2017 Eastern Loggerhead Shrike Recovery Program - Summary Report

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Wildlife Preservation Canada

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Wildlife Preservation Canada

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1.0 Highlights from the 2017 field season

Wild population

26 wild pairs (12 in Carden, 13 in Napanee, 1 in Pembroke)
58 wild young fledged (20 in Carden, 38 in Napanee)
0 wild young recruited for captive population
9 unmated single birds (3 each in Carden and Napanee; 1 each in Grey-Bruce, Smiths Falls, and Quebec)
At least 16% of all birds detected in the wild this year were captive-bred

Captive population

32 initial pairs, and 6 repairing attempts
27 pairs fledged young
144 fledglings survived to end of season
19 fledglings died (as of Nov 6)
16 fledglings retained
128 fledglings released; 16 with radio tags

Status of the captive population (as of Nov 10)

87 birds in captivity
63 breeding adults
16 retained young
5 retired birds; one at Ontario facilities, and four at U.S. facilities
3 hand-reared education birds (2013HY bird at Mountsberg, two 2014HY birds at Toronto Zoo)

2.0 Wild population

2.1 Monitoring

Twenty-six pairs of Loggerhead Shrike were confirmed in Ontario this season: 12 in Carden, and 13 in Napanee, and 1 in Pembroke-Renfrew (Fig. 1). The Carden and Napanee cores also each had one additional site where observations suggest a breeding pair, which would bring the total to 28, though the paucity of observations for these two sites leaves some uncertainty. Regardless, either pair count represents a marked increase over the 18 pairs found in Ontario in 2016, and more than a doubling of the 11 pairs observed in 2015. Using confirmed numbers (26 pairs), Carden saw a 50% increase in number of pairs compared to last year, and Napanee counts increased by 30%. The breeding pair in Pembroke-Renfrew was reported on eBird in the post-season, so no details are currently available. Efforts will be made to get details from the original observers over the winter.

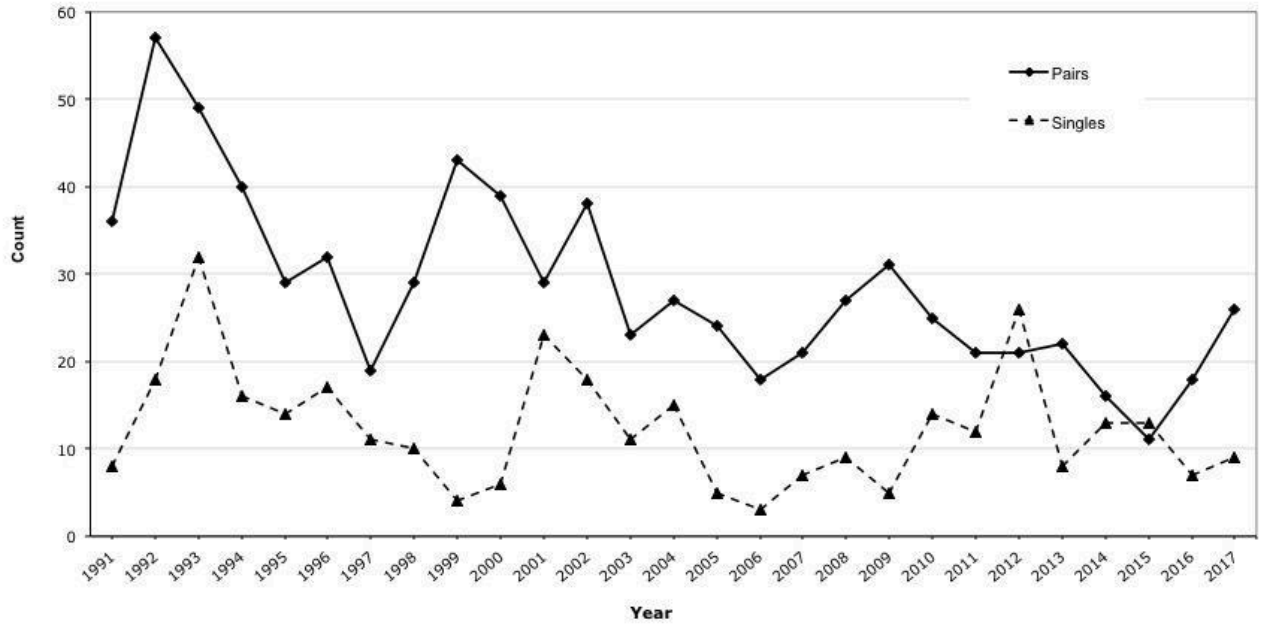

Figure 1. Number of LOSH pairs and single birds in Ontario and Quebec, 1991-2017

Breeding success was high in Napanee this year, with 92% of confirmed pairs fledging young, though in Carden only 67% of pairings were successful. Across Ontario, 80% of confirmed nesting pairs fledged young. There were 58 fledglings confirmed this year (38 in Napanee, 20 in Carden), which gives a somewhat low average of 2.9 young per successful nest; however, this number is likely an underestimate as accurate fledgling counts were difficult to achieve on several sites where staff could only survey from the roadside, and three breeding territories in Carden were located after young had fledged, so some individuals may have gone unobserved. There were no successful double-clutches this year.

In addition to breeding pairs, there were a handful of single birds, most of which were difficult to confirm as separate individuals as they were seen sporadically and were unbanded. However, three single birds could be confirmed in Napanee as they held territories for periods of at least two weeks. Three single birds were also confirmed in Carden, though those birds were only seen once. Two were banded, with full combination observed for one (RD/SI:RD/WH), and partial for the other (?/?:YE/RD), though that partial combination was not seen elsewhere in the region. The final single bird in Carden was unbanded, and was seen feeding a fledgling in the territory of another breeding pair (both of which were banded). This territory proved difficult for staff to confirm bands at each visit, so it's not clear if this adult was helping the pair throughout the season, or was transient.

Outside of the Carden and Napanee cores, there were three sightings of unbanded birds in Grey-Bruce, two in Smiths Falls, and a bird carrying a radio tag seen once in Quebec, which is the first time a LOSH has been reported in Quebec since 2010. A second-year LOSH was also seen on Manitoulin Island on October 15 (reported on eBird), though that individual was unbanded, so nothing can be said of its origin. Field staff did conduct surveys on Manitoulin this year, though only one day was devoted to surveying the island, so a small and/or scattered population could have gone unnoticed.

Using conservative counts of confirmed pairs and single birds, the LOSH population in eastern Canada was 61 adults this year.

2.2 Returning captive-bred birds

Ten captive-released birds were confirmed returning to Ontario breeding grounds, and one additional captive-origin bird was spotted once in Quebec (Table 1). Ultimately, captive-origin birds made up 16% of the population of adult shrike seen in eastern Canada this year. Eight of the captive-origin birds seen in Carden and Napanee were observed as part of breeding pairs, and the other two were transient singles. Six of the breeding birds paired with wild birds, and one pair was made up solely of captive-bred birds. All of these pairings bred successfully, with 20 fledglings confirmed (35% of all wild juveniles seen in Ontario). Unfortunately, one of these birds was road-killed early in the season, though the remaining adult was able to support the four fledglings from that nest.

Four of these birds were confirmed as 2016-releases (4% return rate); the bird spotted in Quebec was only banded with a metal band on left, which is the practice for radio-tagged birds, so year of origin can not be confirmed. The oldest confirmed captive-origin birds were hatched in 2014, and both were birds originally released with geolocators that were removed in 2015. There may have been a 2012-release bird in Napanee that has been observed breeding in the area in 2014 and 2016 (band combination: YE/SI:OR/DG), but as only a partial band combination was observed in 2017 (YE:OR), this bird could not be distinguished with certainty from numerous 2016-releases that also bore those colour bands.

Table 1. Captive-bred birds observed in 2017

Core	Band combination	Hatch year	Hatch site	Release site	Sex	Paired?	Breeding outcome
Carden	SI/YE:WH/YE	2016	TZ	Carden	M	Y[a]	3 fledglings
	SI/YE:DG/OR	2016	TZ	Carden	U	Y	2 fledglings
	SI/YE:RD/WH	2016	ALS	Napanee	U	Y	1 fledgling
	WH/SI:WH/RD	2015	ALS	Napanee	F	Y[a]	3 fledglings
	WH/SI:DB/RD	2015	MRC	Carden	U	Y	5 fledglings
	RD/SI:YE/OR	2014	Carden	Carden	M	Y	2 fledglings
	RD/SI:WH/RD	2014	Carden	Carden	U	N	--
	?/?:YE/RD	n/a	n/a	n/a	U	N	--
Napanee	SI/YE:WH/DG	2016	ALS	Napanee	M	Y	4 fledglings[b]
	YE:OR (partial)[c]	2012 or 2016[d]	n/a	n/a	U	Y	3 fledglings
Quebec	SI(L)	2014-2016	n/a	n/a	U	N	--

[s] Pair comprised of two captive-origin birds

[b] Captive-origin bird road-killed during nestling stage, but female successfully fledged four young

[c] Confirmed captive-origin, despite only partial band combination, through review of banding records.

[d] Nineteen birds released in 2016 with either YE/SI or SI/YE on left and OR on right (12 in Napanee), and one bird released in 2012 banded YE/SI:OR/DG that has been re-sighted as part of a breeding pair in Napanee in both 2014 and 2016.

2.3 Volunteer surveys

LOSH survey efforts were again aided by Adopt-A-Site (AAS) volunteers this year. The effectiveness of the standard AAS protocol, which involves roadside surveys of habitat patches, was tested over the past two years,

and was found to be lacking. An on-site survey protocol was thus developed, modelled after on-site grassland bird surveys developed by Virginia Working Landscapes, to increase the effectiveness of the citizen science component of the LOSH Recovery Program. This protocol was piloted with a pair of volunteers on one site in the Carden core (part of Carden Alvar Provincial Park), with plans to increase coverage in coming years. The standard roadside surveys were also continued this year, to maintain public engagement in the LOSH Recovery Program.

2.3.1 Roadside surveys

Thirty-eight volunteers conducted roadside surveys of 158 priority patches across Ontario. Smiths Falls and Grey-Bruce has good volunteer coverage, with 47 and 31 sites surveyed in each respective core, though Pembroke-Renfrew has minimal coverage, with only one volunteer surveying six sites, and no volunteers submitted data for Manitoulin Island. LOSH activity in Pembroke-Renfrew and Manitoulin Island has been admittedly low in recent years, with no LOSH seen in the breeding season in either core since 2012; however, with the sighting of a SY LOSH in Quebec this past spring, and a late-season SY LOSH on Manitoulin in October, there is reason to maintain surveys in both of these cores. Therefore, efforts will be made to increase volunteer participation in coming years through targeted recruitment emails to naturalist groups in those areas.

Volunteers reported LOSH on four sites: three in Carden, and one in Napanee. In Carden, two of these reports were LOSH already known to field staff, and the third was a pair that was never confirmed by staff during the field season, though review of multiple reported sightings (from AAS volunteers and locals) confirmed this pair in the post-season. The Napanee report was from the first survey window in April, which, since field contracts now start in May, will contribute to the accuracy of LOSH occupancy date for this site.

Twelve volunteers used call-playback (CPB) during their surveys this year, with two positive results. Though the efficacy of CPB at increasing detectability of LOSH is still uncertain, it will continue to be promoted to volunteers as a part of the AAS survey protocol.

2.3.2 On-site Adopt-A-Site pilot

The on-site AAS protocol was piloted with a pair of volunteers on one site in the Carden core (part of Carden Alvar Provincial Park), and resulted in the detection of a pair of LOSH that had not yet been found by WPC staff. In this very limited pilot, the protocol could thus be considered successful. A debrief will occur over the winter with the two volunteers who participated in this pilot, to gauge user-friendliness, and identify areas for improvement. A larger rollout is planned for spring 2018, including sites in both Carden and Napanee.

One drawback of the on-site volunteer protocol is the significant amount of staff time that is required for pre-season coordination, versus the standard road-side surveys, so it is still not clear whether this will ultimately be a useful tool to supplement staff-led LOSH surveys. Also, though the goal is to have volunteers survey on-site on privately owned land, the pilot survey this spring was on provincially owned land that is arguably easier to access because of established working relationships. More focus will be put on developing volunteer-landowner relationships for 2018 surveys.

2.4 Nest cameras and nest failures

Small time-lapse cameras were deployed at three nest sites in Napanee to assess nest predation as a limiting factor; no cameras were deployed in Carden due to uncertainty around nest locations during the incubation and nestling period. One of the camera-monitored nests successfully fledged young, but the other two nests failed. No predation events were captured by cameras at one nest, though extreme weather events (high winds and rain) around the time of nest failure may have been a factor. The camera deployed at the third nest malfunction, so no useable images were recorded.

Five additional nest failures were observed this year at sites without cameras: two in Napanee and three in Carden. All of the failures in Napanee (including those with cameras) were second clutches, and though cause of these failures was not determined with certainty, extreme weather through mid-July is suspected as a

contributor. Two of the three nest failures in Carden were at sites where field staff did not have property access, so cause of nest failures was difficult to determine; however, predation is suspected at one of these sites, as the nest failed in the nestling stage when begging calls can make nests more vulnerable, and American Crows and American Kestrels were regularly observed in the vicinity. The final failure was on a site where field staff had not determined the specific nest tree, so no follow-ups were completed after activity ceased in the area.

2.5 Nest checks

No regular nest checks were performed by the Lead Biologist this year, either because of staff difficulty in locating nest trees (Carden), of because of scheduling difficulties (Napanee). However, Napanee field staff conducted two nest checks, in consultation with the Lead Biologist, when nest status was uncertain. One of these checks was at a nest where behaviour appeared to decrease, so failure was suspected. The nest was approached on June 1st and was found to be empty with no eggshells or signs of disturbance. Fledglings were seen at this site four days after the check, so the perceived failure was simply fledging, and reproductive timing had been miscalculated.

The second check was performed by Napanee field staff to check the status of a nest after one of the adults was road-killed, to assess what actions should be taken to support the remainder of the family group. This check found nestlings approximately 16 days old, and four chicks were seen branching the next day. Supplemental food was given at this site, to support the female in feeding the fledglings over the next week.

2.6 Banding

Five wild LOSH were banded this year, all in Napanee, by Hazel Wheeler and Amy Chabot. Banded birds included both adults from two pairs, and a female from a pair where the male was already banded. Birds were banded with either SI/RD or RD/SI on right, to indicate wild adults caught in 2017. Regular behaviour was observed at all territories the day after trapping activities.

Wheeler also made trapping attempts at two nests sites in Carden where only one member of the breeding pair was banded; however, unbanded birds at both territories were elusive during trapping attempts. Scheduling difficulties prevented any further trapping attempts.

After trapping activities, at least 37% of the wild LOSH population remained unbanded this year.

2.7 Development and critical habitat

Habitat protection continues to be a high-priority activity for the LOSH Recovery Program. WPC continues to submit all LOSH nest locations to the Ministry of Natural Resources and Forestry (MNRF) on an annual basis, and these locations are used to direct habitat protection through the MNRF's General Habitat Description (GHD) for Loggerhead Shrike. However, the LOSH Recovery Team agrees that the current GHD, which leads to the protection of only the habitat within 400m of nest trees, does not offer sufficient habitat protection to support the recovery of the species. To address this, WPC submitted a letter to Amy Mogunel, Manager of the Species at Risk Recovery Section at the MNRF, in December 2016, highlighting the shortfalls of the GHD and stressing the need for revision (letter available upon request). In follow-up to this letter, Hazel Wheeler, Jessica Steiner, and Amy Chabot met with Mogunel and other MNRF staff this past February to discuss LOSH habitat needs, specifically how Chabot's hierarchical habitat analysis could inform more appropriate provincial habitat protection. The meeting felt positive, and it appears that the MNRF may be incorporating some of the habitat protection recommendations in to their policy and planning, though the GHD has not yet formally been updated. There have also been some follow-up discussions regarding the inclusion of single LOSH on territory in habitat protections, as protection has historically only been granted to nest sites. Moving forward, coordinates of single LOSH territories will be submitted to the NHIC along with nest sites, for potential inclusion in protected areas.

WPC has also continued to work with BluEarth Renewables in the development of the Loyalist Solar Project in the Napanee core, though Amy Chabot has become more active in the consultation than WPC staff this past season. BluEarth has worked closely with Chabot in the development of a LOSH landscape analysis research project, which included only the Loyalist project area at its inception, but has since expanded to include core LOSH areas across Ontario. These analyses will bring together results of all habitat work to-date, in the development of a resource selection function for LOSH in Ontario, which can be used to address hypotheses about LOSH habitat use.

It should be noted that WPC had no contact with Kingston Solar personnel this year, despite the need for annual monitoring of the habitat offset areas that were established as part of the Overall Benefit Permit for this project. WPC inquired with the MNRF about habitat offset surveys, but no information could be given about if they were still occurring.

2.8 Staffing needs

Staffing was increased this year, with a team of two working in Napanee, and a team of three (including a short-term husbandry technician) in Carden. This level of staffing was absolutely necessary this season, given the increases in both the wild population and the number of captive-bred and released birds, and funding will be sought to maintain staffing at this level in subsequent years.

3.0 Captive population

3.1 Status of the captive population

As of November 10, there were 87 birds in the captive population (including partner facilities in both Canada and the US). Seventy-nine of these birds are considered breeding stock, and the other 8 are education/exhibit birds, or have aged out of the breeding population. The current breeding stock includes: 16 HY birds retained from this breeding season, 46 birds that are 5 years or younger (HY 2012-2016), 14 birds that are 6-10 year olds (HY 2007-2011), and 3 over 10 years old.

3.2 2017 Captive breeding and release

3.2.1 Summary

There were 32 initial pairs this season, and an additional 6 re-pairing attempts, for a total of 38 pairings. Twenty-seven of these pairs produced 144 young that survived to-date (as of Nov 3; Fig. 2). One hundred and twenty-eight young were released to the wild (78 in Carden, 50 in Napanee), which is a record for the program (highest release number before this season was in 2006 when 111 young were released). Sixteen young were retained to add to the captive population, and 19 fledglings died before the end of the season. This was an outbreak year for West Nile Virus (WNV), and at least six fledgling tested positive for WNV during necropsy; final counts will be tallied once all necropsy reports have been received (details in Mortality section below).

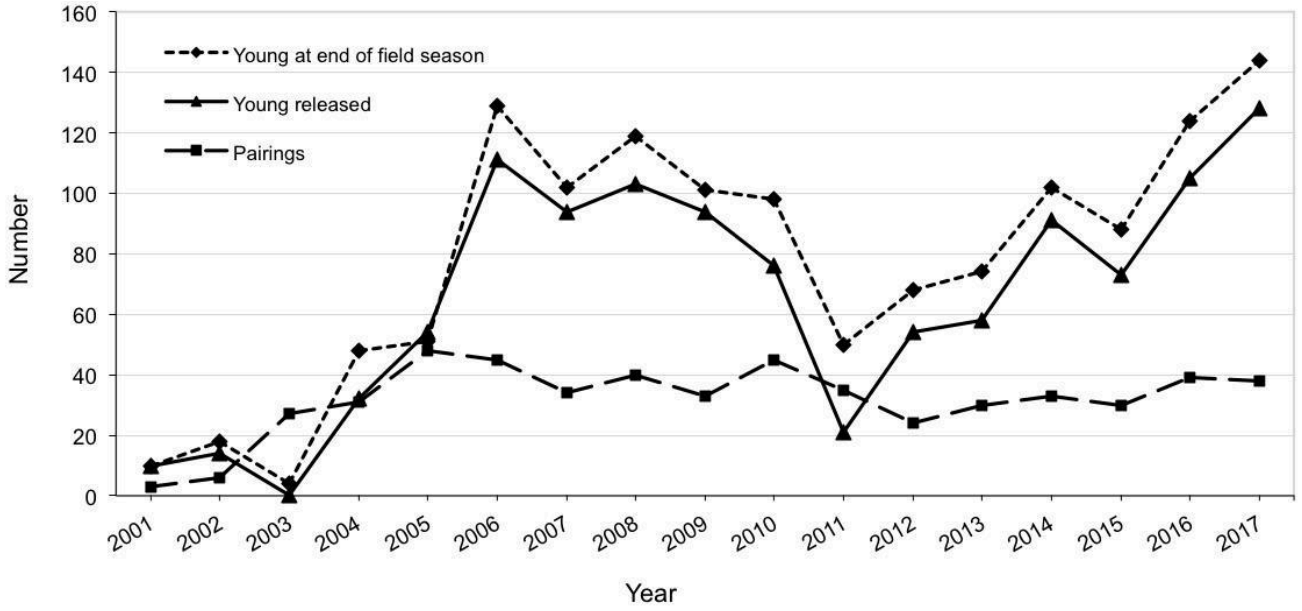

Figure 2. LOSH captive pairings, young surviving to end of season, and young released, 2001-2017

3.2.2 Breeding facility results and wintering status

African Lion Safari (ALS): 8 of 11 pairings fledged 48 surviving young (25 from 1st clutches, 23 from 2nd clutches). Forty-five birds were released (28 in Napanee, 17 in Carden), seven with radio tags. Three young were retained for the captive population (one from 1st clutches, two from 2nd). Three 2nd clutch young died prior to release or retention. This facility is currently wintering 20 birds, including three retained young, and one bird that is no longer considered breeding stock (Studbook 2069).

Mountsberg Raptor Centre (MRC): 4 of 7 pairings fledged 27 surviving young (16 from 1st clutches, 11 from 2nd clutches). Twenty-four were released (16 in Carden, 8 in Napanee), three with radio tags. Three 2nd clutch young were retained for the captive population, and three additional 2nd clutch young died prior to release or retention. This facility is currently wintering 12 birds, including three retained young; an additional hand-raised captive bird is being held for education purposes.

Smithsonian Conservation Biology Institute (SCBI): 6 of 9 pairings fledged 21 surviving young (8 from 1st clutches, 13 from 2nd clutches). Twenty birds were transferred to Ontario in August and released at the Carden field site (two with radio tags). Three fledglings died prior to release or retention, four nestlings from one clutch where predated by a snake, and two breeding adults died during the breeding season. This facility is currently wintering 14 birds, including one retained young and one retired bird, but eight individuals will be transferred here in November, bringing their total holdings to 22 birds.

Toronto Zoo (TZ): 10 of 10 pairings fledged 48 surviving young (27 from 1st clutches, 21 from 2nd clutches). Thirty-nine birds were released (25 in Napanee, 14 in Carden), four with radio tags. Nine young were retained for the captive population, five from 1st clutches, and four from 2nd. Ten fledglings died prior to release or retention. This facility will hold 20 birds over the winter, including seven retained young, and two education birds; an additional eight birds are being held at this facility, but will be transferred to SCBI in November to augment their breeding pool.

3.2.3 Non-breeding facility status

Little Ray's Reptile Zoo (LRR): Little Ray's continues to function as an overwintering facility, and it is currently overwintering 9 birds that are part of the captive breeding population. The overwintering pens were moved from their original location at the LRR off-site holdings at the end of the summer, and set up at back of the zoo property in time to receive birds in October. This site is more accessible to the public, but cages were oriented to minimize sight lines between LOSH and any zoo patrons. LRR also has space for a LOSH to be put on public

display, as their existing exhibit bird had to be euthanized in early November (see section 3.3.1). Efforts will be made to fill this exhibit space as soon as possible.

Nashville Zoo at Grassmere (NZ): The Nashville Zoo is holding three retired birds that have aged out of the captive breeding population, and has been working to develop methods to study the effect of captivity on migratory urge in LOSH (see section 6.2). Nashville is still interested in expanding their involvement to include captive breeding, and this possibility will be explored over the next year.

Interest from other, smaller facilities (e.g. Riverview Zoo, Creature Quest) has waned, and WPC effort has been refocused towards building relationships with larger facilities in the U.S. that could contribute significantly to the captive breeding population. These relationships will continue to be explored through C2S2 and the LOSH Working Group.

3.3 Mortality

3.3.1 Adults

We had 11 adult deaths in the captive population this year, as of November 10, plus one escaped bird. An additional death occurred at the end of 2016, after last year's summary report. The death in 2016 was a 6-month old female with an enlarged heart that appeared to die from cardiac arrest at the Toronto Zoo, likely caused by stress.

In 2017, two birds had cause of death identified: a 2-year-old bird died from a vitamin A deficiency at ALS, and a 6-year-old bird died of acute head trauma at SCBI. Two other birds were euthanized because of illness: one a 9-year-old bird at SCBI that was suffering from a chronic nasal infection that had spread to the eye and sinuses, and the other a 13-year-old bird that was on exhibit at LRR that had declined in health due to her advanced age. Two other birds at ALS were euthanized as they were linked to the genetic line that seemed to be perpetuating congenital cataracts within the captive population. Cause of death for the remaining four birds, two of which were held at SCBI, one at LRR, and one at NZ, is currently unknown; one bird was found dismembered within her breeding enclosure, so no necropsy was possible, and final necropsy results for the other three birds are pending.

In addition to the deaths, one adult bird escaped when it was being boxed for transport from LRR in April.

3.3.2 Fledglings

There were 19 fledgling deaths (12%) as of November 6, which is slightly higher than the fledgling mortality in 2016 (10%; Fig. 3). Ten of these deaths were birds hatched at TZ, and the remaining 9 were split evenly amongst ALS, MRC and SCBI. Notably, five fledgling deaths (and one additional nestling death) have been attributed to West Nile Virus (WNV) so far, with preliminary necropsy results suggestive of WNV for two other birds, though final results are still pending. WNV affected fledglings at all facilities in Ontario, with two deaths at TZ (plus one nestling), two at MRC, and one bird from ALS dying from WNV two days after transfer to the Carden field site.

Capillarisis was also a significant contributor to fledgling mortality this year, and was implicated as a primary or secondary factor in the death of four fledglings from a single clutch at TZ. Other deaths were attributed to trauma (one bird), upper respiratory infection (one bird), and accidental isolation in an unserviced cage (one bird). The causes of death for the remaining five fledglings are currently unknown, either because necropsy results were inconclusive, or reports are pending.

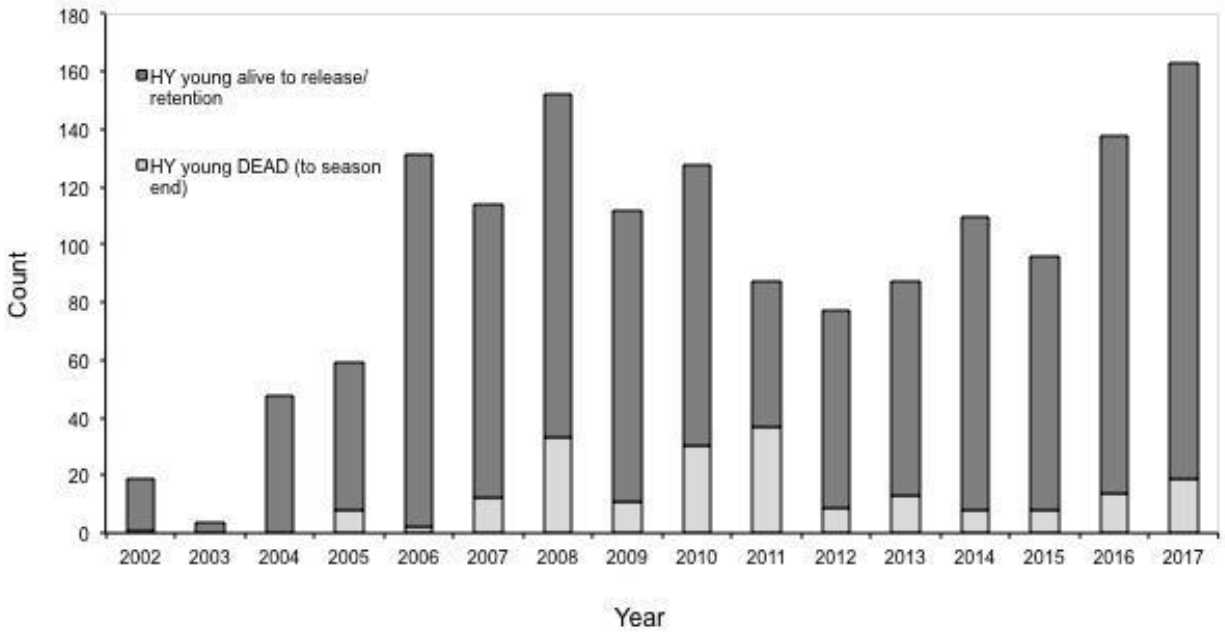

Figure 3. Number of fledglings produced each year that died or survived to release or retention

3.4 Captive-bred releases

3.4.1 Banding

One hundred and fifty-five captive juvenile shrikes received stainless steel bands this season. Released birds that received colour-bands were given a combination that included either SI/RD (63 birds) or RD/SI (48 birds) on the left leg to identify them as a 2017 release bird. One captive-bred bird was banded with SI/RD on the right leg prior to release because an injury on the left leg prevented use of the regular colour band scheme. Birds released with radio tags (16 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

Sixteen birds were released with radio tags on the Motus network this season, using the same nylon-coated elastic cord harness attachment technique used since 2015. Though all birds passed pre-release inspection and were flying well prior to release, one bird released with a radio tag in Napanee at the end of July was observed to be unable to fly on Aug. 7; this bird was perching on a brush pile, and walking to a nearby corral to access the supplementary food. Efforts were made to trap this bird when it was first seen, but were ultimately unsuccessful, and this bird was not seen again.

3.4.3 Post-release movements

Short-distance, pre-migratory dispersal of captive releases was seen by field staff in both Napanee and Carden this year. In Napanee, a bird released on Aug. 9 was seen on Aug. 29 on the territory of a wild LOSH pair approximately 6km to the west of the release site. The juvenile was seen interacting with one of the wild adults, causing the wild bird to alarm call and leave the area. In Carden, two captive-bred juveniles released at the end of July were seen in Carden Alvar Provincial Park, approximately 4km north of the release site, in August. One bird was seen on two occasions, and the other was present on the site for approximately three weeks.

Further afield, two captive released birds were sighted during migration at the end of the summer. One bird, hatched at SCBI and released in Carden on Aug.25, was seen at the Darlington Nuclear Plant in Bowmanville on Aug. 28. The other bird, seen on Aug. 31 and Sept. 1 in Buffalo, NY, was hatched at TZ and released in Carden on Aug. 5.

No detection data have yet been received for radio-tagged birds released this year, but data received to-date is detailed in section 6.1.

3.5 Population management

Andrea Morgan (African Lion Safari) continued in her role of studbook keeper in 2017, with Colleen Lynch, Consulting Population Biologist with the Population Management Centre, contracted by WPC to produce a Breeding and Transfer Plan for the season, including release prioritization and repairing recommendations throughout the breeding season.

Excluding holdings for education/outreach birds, holding capacity across all project partners is currently 86 birds. However, four of those spaces (at Nashville Zoo) are solely intended to be holdings for retired birds for the foreseeable future, so effective space for breeding birds is 82 pens. SCBI added capacity for four more individuals this year, but there is still a need for 18 additional spaces if we are to reach our goal of 100 breeding individuals. Current captive partners in Ontario could likely provide this space, if there is some assurance that the captive-breeding and release program will continue for the foreseeable future. To this end, the development of a strategic plan for the program will remain a priority for the Recovery Team. Though this plan was earmarked for development over the winter of 2016/17, no progress has yet been made to its completion.

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 was a renewed need for a comprehensive captive database to manage the population. PopLink was found to have suitable capabilities to contain this database, including medical records, and efforts to incorporate all data in to the program were started in 2017. Full integration of all captive program activities (including breeding, transfers, and medical procedures) is anticipated in 2018.

4.0 Public education and outreach

4.1 Public presentations and site tours

Lead Biologist, Hazel Wheeler was the guest speaker at the Toronto Ornithological Club meeting on Feb. 13, and the Prince Edward Point Bird Observatory AGM on May 27. Both meetings were quite well-attended, with 50-80 people present, and the presentations were received very positively.

LOSH displays were staffed at three events this year:

- Niagara Peninsula Hawkwatch Open House, April 14, Beamer Conservation Area, Grimsby
- Spring Birding Festival, May 27, Colonel Sam Smith Park, Toronto
- Family Funday: Brilliant Science, September 24, Royal Ontario Museum, Toronto

4.2 Events

WPC partnered with the Bloor HotDocs cinema for a presentation of ‘Winged Migration’, held at the cinema on April 8. The Toronto Zoo also participated in the event, with Charles Guthrie bringing one of the Zoo’s outreach shrikes (Sparky) for his first public appearance off of Toronto Zoo property, and he was very well-received. Hazel Wheeler gave a brief introduction to the movie, and Bridget Stutchbury participated in a Q&A after the screening. Approximately 185 people were in attendance.

WPC also participated in the Nature Conservancy of Canada’s event to announce the acquisition of a parcel of land immediately adjacent to the existing Napanee Plain Alvar Nature Reserve, which hosts the Napanee release site. Jessica Steiner spoke to media at the event, and Hazel Wheeler gave a tour of the Napanee field site. Local

media was present at the event, so the LOSH Recovery Program received coverage on local TV and online news sites.

In partnership with the Couchiching Conservancy and the Nature Conservancy of Canada, WPC also led the organization of an "Alvar and Grassland Stewardship Workshop", that was held at the Carden Rec Centre on October 3. This was the second in a series of workshops geared towards local landowners (the first held last fall in the Napanee region), and provided education on the unique flora and fauna of the Carden Alvar, information on responsible stewardship (including LOSH habitat), and highlighted funding available to landowners interested in undertaking stewardship projects. Twenty people were in attendance, including local landowners, environmental organizations, and citizen scientists. This level of attendance was somewhat lower than was hoped, likely because many landowners were unable to attend a full-day workshop during a busy fall farming season. In future, consideration will be given to restricting any landowner workshops to evenings, to boost attendance.

4.3 Media

This year saw the completion of filming for the Our Incredible World series: Sharing our Habitats (https://incredibleworld.ca/2017/). Hazel Wheeler played the role of "shrike expert" in a series of scenes that were filmed this July at the Napanee field release site. The full series, which will also feature footage taken at the Toronto Zoo, is expected to be released next year.

5.0 Habitat stewardship

Habitat stewardship projects continued this year, though they were only funded through the federal Habitat Stewardship Program, so capacity was limited; no money was allocated for habitat stewardship from the provincial Species at Risk Stewardship Fund. One project has been completed in Napanee so far, and involved repairing a length of cattle fencing on the Wales property in August. This property has been a nesting territory for LOSH in 16 of the last 25 years, including annual occupancy since 2015. Discussions are ongoing with the Nature Conservancy of Canada to complete some vegetation thinning at the west end of the Scheck Nature Preserve, which has been the Napanee LOSH field release site since 2012. WPC will also contribute to the replacement of a solar pump on the Scheck property.

In Carden, WPC will be contributing to the repair of cattle fencing around a property near Windmill Ranch. This property has so far been inaccessible to WPC staff, but was recently purchased by a landowner that is willing to work with WPC, so will be open for on-site surveys in coming years.

6.0 Ongoing research

6.1 Identification of wintering grounds and migratory routes

Sixteen birds were released with radio tags on the Motus network this season, using the same nylon-coated elastic cord harness attachment technique used for the past two years. Though the program was permitted to attach radio tags to up to 50% of released birds, a parts issue at the manufacturer-level has meant that we were not able to get any new tags this year, so were limited to our existing inventory of 17 tags. The one remaining tag was not deployed as it had malfunctioned and could not be activated by staff. This parts issue may extend in to next year, so though we maintain the goal of deploying tags on up to 50% of released birds, it is uncertain if we will be able to secure the tag inventory to meet this goal.

Tracking results from 2015 (Fig. 4a) and 2016 (Fig. 4b) have revealed two different migratory strategies for our birds, with some individuals heading northeast along the Great Lakes to pass in to the US near Windsor, and other birds apparently crossing Lake Ontario. Though the network of Motus towers has very dense in

southwestern Ontario, there hasn't been much coverage on the south shores of any of the lakes for the past two years, so our birds had essentially entered a large gap in the possible detection zone once they passed in to the US. However, Bird Studies Canada has increased coverage along the south shore of Lake Erie, opposite Long Point, and there are new arrays at the southwestern shore of Lake Erie, and throughout Pennsylvania, so the potential to detect our birds in the US is greatly increased compared to past years.

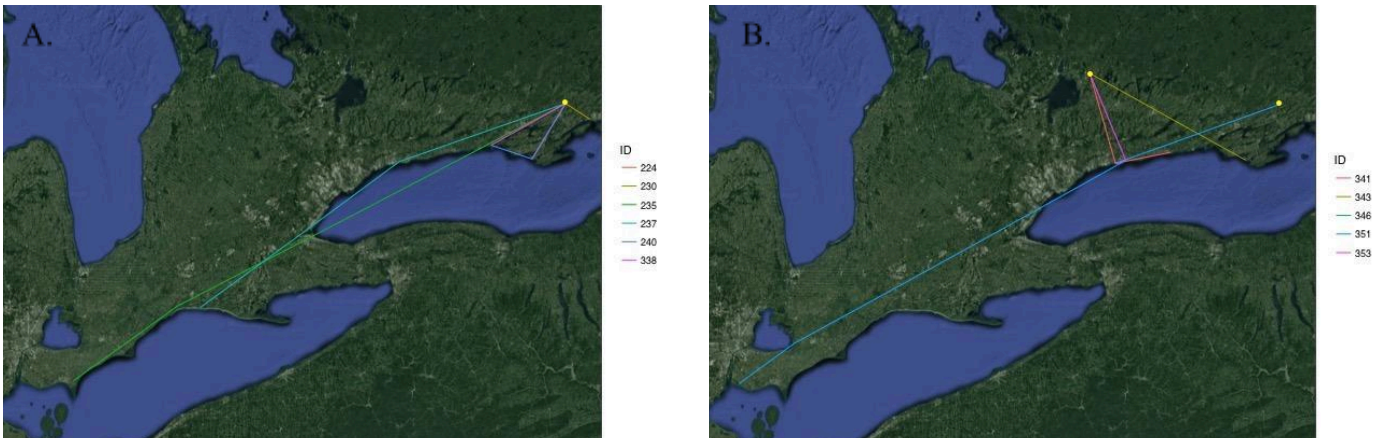

Figure 4. Movement tracks of radio-tagged LOSH in 2015 (A) and 2016 (B), released from the captive breeding program

The benefits of Motus lie in the network of researchers that maintain receiving stations so that detections of tagged animals can go beyond the means of a single researcher or organization. Beyond detecting shrike, the Motus stations operated by WPC have picked up several other birds during migration (Table 2). Data available to-date extends to the fall of 2016 for the Carden tower, and spring 2017 for Napanee, with more recent data to come as it is downloaded and processed.

Table 2. Non-LOSH birds detected on WPC-operated Motus towers

			Tag deployment	
Tower	**Detection date**	**Species**	**Date**	**Origin**
Napanee	22 Sept 2016	Least Sandpiper	6 Sept 2016	Ontario (James Bay)
	23 Sept 2016	Gray-cheeked Thrush	21 Apr 2016	Magdalena, Colombia
	23 Sept 2016	Least Sandpiper	16 Aug 2016	Ontario (James Bay)
	24 Sept 2016	Swainson's Thrush	11 May 2016	Pennsylvania
	24 Sept 2016	Gray-cheeked Thrush	21 Apr 2016	Magdalena, Colombia
	25 Sept 2016	Gray-cheeked Thrush	20 Apr 2016	Magdalena, Colombia
	3 Oct 2016	Semipalmated Plover	7 Sept 2016	Ontario (James Bay)
	4 Oct 2016	Swainson's Thrush	24 Sept 2016	Quebec
	9 Oct 2016	Least Sandpiper	16 Aug 2016	Ontario (James Bay)
	9 Oct 2016	Swainson's Thrush	22 Sept 2016	Quebec
	26 Feb 2017	Snow Bunting	23 Dec 2016	Ontario (Wellington Cty)
	17 May 2017	Red Knot	29 Apr 2017	South Carolina
	24 May 2017	Red Knot	29 Apr 2017	South Carolina
Carden	1 Sept 2016	Semipalmated Sandpiper	8 Aug 2016	Ontario (James Bay)
	1 Sept 2016	Semipalmated Sandpiper	11 Aug 2016	Ontario (James Bay)
	1 Sept 2016	White-rumped Sandpiper	6 Aug 2016	Ontario (James Bay)

In addition to the WPC-owned Motus towers in Carden, Hazel Wheeler worked with the Couchiching Conservancy to erect two more towers in Carden this year, creating a network of coverage for the region. No detections have yet been reported for the 2017 fall migration; results are expected over the winter.

6.2 Migratory urge study

Under the current management plan, LOSH that are brought in to the captive breeding population remain in that population for their entire lives, with only hatch-year birds released into the wild. As a result, there is limited control over the age distribution of the captive population, and holding space, which is very limited, is sometimes taken up by birds that are no longer reproducing. Family releases have been discussed as a potential change to captive population management, which would see birds brought it to captivity for a certain number of years but released before they age to a post-reproductive state, thus ensuring that all spaces are used by birds that are still reproducing. Before family releases could be instituted, however, we must first understand if and how time in captivity affects the migratory urge of Loggerhead Shrike.

Leanne Grieves (PhD student at Western University, and 2015 Carden Biologist) was working with the Nashville Zoo at Grassmere to develop experimental methods for the study of migratory urge in captive shrike, using four retired birds that were transferred down to that facility in 2016. Though initial plans included a pilot of methods over the winter of 2016/17, progress was delayed because of difficulties in designing experimental cages that the shrikes would use without becoming overly stressed. Also, Grieves had to step back from this work to focus on her PhD, so Hazel Wheeler took over as project lead this summer. Experimental cages were nearing completion at the end of the 2017 field season, and methods should be able to be tested in the coming months.

6.3 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 genetic markers to quantify the effect of captivity and managed breeding on the genetic diversity of shrike; 2) using previously developed nuclear genetic microsatellite markers, determine range limits of the subspecies of shrikes found in Ontario; 3) determine the suitability of Ontario captive stock for captive breeding efforts in the northeastern United States; and 4) make recommendations to improve management of the shrike captive-breeding program in Ontario and in eastern North America. All analyses are ongoing, with results anticipated over the winter of 2017/18.

6.4 Genetic suitability of mates chosen by captive birds.

African Lion Safari trialed a shrike “dating centre” this spring, where one female was given controlled access to several males at once (i.e. birds were in adjacent enclosures, with perching on shared mesh wall that allowed some interaction). The purpose of this experiment was to compare mate selection to breeding recommendations provided by the studbook keeper, and to see if the major histocompatibility complex (MHC) may influence mate selection in shrike. MHC, which plays a role in immune function, has been demonstrated to influence mate selection in some species, where mates are chosen based on dissimilar MHCs. MHC data will be incorporated in to studbook once available, and the “dating centre” protocol refined over the winter, to be repeated next spring.

6.5 Stress hormone research

Josh Robsertson, a PhD student at Trent University who is co-supervised by Gary Burness (Trent) and Gabriela Mastromonaco (Toronto Zoo; through the ReNewZoo program), began his stress hormone work this year. Though initial plans involved a validation of assay methods using Northern Shrike, Robertson is instead using Black-capped Chickadees and Herring Gulls as model species to construct feather-based assays for time-averaged, autonomic stress (catecholamine metabolites) and reproductive physiology (testosterone and progesterone). By leveraging these novel assays and feather-based glucocorticoid assays previously developed by Thom Luloff (Trent University and The Toronto Zoo), Robertson will examine how chronic stress (quantified by both catecholaminergic and steroidal measures) relates to reproductive output in captive LOSH, and further, will examine if post-fledging survival is related to the stress levels of parents. Furthermore, Robertson proposes

to use feather-derived DNA to test for selection on stress physiology axes in captivity (here, genes encoding enzymes involved in catecholamine and glucocorticoid production and metabolism).

7.0 Partnerships and collaboration

7.1 U.S. partnership development

8.1.1 Loggerhead Shrike Working Group

The 3rd annual LOSH Working Group meeting was held on Mar. 7 and 8 at the Tennessee Wildlife Resource Agency, Nashville, TN. The meeting was well-attended, with 19 individuals present from nine states, which demonstrates the interest in the species in the eastern U.S. Amy Chabot, Jessica Steiner, Ken Tuininga, and Hazel Wheeler attended this meeting to represent Ontario interests.

The increased participation in LOSH conservation efforts in the U.S. creates great potential to successfully implement a full life-cycle model of species recovery, addressing both breeding and wintering ground factors affecting the Ontario population. The following are highlights of this year's meeting, and subsequent work:

- The Conservation Action Plan [Draft] was circulated to meeting attendees, and comments solicited to finalize the document, to be adopted by the group. Edits are ongoing.
- The Loggerhead Shrike Banding Protocol, developed by Amy Chabot with input from WPC and LOSH Working Group members, has been revised for review and adoption by the North American Banding Council.
- A draft LOSH WG website was created by Ruby for Good in their "hackathon" in 2016. Discussions at the WG meeting focused on the design of the public face of the website, with the decision to mimic the layout and functionality of the American Oystercatcher Working Group website. Public content for WG website has been finalized, and website design is ongoing.
- The LOSH WG adopted WPC's Ontario Landowner's Guide as a key outreach tool. Design files were purchased with the assistance of C2S2, and content will be adapted to reflect regional differences in shrike habitat.
- Surveying and colour-banding was conducted in the following states in 2017: Arkansas, Illinois, Indiana, Kentucky, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia. In addition to increasing the understanding of shrike demography and movements, the expansion of survey and trapping efforts in these states increases the probability that birds banded in Ontario will be resighted over the winter months.
- Following the broad-scale Species Distribution Modeling (SDM) for the southeast region, completed by A. Johnson in Virginia, SDM was completed for Ontario by Chabot, and habitat modeling is planned for Ohio. Development of these models will help direct survey efforts in areas without detailed prior knowledge of LOSH occurrence.
- LOSH occupancy and detectability research is underway in Arkansas (Than Boves), Virginia and West Virginia, (Chris Lituma), South Carolina (Amy Tegeler)
- The wild shrike health assessment, developed by the Smithsonian Conservation Biology institute, has been ongoing in Kentucky, Virginia and West Virginia, with interest from Ontario if funding and logistics can be sorted.

7.1.2 C2S2 workshop: Strategies for saving songbirds by linking in-situ and ex-situ conservation

Amy Chabot, Jessica Steiner, and Hazel Wheeler attended this workshop, organized by C2S2, which had the goal of developing frameworks for North American songbird conservation that linked in-situ and ex-situ efforts.. The LOSH Recovery Program was used as an example of how such an approach can be applied, and connections were developed between WPC and a number of U.S. organizations, including several in Ohio that are interested in becoming involved in LOSH work. To this end, discussions are planned with representatives from The Wilds, Hiram College, and the Toledo Zoo over the winter of 2017/18.

7.2 Building Regional Capacity

WPC staff continue to participate as a member of the steering committee for the NPJI. The group was less active this year than it had been in past, as a new MNRF Partnership Specialist took over spearheading the group, which caused a hiccup in momentum. However, the NPJI did complete a regional field guide, "A Guide to Alvar and Grassland Species on the Napanee Plain", and a limited run was printed with WPC assistance. This fall, the group will focus on holding a meeting for the whole of the NPJI, which hasn't met since 2015.

The Carden Working Group did not have a formal meeting this year; however, some members (The Couchiching Conservancy and the Nature Conservancy of Canada) were involved in the planning of a landowner stewardship workshop that was held in Carden at the start of October (described above). WPC continues to participate in the annual Carden Forum, which was held in May this year.

The Escarpment Biosphere Conservancy (EBC), which reached out to WPC staff last fall about surveying for LOSH on their properties in the Grey-Bruce and Manitoulin regions, undertook some targeted LOSH surveys this spring. None of their current land holdings overlap mapped LOSH habitat in those regions, but current maps may not accurately represent suitable habitat, especially on Manitoulin Island, which wasn't included in the 2013 CWS mapping update. One of this season's contract field biologists met with EBC staff on Manitoulin in June to survey some properties, and provide some on-the-ground training in LOSH surveys. Though the work in the region this year did not result in any LOSH sightings, the development of this relationship between EBC and WPC was a positive step to increasing LOSH survey coverage in Grey-Bruce and Manitoulin. Further, EBC has agreed to partner with WPC in the organization of a grassland and alvar stewardship workshop in the Grey-Bruce region in 2018, if funding is secured.

8.0 WPC fundraising

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

- Habitat Stewardship Program (HSP) for Species at Risk (year 2 of a 2-year grant; $65K)
- Species at Risk Stewardship Fund (SARSF; $59K)
- Colleges and Institutes Canada – Clean Tech Internship (2 internships, $11K each)
- Loyalty One Young Conservation Leaders program ($10K)
- Private foundations ($10K)
- Employment and Social Development Canada – Canada Summer Jobs ($6K to subsidize two positions)

All existing grant agreements will be completed in early 2018, so new funding will be sought for next season. WPC has submitted a 2-year application to SARSF to implement the LOSH Recovery Strategy in Ontario, and will submit a complementary application to HSP to cover general program costs. Field-staffing subsidies (CleanTech, Canada Summer Jobs) will continue to be high priority, to maintain teams of at least two in the two main LOSH cores. Private foundation grants will continue to be pursued as applicable.