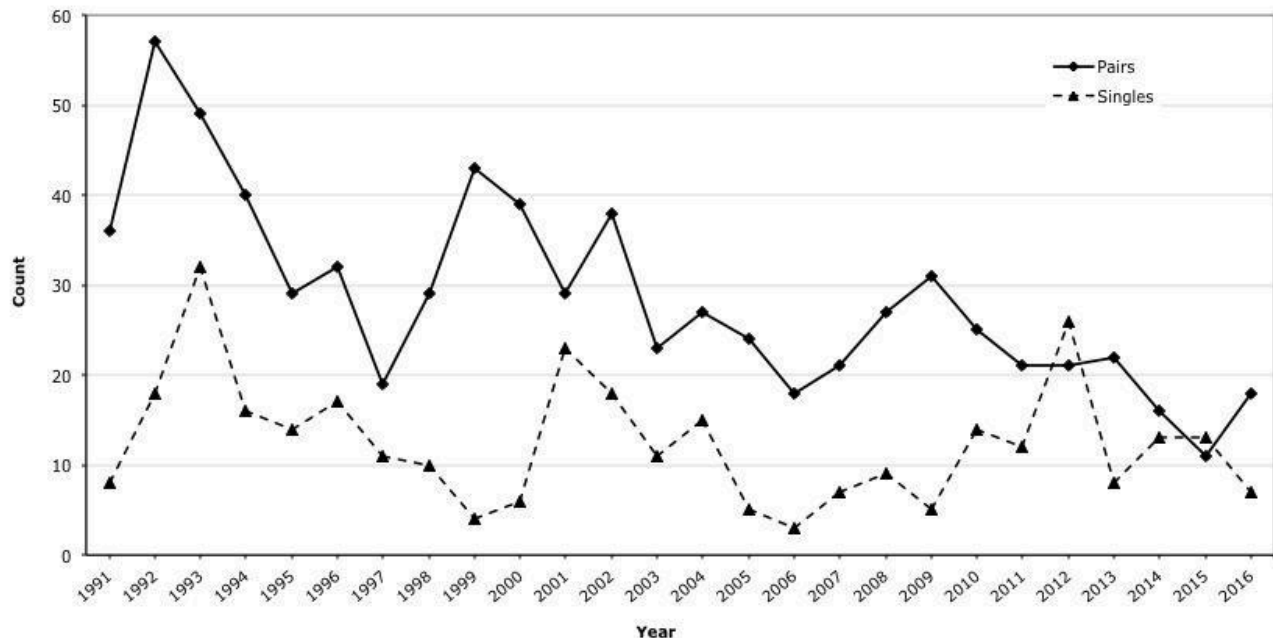


Figure 1: Number of LOSH pairs and single birds in Ontario 1991-2016

Call-playback (CPB) was used during most surveys, in accordance with field protocols, and aided in the detection of LOSH on three sites, two in Carden and one in Napanee. At two other sites in Napanee, birds were found shortly after completion of the playback, but detection could not be linked to CPB.

2.2 Returning captive-bred birds

Twelve captive-released birds were confirmed returning to Ontario breeding grounds (Table 1), making up 28% of the confirmed population in 2016. Further, the captive-breeding and release program made a significant contribution to the fledgling count in Ontario this year, with 41% of observed fledglings coming from pairings that included a captive-bred bird.

Two birds hatched and released in 2012 were the oldest seen, and both of those were found in Napanee. Five birds could be confirmed as 2014-release birds, but another bird spotted in Carden was also likely released in 2014. Only the right leg bands were seen on this bird, from which we can confirm it was captive-bred, and birds with this right leg combination have been released in Napanee in 2012, 2014, and 2015. However, those bands were also added to the right leg of a bird carrying a geolocator that was caught in Carden in 2015. Given that the birds tend to return to the same core areas between years, it is likely that the ‘geobird’ was the one seen in Carden this year. If so, that would make it a 2014 bird, bred and released in Carden.

Table 1. Captive-bred birds observed in Ontario in 2016

Core	Band combination	Hatch year	Hatch site	Release site	Sex	Paired?	Breeding outcome
Carden	RD/SI:OR/OR	2014	Carden	Carden	M	Y	2 nests, 10 fledglings
	DG/SI:OR/DB	2014	Carden	Carden	F	Y	Nest predated
	RD/SI:YE/OR	2014	Carden	Carden	M	Y	2 fledglings
	WH/SI:LG/RD	2015	TZ	Carden	U	Y	2 fledglings
	WH/SI:LB/RD	2015	MRC	Carden	U	N	--
	WH/SI:OR/LB	2015	TZ	Carden	U	N	--
	???:WH/RD	n/a	n/a	n/a	U	U	n/a
Napanee	YE/SI:OR/DG	2012	ALS	Napanee	M	Y	4 fledglings
	YE/SI:RD/DB	2012	ALS	Napanee	U	N	--
	DG/SI:OR/DG	2014	TZ	Napanee	F	Y	5 fledglings
	DG/SI:LB/OR	2014	MRC	Napanee	M	Y	3 fledglings
	RD/SI(L)	2013 or 2014	n/a	n/a	F	Y	Nest failed

One bird was observed with the geolocator band combination (RD/SI[L]) in Napanee. Targeted trapping efforts were made for this bird, but were unsuccessful. The geobird appeared to be the female of a pair that held a territory on a site to which WPC staff did not have on-site access (for details, see section 2.4). Unfortunately the male of the pair was trapped while the female watched, and the trap-shy nature of shrikes, even from observing another individual being caught, suggests that this geobird may not be trappable in future. Further, the nest site near the road seemed to be abandoned following trapping, and the pair was only seen inconsistently through the rest of the season, so there were no further trapping opportunities.

2.3 Volunteer surveys

LOSH survey efforts were again aided by Adopt-A-Site (AAS) volunteers. To date, 29 volunteers have submitted data for 130 priority patches across all core areas, and were responsible for the vast majority of coverage outside of the Carden and Napanee cores. Four LOSH were observed during volunteer surveys, and there was one other incidental LOSH sighting reported when a volunteer was travelling between assigned survey sites. One of these reported birds was not seen by WPC staff during follow-up visits, so would have otherwise been unaccounted for without the participation of this volunteer.

Call-playback was again included in to the volunteer protocol as an optional tool to increase detectability of shrike, but was used by few volunteers due to a lack of equipment. However, WPC has secured some funding to purchase playback equipment for volunteer use, so this tool should be more widely incorporated in 2017.

The effectiveness of the AAS program at detecting shrike was again assessed this year by having volunteers duplicate field staff surveys of sites throughout the core areas, including those sites where shrikes were found in 2015. Though some LOSH were reported by volunteers, there were four additional sites where WPC staff confirmed LOSH that were not detected by volunteers from the roadside. These results support the conclusion that the current model of roadside surveys has a low level of effectiveness at detecting LOSH, with that effectiveness impacted by patch size (area visible from the roadside) and volunteer experience. An on-site survey protocol will be developed over the winter, to be piloted on a limited number of sites in 2017, to address the difficulty of surveying large patches from the roadside. Along with the on-site protocol, increased pre-season training may be delivered for volunteers, but will be limited by WPC staff capacity.

2.4 Nest failures

There were two observed nest failures this year, one in each active core. The nest in Carden appeared to be predated, based on the state of the nest on inspection. This breeding pair was first observed during staff training on May 2nd, where the nest tree was located, and the male was bringing food to the female as she was incubating. No activity was observed at this site on follow-up monitoring visits, and pictures taken revealed an empty nest with the lining pulled out (Figure 2). Though behavioural monitoring appeared to reveal some re-nesting behaviour, this pair did not successfully reproduce.



Figure 2. Picture of empty nest, with lining pulled out, suggesting predation

The nest failure in Napanee was likely due to attempting to trap the female of the pair, which was a captive-released bird with a geolocator. This pair was nesting on a property for which WPC did not have on-site access, but the first nest tree was located within 5 metres of the road, so the bird was somewhat accessible. Trapping was attempted when both adults were seen foraging in the area, which was thought to indicate a hatched nest. During the trapping attempt, the male was caught rather than the female, and the nest seemed to be abandoned upon follow-up visits to the site. It is believed that the initial trapping attempt was ultimately ill-timed, and the behaviour that was initially thought to indicate a hatched nest may have been pre-laying foraging by both birds. If re-nesting attempts were made, they were not detected from roadside monitoring.

2.5 Banding, nest checks, and nest cameras

Hazel Wheeler performed all trapping and banding this season, with assistance from area biologists. Returning birds carrying geolocators were the main targets for trapping, and effort was put towards trapping unbanded

adults as time allowed. We continue to use the double-overlap colour bands, and started melting the exposed end with a small butane spot-welder this year to further improve retention. YE/SI on the right leg was used to denote year of banding for newly caught adults in 2016.

Two adults were trapped and banded this year, both in Napanee. The first was the male of a breeding pair in which the female was banded as a geobird. The female was the target of this trapping effort (as detailed in section 2.2), but the male was caught instead. The other bird trapped this year was also part of a breeding pair, both of which were unbanded. One other attempt was made to trap a pair of unbanded wild birds on the same day in Napanee, but it was halted due to rain.

Nest checks continued in 2016 and were performed by Hazel Wheeler and area biologists. A selfie-stick was used to take pictures during nest checks this year, which allowed for more confidence in counting and aging nestlings.

Small time-lapse cameras were deployed by Hazel Wheeler at six nest sites, three in each core to assess nest predation as a limiting factor. All of the nests with cameras successfully fledged young, though one other nest was predated early in the season (see section 2.4). Despite not capturing any predation events, photos will be saved for potential review in the future to identify potential predators/disturbance that occur in the vicinity of the shrike nests.

2.6 Post-season sightings reports

We received several reports of captive-bred LOSH sightings during migration through southern Ontario. One bird, released in Napanee at the end of August, was seen by numerous individuals, including Todd Norris, on Gull Island in Presqu'ile Provincial Park. This bird was only seen on one day (September 15), before it moved on. Another colour-banded bird was spotted over three days at the beginning of October in Stratford, ON. The origin of this bird is uncertain, as bands could not be positively identified from the picture provided.

This year we also received a sighting of an Ontario bird near Moscow, VA, on October 22. This was a bird bred at Mountsberg, and released from Napanee at the end of August. This is the third time in five years that a bird of Ontario origin has been spotted in Virginia outside of the breeding season, highlighting the connection between the two areas.

Most notably, in addition to an Ontario bird being seen in Virginia, a bird that was banded in May in Smyth County, VA was observed in Napanee, approximately 900km north, at the end of August. This bird, banded by Sergio Harding (Nongame Bird Biologist, VA Department of Game and Inland Fisheries) and Rich Bailey (Biologist, WV Division of Natural Resources) was a second-year female with an active nest at the time of banding. It wasn't directly observed by staff in Napanee, but was recorded by a time-lapse camera that had been set up at the Napanee field site to monitor the supplementary feeding corrals used to feed the recently-released birds. It was during image review that this banded bird was identified.

2.7 Development and Critical Habitat

WPC has been actively working with two renewable energy projects in the Napanee region, to ensure responsible development and habitat restoration moving forward.

1) Kingston Solar

The Kingston Solar Project, undertaken by Samsung, 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 development, Samsung was required to work with WPC to release 40 LOSH in Ontario over the next three years, and to enhance 49 ha of LOSH habitat in the Napanee core. As 105 juveniles were released this year, the requirement to release 40 birds has likely been met, which would conclude that section of the agreement.

A final report of all juvenile releases has been submitted to MNRF, and we await confirmation that this satisfies the permit requirements.

Two habitat enhancement sites were chosen by Kingston Solar, in consultation with MNRF, to meet the required 49 ha of enhanced LOSH habitat. WPC was contracted to conduct surveys of these patches during the 2016 field season; no LOSH were found on these sites this year.

2) Loyalist Solar

The Loyalist Solar Project, headed by BluEarth Renewables, is located in one of the most active LOSH areas within the Napanee core. To their credit, BluEarth started consultation with WPC early in the project development process, to ensure plans did not impact Critical Habitat. To that end, WPC was subcontracted through Dillon Consulting for the 2016 field season, to conduct habitat surveys of all identified LOSH habitat within the Loyalist Solar project study area. Three active territories were identified within the study area, with results disseminated to Dillon, BluEarth, and MNRF. WPC will be meeting with BluEarth at the end of November to get an update on the planning and natural environment studies undertaken to-date, and an overview of 'next-steps' and timelines for the Loyalist Solar Project.

To our knowledge, no other new solar projects were approved in the core LOSH areas in 2016.

2.8 Staffing needs

Staffing for the 2016 field season was initially a single biologist in each main core (Carden and Napanee). However, the workload for biologists this year, where wild population numbers were near double what they were in 2015, made adequate monitoring difficult, especially once juvenile releases started in July. This workload was alleviated in Carden through the recruitment of an international volunteer from July to mid-August, and a field assistant was ultimately hired in Napanee for the month of August to assist with wild and captive activities. The quality of work, and the well being of all staff associated with the program, benefited greatly from the return to a "field team" model, which was the staffing structure up to 2014. Plans for 2017, therefore, will include two staff in each core, to assist with both wild and captive duties.

3.0 Captive Population

3.1 Status of the captive population

As of November 1, there were 84 birds in the captive population (including partner facilities in both Canada and the US). There are 55 adults considered breeding stock; 46 are 5 years old or younger (HY 2011-2015), 7 are 6-10 years old (HY 2006-2010) and 2 are over 10 years old. Six birds have aged out of the breeding population and are now retired, and four other birds are exhibit or education birds. The oldest individual is a 14-year-old retired male that will be transferred to the Nashville Zoo in TN in November. Nineteen captive-reared young are currently maintained at wintering facilities and will supplement the captive population.

3.2 2016 Captive breeding and release

3.2.1 Summary

There were 30 initial pairs this season, and an additional 9 re-pairing attempts, for a total of 39 pairings. Twenty-four of these pairs produced 138 young this season (Figure 3). One hundred and five young were released to the wild (66 in Carden, 39 in Napanee). Nineteen young were retained for the captive population from high priority pairings. There were 14 fledgling deaths this season (details in Mortality section below).

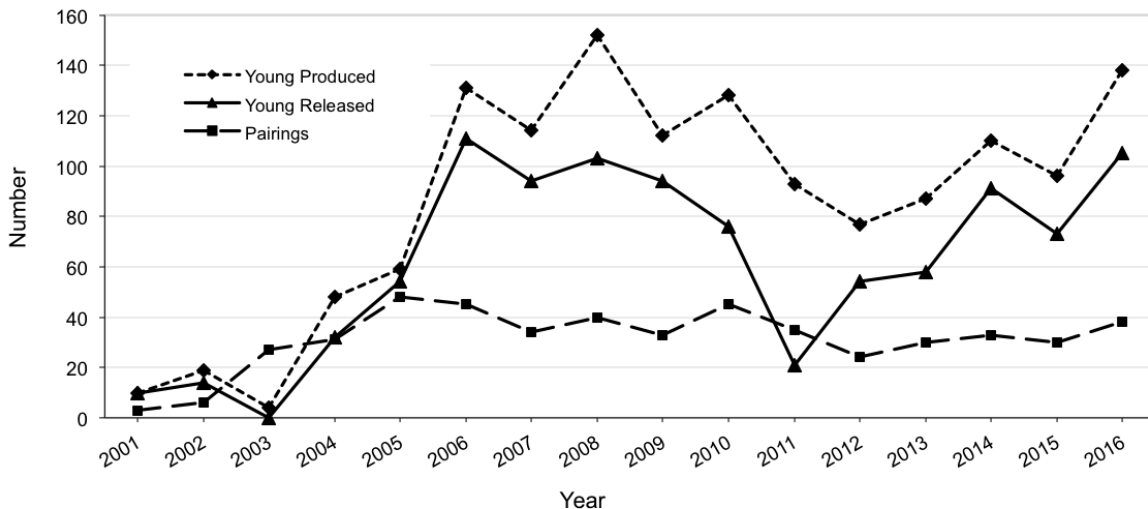


Figure 3. LOSH captive pairings, young produced, and young released, 2001-2016

3.2.2 Breeding facility results and wintering status

African Lion Safari (ALS): 6 of 13 pairings fledged 28 young (20 from 1st clutches, 8 from 2nd clutches). Six birds were released (three each in Napanee and Carden), none with radio tags. Twenty-two birds were released: 19 in Napanee, 3 in Carden. Two young were retained for the captive population. Four fledglings died prior to release, including three that were euthanized due to congenital defects (detailed below). An additional two adults were lost at ALS during the breeding season, one that escaped its enclosure in May, and another that was euthanized due to the same congenital defect seen in two of the young things year. This facility is currently wintering 19 birds, including 2 retained young.

Mountsberg Raptor Centre (MRC): 4 of 7 pairings fledged 27 young (18 from 1st clutches, 9 from 2nd clutches). Twenty-four were released (10 in Napanee, 14 in Carden), 2 with radio tags. Three young were retained for the captive population. This facility is currently wintering 12 birds, including 2 retained young; an additional captive bird is being held for education purposes.

Smithsonian Conservation Biology Institute (SCBI): 5 of 9 pairings fledged 30 young (13 from 1st clutches, 12 from 2nd clutches, 5 from 3rd clutches). Eighteen birds were transferred to Ontario in August, 17 of which were released in Carden (6 with radio tags). The other transferred juvenile was retained, along with six others that remained in Virginia. Six fledglings died prior to release, and three adults died during the breeding season (detailed below). This facility is currently wintering 18 birds, including 6 retained young.

Toronto Zoo (TZ): 9 of 10 pairings fledged 53 young (38 from 1st clutches, 15 from 2nd clutches). Forty-two birds were released (10 in Napanee, 32 in Carden), 2 with radio tags. Seven young were retained for the captive population. Four fledglings died prior to release, and one adult male died during the breeding season (detailed below). This facility will hold 20 birds over the winter, including 9 retained young, and 2 education birds; an additional 4 retired birds are being held at this facility, but will be transferred to the Nashville Zoo in mid-November.

3.2.3 Non-breeding facility status

Bowmanville Zoo: The shrike holding facility at Bowmanville Zoo, for which construction was stalled in 2014, was never completed, and the Bowmanville Zoo closed at the end of the 2016 season amidst controversy following a number of charges of animal cruelty being brought against the zoo owner. Initial contact was made with Bowmanville at a time when the LOSH Recovery Program was in dire need of more holding capacity, but the outcome of this near-partnership has created trepidation around pursuing smaller zoos as breeding partners.

Creature Quest: Creature Quest is a small non-profit dedicated to nature education, and is an institutional member CAZA. WPC met with the owners of Creature Quest in February, and they were enthusiastic about taking a retired bird from the captive-breeding program to put on exhibit at their facility in Hillsburgh, ON, which is a base for their educational programs. Communication dropped off in the spring, however, and their current interest in an exhibit bird is uncertain. Though we currently have no “spare” retired birds in Ontario, there are some younger birds that could be removed from the breeding population (either consistently poor breeders, or breeders that have produced multiple young with congenital defects) and put on exhibit. Follow-up contact will be made in this fall, to assess interest.

Little Ray's Reptile Zoo (LRR): Little Ray's continues to function solely as an overwintering facility. It is currently overwintering 10 birds that are part of the captive breeding population; an additional retired bird remains on exhibit at the Nature Centre. The current overwintering pens at Little Ray's will need to be moved, thus emptied of birds, before the end of March 2017. WPC will be working with Little Ray's over the winter to try to identify a new site where the pens could be reconstructed.

Nashville Zoo at Grassmere (NZ): The Nashville Zoo is a new partner for the LOSH Recovery Program, with contact initiated through C2S2 at the Shrike Meeting held at SCBI in February 2015. Nashville has expressed interest in eventually breeding birds, but for now will be taking four retired birds that have aged out of the captive breeding population. These birds, which will be transferred to the facility in mid-November, will be used in a pilot study on the effects of captivity on migratory urge (see section 7.1).

Riverview Zoo: Though the staff at Riverview Zoo have remained enthusiastic about joining the shrike recovery efforts, restrictions to their operating budget have again resulted in a lack of funds to participate in the breeding program this year. The space available for breeding enclosures at this facility is not ideal: it is both limited, with space for only two cages, and subject to regular disturbance from those attending the Zoo. Thus, continued development of this location as a breeding facility is not a priority for WPC.

3.3 Mortality

3.3.1 Adults

We had 9 adult deaths in the captive population this year, as of November 1, plus one escaped bird. An additional three deaths occurred in 2015, reported after last year's summary report. Two of the late deaths in 2015 were at FR: one hatch year bird was euthanized following an illness, and another hatch year bird succumbed to illness; final necropsy reports have been requested. The other 2015 death was a 2011-hatch bird that suffered a head trauma at the Toronto Zoo.

In 2016, three birds had cause of death identified: one second-year bird was predated at TZ, a 3-year-old bird died of head trauma at ALS, and a 5-year-old bird died from aspergillosis at FR. A second-year bird was euthanized at ALS in August, as it presented an eye-defect that appeared to have a genetic origin, thus couldn't be bred and was unfit for release. The remaining five deaths had no clear cause of death, and final necropsy reports are pending.

In addition to the, one adult bird escaped its breeding enclosure at ALS in May. Ultimately, the captive population lost 10 adult birds in 2016.

3.3.2 Fledglings

There were fourteen fledgling deaths (10%) as of November 1, which is marginally higher than the fledgling mortality in 2015 (8%; Figure 4). MRC is the only facility that had no fledgling mortality; deaths were spread fairly evenly across the remaining facilities, with four each at ALS and TZ, and six at FR.

Four juveniles were euthanized this year:

- One bird from TZ had been moved to the Carden field site for release, but the bird showed poor flight fitness, and was generally lethargic. It was transferred back to TZ for assessment, and was

ultimately euthanized because of severe neurologic symptoms. Preliminary necropsy showed encephalitis; final necropsy, to determine cause of encephalitis, is pending.

- A bird was euthanized at TZ after its spine was broken during routine catch-up for banding and blood sampling. Protocols around catching and handling birds were examined, but there were no departures from the methods regularly and safely used.
- A fledgling at ALS was euthanized because of a malformed leg, with the tarsus twisted so bird could not perch or move properly.
- Two fledglings from a high-priority clutch of four birds had a congenital cataract, causing one eye to appear sunken and malformed. Another bird, hatched last year from the same sire, presented the same issue, so it is believed to have a genetic cause. After consultation with program vets and ophthalmologists, it was decided that all three of these birds would be euthanized (2015-hatch death detailed above). One of the juveniles died of acute segmental hemorrhagic enteritis before it could be euthanized; the other was euthanized in mid-August.

The causes of death for the remaining birds are currently unknown. Remains, when present, were submitted for necropsy; reports are pending.

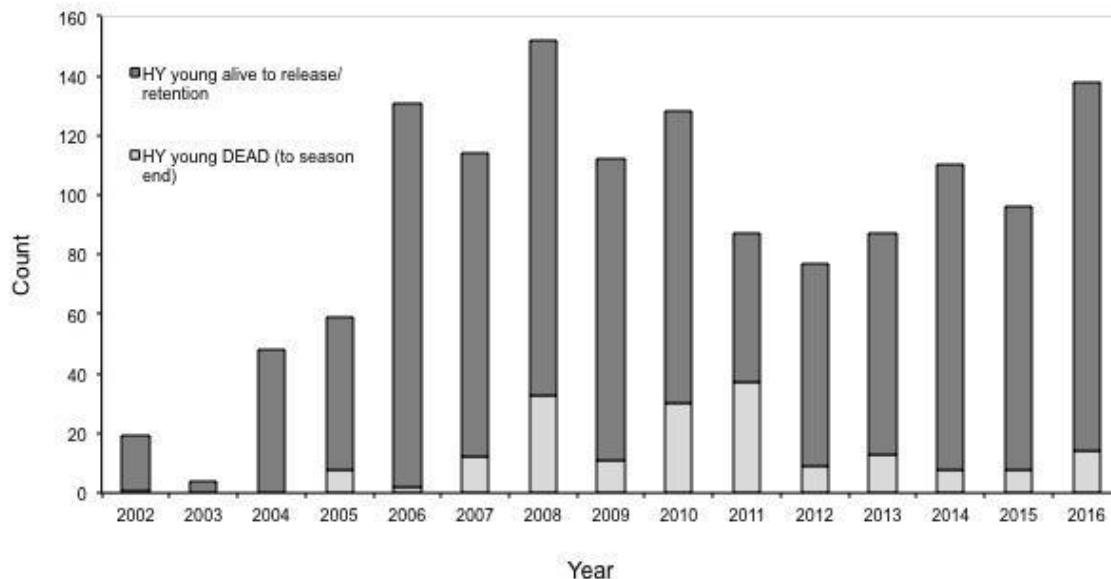


Figure 4. Number of fledglings produced each year that died or survived to release or retention

3.4 Captive-bred releases

3.4.1 Banding

One hundred and thirty-three captive juvenile shrikes received stainless steel bands this season. Released birds that received colour-bands were given a combination that included SI/YE (79 birds) or YE/SI (16 birds) on the left leg to identify them as a 2016 release bird. As in 2015, birds released with radio tags (10 individuals) received only SI on left because of weight constraints. 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.

3.4.2 Radio tags

Ten birds were released with radio tags on the Motus network this season, using the same nylon-coated elastic cord harness attachment technique used in 2015. An additional three tags were removed at pre-release checks as the weight of the birds had dropped below the acceptable cut-off (50 g).

WPC erected a Motus receiving station near each field release site, which will gather data on the timing of migratory departures for tagged birds, and will generally expand the coverage of the Motus network in Ontario.

The station in Carden used an MNRF weather station as the mounting structure for the antennas (Figure 5a), and the station in Napanee was mounted to one of the release cages (Figure 5b). Data have been downloaded from both stations and submitted for processing, but no results have yet been made available. WPC will be working with Couchiching Conservancy to erect two more Motus towers in the Carden core by spring 2017.

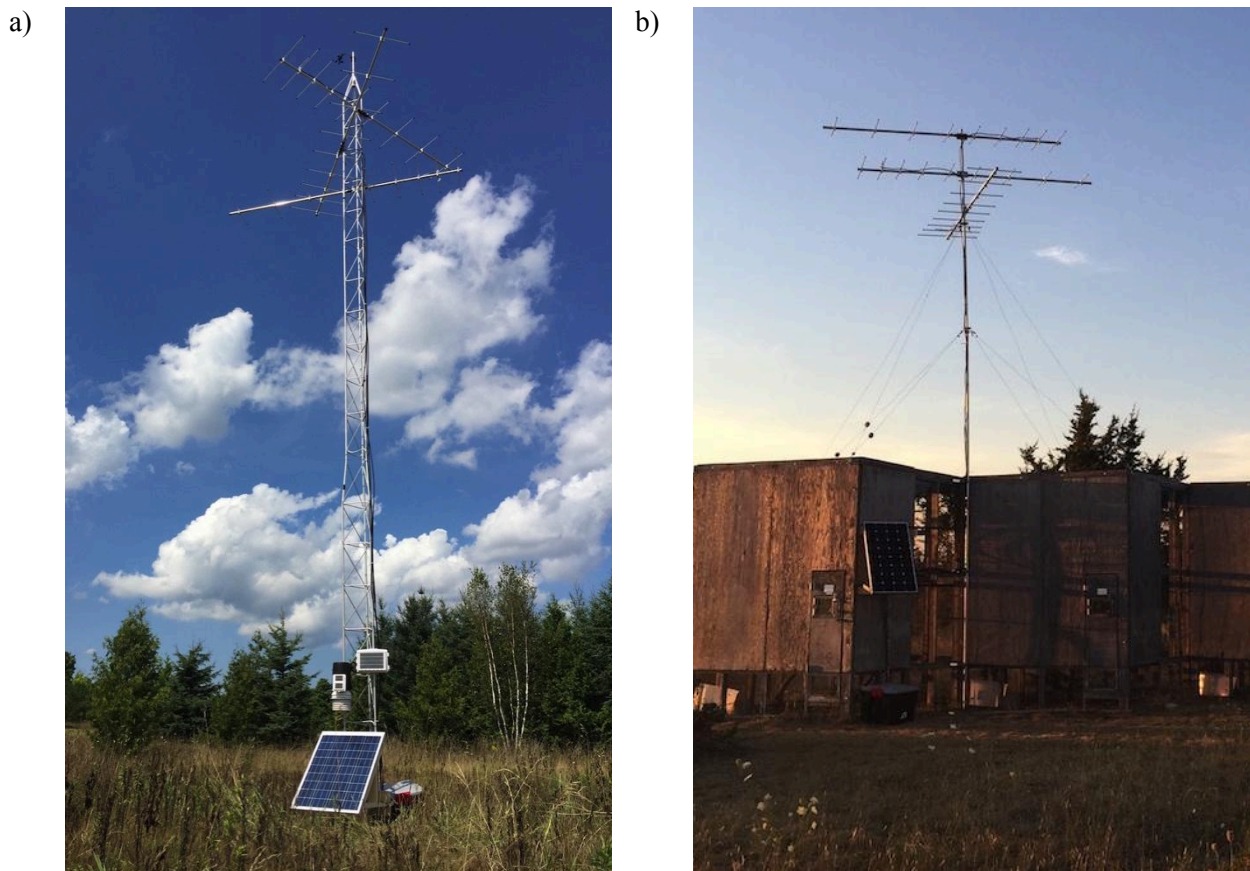


Figure 4. Motus receiving stations set up a) on an MNRF weather station in the Carden core, and b) at the Napanee field release site

3.5 Population Management

Lydia Attard, who had taken over management of the LOSH studbook after John Carnio retired in 2013, stepped down as studbook keeper in January 2016. Before leaving the position, however, she worked closely with Colleen Lynch, Consulting Population Biologist with the Population Management Centre, to proof the studbook and move it from SPARKS in to a different, open-source program (PopLink). Andrea Morgan (African Lion Safari) has now stepped in to the role of studbook keeper, and continues to work with Lynch while she learns the program. Lynch consulted on the LOSH studbook pro bono in 2016, but a consulting fee for her services should be included in the program budget moving forward.

With the growing interest in LOSH from US facilities connected with Conservation Centres for Species Survival (C2S2), and the continuing effort to expand the captive holdings to new facilities, there is a renewed need for a comprehensive captive database to manage the population. PopLink may be able to satisfy this need, at least in part, and WPC will be working with Morgan over the winter to assess whether this will be feasible, based on the available functions in the program. It is likely, however, that medical records will need to be maintained in a separate program. WPC will be consulting with partner facilities over the winter to develop a workable solution to the problem of how to maintain and share records.

4.0 Public Education and Outreach

4.1 Public Presentations and Site Tours

Lead Biologist, Hazel Wheeler was the guest speaker at the Kawartha Lakes Field Naturalists meeting on June 6, where she spoke about Loggerhead Shrike recovery activities in Ontario. Approximately 50 members were in attendance, and response was very positive. Wheeler also delivered an online presentation to the Fish and Wildlife Restoration Class at Cambrian College (April 6).

WPC Conservation Programs Director, Jessica Steiner, delivered a presentation to the Masters of Environmental Studies Resources Management Class at York University (June 18). This presentation highlighted LOSH, along with the other programs coordinated by WPC.

LOSH displays were staffed at four events over the season:

- Spring Birding Festival, May 28, Colonel Sam Smith Park, Toronto
- Napanee Riverfront Festival, June 11, Napanee
- Conservation Awareness Day, June 19, Toronto Zoo
- Napanee Fair, July 29 – August 1, Napanee.

Outreach at the Napanee events was targeted towards landowners, to encourage responsible habitat management, and forge new relationships within the community.

In partnership with members of the Napanee Plain Joint Initiative, WPC helped to organize an “Alvar and Grassland Stewardship Workshop”, that was held on September 20 in Roblin, ON. This workshop, geared towards local landowners, provided education on the unique flora and fauna of the Napanee Limestone Plain, and provided information on responsible stewardship, as well as funding available to landowners interested in undertaking stewardship projects. WPC gave a presentation on habitat stewardship for LOSH, and the NCC Scheck site (the Napanee LOSH field release site) was included in the fieldtrip portion of the workshop as one of the demonstration sites for habitat stewardship. Approximately 60 people were in attendance, including local landowners, environmental organizations, First Nations, provincial and federal government, and conservation authorities.

4.2 Media

The Loggerhead Shrike Recovery Program will be featured in an upcoming issue of “Les Débrouillards”, a French children’s science magazine based in Montreal.

Megan Perra, an artist (<http://feral5creativeco.com/>) and visual journalism graduate student at Concordia University, contacted members of the LOSH Recovery Program to make a visual communication piece on the shrike program. The final product will be a 7-minute video documentary looking at all aspects of the recovery program, and will be made available online.

Loggerhead Shrike will be featured in the next “Our Incredible World” series (<http://www.incredibleworld.ca/>), which is a web series, and associated school materials, designed to fit in the Ontario elementary school curriculum. This series, entitled “Sharing our Habitats”, will highlight SAR in Ontario. Some footage of captive birds and a release was taken this year, but the bulk of the filming will occur during the 2017 field season.

Hazel Wheeler did an interview about the LOSH Recovery Program for a Prince Edward County community radio station (99.3 County FM). The interview will be aired on “The County, Naturally”, a nature program hosted by Pamela Stagg; Stagg connected with WPC through the Alvar and Grassland Stewardship Workshop held in Roblin in September.

5.0 Habitat Stewardship

One habitat stewardship project has been completed Carden so far, in collaboration with Couchiching Conservancy. This project involved repairing a length of cattle fencing on Cameron Ranch, which is a very important area of LOSH habitat in the Carden core. This project was completed in April 2016; discussions will continue with Couchiching Conservancy over the fall and winter to identify other potential stewardship projects in the region.

In Napanee, WPC will be contributing to the securement of a parcel of land immediately adjacent to the NCC Scheck Nature Reserve, which has been the Napanee field release site since 2012. Securing this title will increase the protected area of contiguous, high-quality LOSH habitat in the region, which is especially important in the Napanee core as the vast majority of habitat is privately owned, thus unprotected.

6.0 WPC Fundraising

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

- Habitat Stewardship Program (HSP) for Species at Risk (year 1 of a 2-year grant)
- Species at Risk Stewardship Fund (SARSF)
- Colleges and Institutes Canada – Clean Tech Internship Program
- Kingston Solar (as a requirement of their ESA permit for the Sol-luce Kingston Solar PV Energy Project)
- Dillon Consulting
- Private foundations

In 2017, funding has been secured through HSP, and some private foundations. WPC has submitted a 2-year application to SARSF to implement the LOSH Recovery Strategy in Ontario, and will apply to the Clean Tech Internship Program to support field-staffing needs. Private foundation grants will continue to be pursued as applicable.

7.0 Ongoing research and activities

7.1 *Migratory urge study*

Leanne Grieves (PhD student at Western University, and 2015 Carden Biologist) is leading the migratory urge study, which will examine the effects of captivity of migratory restlessness in LOSH. Full experimental design is still in development, and will be informed by a pilot study that will be undertaken this winter with retired birds at the Nashville Zoo. This pilot will serve to test the equipment and video analysis methods, and will gather baseline behaviour data on adult birds during the non-migratory period. Joe deGrauw, Avian Curator at the Nashville Zoo, has purchased cameras, and designed and built enclosures, in consultation with Grieves. The pilot study is expected to begin mid-winter, once the birds have settled at the Zoo and become acclimatized to the study cages. The full study, which will incorporate other captive facilities and compare migratory behaviours against the baseline non-migratory data, is anticipated in fall 2017.

7.2 *Stress hormone research*

The stress hormone research, as originally proposed by Thom Luloff, was truncated by his departure from his PhD program and thus did not yield any publishable results. However, Josh Robertson, a PhD student at Trent University who is co-supervised by Gary Burness (Trent) and Gabriela Mastronomaco (Toronto Zoo) will be undertaking a similar research project that will help to inform captive management. This research will examine how chronic stress (measured through corticosterone in tail feathers) relates to reproductive output in captive LOSH, and further, will examine if post-fledging survival is related to the stress levels of parents. Robertson's research will also examine the use of thermal imaging to quantify acute stress in captive birds, which is an

emerging tool in avian research. Work will begin in winter 2016/17, with validation of methods on Northern Shrike. Application of methods to captive LOSH will follow in spring 2017.

7.3 *Ecogenomic tools for species conservation and management*

In partnership with Dr. Amy Chabot, African Lion Safari is leading research to develop ecogenomic tools for Loggerhead Shrike, specifically: 1) developing a suite of SNP (single nucleotide polymorphism) markers; 2) developing genetic markers for the major protein coding region in both Class 1 and Class 2 regions of the Major Histocompatibility Complex (associated with immune function); 3) using SNP and MHC markers to quantify the effect of captivity and managed breeding on the genetic diversity of shrike; 4) using previously developed nuclear genetic microsatellite markers, determine range limits of the DU including shrikes found in Ontario; 5) determine the suitability of Ontario captive stock for captive breeding efforts in the northeastern United States; and 6) make recommendations to improve management of the shrike captive-breeding program in Ontario and in eastern North America. The project will be completed by April 2017. Progress to date is as follows:

- The genome of the Loggerhead Shrike has been sequenced and aligned to that of the Zebra Finch. Seventy five percent of the shrike genome aligned to that of the reference genome.
- A double-digest RADSeq (ddRADSeq) library was created using a standard restriction enzyme “cutter”.
- The ddRADSeq library was assayed on an Illumina HiSeq. Data was received in October 2017.
- Bioinformatics are underway to identify reliable SNPs for use in analyses e.g. Inbreeding Depression.
- Species-specific MHC Class 1 and Class 2 primers have been developed that reliably amplify Exon 2 of Class 2, and Exon 3 of Class 1.
- A database of founders, breeders and current living birds as well as a subset of hatch year birds, both that survived and did not survive, in 2011 has been compiled. DNA extraction has been completed for ~100 of the <360 individuals.

Future work will focus on the following:

- SNP and MHC data analysis will look at diversity levels within and among cohorts (founders versus current breeders) and core areas (i.e. founder natal origin).
- Collection of tissue from shrike specimens in the National Museum of Natural History in Washington, D.C. is anticipated by the end of the 2016 calendar year. Tissue collection, DNA extraction, and PCR of microsatellite markers will be undertaken in collaboration with the Smithsonian Conservation Biology Institute.
- The studbook, currently in the program PopLink, will be updated to include relevant information compiled as part of this project (e.g. genetic diversity indices, cause of death, etc.)
- Microsatellite data analysis will be conducted by pooling results from museum specimens and shrike sampled from extant populations in Virginia and West Virginia with those used in the taxonomic re-assessment of the species conducted by Chabot and Loughheed (2016).
- A final report will be prepared summarizing results and will include recommendations for future work, and management of the population in human care.

7.4 *U.S. partnership development*

Amy Chabot has been working with Jessica Steiner, Hazel Wheeler, Rich Bailey (Virginia state ornithologist), Sergio Harding (West Virginia state ornithologist) and Katy Palfrey (Conservation Centers for Species Sustainability) in furthering the development and implementation of a North American Loggerhead Shrike collaborative research and conservation initiative, as a means to address knowledge gaps for the species locally, regionally and range-wide. The following are highlights of work to date:

- A North American Loggerhead Shrike Workshop has been organized, and held two annual meetings to date, both in conjunction with the Southeastern Partner’s in Flight annual meeting, with a third being planned for 2017.
- A Draft Conservation Action Plan has been developed by the group in which key knowledge gaps and short-term priority activities are identified. The focus is on identifying habitat, surveying for shrike and

banding adult birds. Efforts are underway to build a citizen science project to assist with surveys and monitoring.

- The Banding Protocol developed for use in Ontario is being revised slightly for review and approval of the North American Banding Council.
- Survey protocols and detectability studies are being led by Chris Lituma (Virginia) and Than Boves (Arkansas) with advice from Dave Buehler (Tennessee).
- The Loggerhead Shrike has been adopted as a focal species by C2S2 under their new Avian Sustainability Program. Katy Palfrey, C2S2 Executive Director, has been assisting in efforts to develop work with state partners. A meeting was held in March 2016 at the Smithsonian Conservation Biology Institute in Front Royal, VA, with a focus on how Conservation Breeding Centers could collaborate, and assist or lead on-the-ground efforts.
- Surveys and banding are being conducted in Illinois, Indiana, West Virginia and Virginia. In December 2016, biologists from WV and VA will be training counterparts from Tennessee, Kentucky, North Carolina and South Carolina, with the expectation that surveys and banding will be initiated in those states in 2017.
- An MSc project was initiated in January 2016 in South Carolina with a focus on identifying the use of and detectability of shrike in different habitat types.

7.5 Building Regional Capacity

WPC staff continue to participate as a member of the steering committee for the Napanee Plain Joint Initiative (NPJI). This year, the NPJI focused on outreach, including the development of alvar-specific species fact sheets, a landowner handbook for species identification, and delivering an Alvar and Grassland Stewardship Workshop to landowners in the Napanee region (as described in section 4.1). Mapping of ecologically important and/or protected areas in the Napanee region continues to be refined, for the purpose of guiding future land acquisition.

Following the success of the NPJI, WPC staff initiated the rebuilding a similar group in the Carden area (the Carden Working Group), which met as a smaller group following the Carden Forum meeting in fall 2015. Where the Carden Forum is more focused on information-sharing than activity-planning, the working group included regional stakeholders that have an environmental conservation focus, and included representatives from WPC, Couchiching Conservancy, NCC, Ontario Parks, Kawartha Conservation, and Lake Simcoe Region Conservation Authority. The goal of the working group is to share information on upcoming projects, discuss issues of common concern, and explore opportunities for collaboration among conservation groups/agencies. WPC will be approaching the working group this fall to begin planning for a landowner workshop to be held in Carden next year, paralleling the Alvar and Grassland Stewardship Workshop put on by NPJI this year.

In October, WPC was contacted by staff at the Escarpment Biosphere Conservancy (EBC), which is a land trust that focuses on protecting land in the Grey-Bruce and Manitoulin Island regions. They were interested in initiating targeted LOSH surveys on their lands where appropriate habitat exists, and WPC's field protocols were shared with them to ensure a coordinated and comparable effort. Further, the EBC expressed interest in assisting with the testing and development of an on-site volunteer LOSH survey protocol (to be developed by WPC this winter), including potentially delivering volunteer and landowner training sessions. Discussions will continue with the EBC over the winter, with the goal of ensuring that their staff are prepared for LOSH surveys next spring.

To date, WPC has been unable to transition coordination of key LOSH recovery activities to other organizations, and that goal is now thought unfeasible. However, efforts will continue to work with existing partners, and seek out other organizations, where recovery activities could be approached cooperatively (e.g. volunteer habitat surveys). Bird Studies Canada, through the Important Bird Areas program, remains a high priority organization for collaboration on the development and/or expansion volunteer surveys for LOSH.