

Loggerhead Shrike Banding in Ontario: Report on the 2002 Field Season

for

Canadian Wildlife Service - Ontario Region

by

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EXECUTIVE SUMMARY

The eastern population of the Loggerhead Shrike in Canada is on the brink of extirpation and there are several key questions that must be answered as soon as possible to conserve this species. Initiated in 1999, the Loggerhead Shrike colour banding program in Ontario will furnish much needed information on critical questions regarding post-fledgling survivorship, recruitment, longevity, age structure, overall population size, and site faithfulness. It will also help assess the efficacy of a planned release program, and could contribute some information on wintering areas.

Since 1999, a grand total of 597 shrikes (91 as adults, 506 as young) has been colour banded in Ontario. In 2002, 135 shrikes (18 adults and 117 young, including 19 pen-reared young) were banded between 30 May and 13 August from 15 of 25 active sites on the Napanee Plain, 10 of 13 active sites at Carden Plain, 1 of 1 active site in Grey-Bruce, and from 4 of the 6 release cages being used at Smiths Falls. None of the 19 single birds reported at various sites were trapped. There were no birds reported from Manitoulin Island or Ottawa this year.

The 2002 returns included 3 birds banded as nestlings in 1999, 3 birds banded as adults in 2000, 2 birds banded as nestlings in 2000, 2 birds banded as an adult in 2001, and 13 birds banded as nestlings in 2001. Unfortunately, a further 7 returning birds could not be assigned to a particular banding year, owing to incomplete resighting information, exacerbated by what appeared to be a high rate of colour band loss..

In 2002, two birds originally banded at Carden in 2001 were found in the Napanee area and one bird banded in 2001 at Napanee was found nesting at Carden. This is the first time we have ever had any of the banded birds move between the core areas, and clearly establishes that these two subpopulations are genetically linked..

Of the 26 adult birds that were trapped (including 8 retraps of returning birds), 11 (42.3%) were trapped in Potter traps and 15 (57.7%) were trapped in the Chardonneret traps. Both traps appear to be effective devices.

Excluding nests in the release cages, it took an average of 19.7 minutes (range 3 to 32 minutes) to band all the young (range 1-7 chicks per nest). On average, adults resumed nest-tending duties within 10.7 minutes of the completion of banding (range 2 to 30 minutes). In 54.9% of cases, adults returned to the nest within 10 minutes,

The nestlings banded in the release cages were dealt with separately because the adults could see everything that happens within the cage confines. The average time taken to band a chick was 5.82 minutes, slightly longer than for the wild nests. This was primarily due to the 'clock' being started as soon as we entered the pen and included having to try to push the adults into the next pen, and keep them there while the banding of the chicks took place.

Five broods were banded in the release pens this year, three pairs each had a clutch of four chicks and the fourth pair was double-brooded, with clutches of five and two chicks.

Of the 30 returning banded birds, 10 had a full complement of three colour bands (plus a numbered metal band), 14 had two colour bands, 3 had a single colour band, 2 had no colour bands (just metal band) and one had an undetermined number of bands. One bird at Napanee had two colour bands when first sighted but subsequently lost one colour band. The fact that 5 of the 13 (38%) returning birds that had been banded as nestlings from 2001 had lost one or more colour bands in a one-year period is a cause for concern. This represents a 20% rate of band loss (total of 39 bands used, of which 8 were lost prior to the birds being re-sighted in 2002). The bands on all eight previously banded birds that were retrapped in 2002 were carefully examined. None of the colour bands on these birds appeared to be damaged. However, two of the birds banded as nestlings had chewed their aluminum bands. One of these birds had also removed all three colour bands, while the other had not removed any of its colour bands. On the former bird the aluminum band was replaced with a stainless steel band because the band numbers were hard to read. The numbers on the aluminum band on the latter bird were still easily read and the band was not replaced.

In 2002, we measured the leg diameter of a total of 108 wild birds, both adults and young, from all the core areas. The internal diameter (3.18 mm) of the size 1A USFWS band makes this band size too small for over 70% of the shrikes measured (legs 3.1 mm or larger). The next band size up, a size 2 band (internal diameter of 3.8 mm) was used on all birds handled later in the season due to the concerns with the leg size of the birds.

Due to perceived problems at the release cages, the colour bands on the young birds scheduled to be released were removed a few days before the release took place. This gave an ideal opportunity to re-measure some of the chicks in order to check leg sizes again, at four to six weeks after banding.

Of the adult population, 30 birds had been previously banded and an additional 18 birds were caught and banded in 2002. Because banding effort was more concentrated in the Napanee region in all years, the banded population there is higher than in other regions: 34 of 56 adults (61%) and 32 of 46 (70%) paired adults. At Carden, 13 of 34 adults (38%) and 13 of 26 paired birds (50%) were banded.

In 2002, 98 young shrikes from a total known pool of 110 wild young (89%) were banded. The 13 unbanded wild young were from 4 sites (one at Carden, two at Napanee and one at Grey-Bruce), which were not found until after the young had fledged. An additional 19 pen-reared young were banded at Smith Falls.

Of the 18 adults that were banded in 2002, 9 were male and 9 were female. Over the four years we have been banding, 45 adult males and 45 adult females were trapped. In SY birds (N=32), 62.5% of those trapped were females as opposed to 37.5% males. In ASY birds (N=51), only 41.2% of the birds trapped were females and 58.8% were male. This suggests that there may be

age- and sex-related biases in trapping efficiency and/or return rates.

Just over half (52%) of the 25 known-aged returning birds were SY birds (banded as nestlings in 2001). The 2002 paired population as a whole (74 birds) included 23 (11 newly banded and 12 returns) known SY birds, accounting for 31% of the total known paired population, and only 17 (5 newly banded and 12 returns) known ASY birds (23%). This is in agreement with results from previous years, and again suggests that over-winter survival and subsequent recruitment of young birds into the breeding population is good.

In 2002, 13 pairs were discovered in sites that have not been used recently (at least during the last four years), one on the Bruce, seven at Napanee and five at Carden. Of the 26 adults at these new sites, five were banded as SY birds, three were new SY birds, one was a new ASY bird and the other adults were of an unknown age.

In 2002, at least 89 of the 93 adult shrikes in Ontario had their legs examined, either in the field or in the hand. Of these, 30 (33.7%) had been previously colour banded (either as adults or nestlings) from 1999 onwards.

Of 108 young shrikes banded in 2001, 13 (12%) were resighted in 2001. This is an unprecedented return rate and much higher than in any previous year, again indicating very good survival last winter.

The 13 returning SY birds (banded as nestlings in 2001) moved from 0-145 km (mean = 47 km). One SY bird (a male) returned to its natal territory. Seven SY birds moved more than 30 km (30-145 km), including three birds that moved between the core areas (110-145 km, two from Carden to Napanee and one from Napanee to Carden). These are the first reported movements of birds between core areas in Ontario. These dispersal distances are four times the distance for adults and nestlings found by Collister and DeSmet's (1997).

In 2002, tail feather samples were collected from 26 adults (including 8 that were re-trapped from 1999/2000/2001), plus 113 nestlings. Samples were not collected from 4 nestlings, because feather growth was insufficient at the time of banding

Recommendations include the following:

1. In 2003, it is again very important that the return rates of shrikes banded in previous years are determined. A concerted effort needs to be made to retrap any returning birds for which colour band combinations, based upon resightings alone, are insufficient to accurately identify the unique band histories of the birds.
2. Continued banding (and feather sampling) should occur in all core regions in 2003, with the focus on adults, followed by young. Additional work should be considered in the Ottawa/Smiths Falls area if any captive release birds return there.

3. A sophisticated mark/recapture analysis should be conducted at the conclusion of 2003 if not before.
4. Several recommendations to refine the banding protocol are also offered.

INTRODUCTION

The eastern population of the Loggerhead Shrike in Canada is on the brink of extirpation and there are several key questions that must be answered as soon as possible to conserve this species. Initiated in 1999, the Loggerhead Shrike colour banding program in Ontario is intended to furnish much needed information on post-fledgling survivorship, immigration and emigration rates among and between the four sub-populations in Ontario (Napanea, Smiths Falls, Carden and Grey-Bruce/Manitoulin), longevity, age structure, overall population size, and site faithfulness. It will also help assess the efficacy of a planned release program, and could contribute some information on wintering areas.

Objectives of the 2002 field work were to:

- 1) safely colour band as many nestlings and adult shrikes in Ontario as possible,
- 2) continue to build information on the age structure of the Ontario population,
- 3) determine the extent of site fidelity, dispersal and population turnover in Ontario,
- 4) continue to investigate whether bill colour is useful in determining sex or age of adult shrikes,
and
- 5) gather tail feather samples for DNA analysis.

METHODS

In 2002, Canadian Wildlife Service (CWS) contract biologists searched shrike habitat in the Napanea, Smiths Falls, Grey-Bruce-Manitoulin and Carden regions known or suspected to have been occupied by shrikes in recent years. Some shrike sightings were also reported by Ontario Breeding Bird Atlas participants. In addition to locating nests and adults, surveyors also tried to determine whether adults carried bands. If so, then attempts were made to “read” the colour sequences of these bands in the field.

The 1999-2002 shrike colour banding program followed as closely as possible a written protocol accepted by the recovery team and Ontario Ministry of Natural Resources (OMNR) Animal Care Committee (see Appendix A). Since 1999 some changes have been made to the operating protocol, particularly regarding the method of capturing adult birds and the colour marking.

Banding of adults was undertaken only after the nestlings had fledged, usually with the bander working alone. In 2002, adults were trapped using the modified side-opening Potter trap (designed by Susan Craig) and the similar but top-opening Chardonneret traps first tested in 2000. At most sites, four traps (two Chardonnerets and two Potter traps) were used. These were baited with mice or, later in the season, a combination of mice and/or a grasshopper. Mice were obtained from pet stores in Belleville (none available in Napanea in 2002). Grasshoppers were obtained in the wild (grasshoppers and crickets in pet stores are too small and can escape from the bait cage).

The best places to site the traps are to put two or three of them near the tree the fledged young are in, with the other one placed where an adult has a favourite hunting perch (it usually takes only a few minutes of watching to see where these perches are). This trap is moved after catching the first adult, to where the other adult perches. For roadside birds, the open grassy area/verge at the edge of the road below telephone wires seems to work best. If the adults cannot find their way in to the trap or get bored with the traps, moving them up or down the road a bit helps. The birds then seem to think they are new prey items.

As in 2001, each bird received a combination of four bands, consisting of three, size XB (3.8 mm internal diameter), coloured Darvic bands (versus one or two, size XCI (3.1 mm), coloured celluloid bands on birds banded prior to 2001) and either a size 1A (3.18 mm), stainless steel band on adult birds or a standard, size 1A, aluminum alloy band on young birds. Partway through the 2002 banding season, this was changed to having **all** birds receive a stainless steel size 2 (3.8 mm internal diameter) band due to the concerns about the fit and durability of the smaller aluminum bands. The change to the Darvic PVC-type colour bands in 2001 was made because they are more UV-resistant than the celluloid bands, and hence less prone to fading and to brittleness (which can contribute to band loss).

The stainless steel size 2 bands are somewhat difficult to close with the standard Avinet-type banding pliers but are readily closed by using a pair of BTO #1 pliers (available from the British Trust for Ornithology). Using the “size D” hole (fourth from the tip), close the band as normal then turn the pliers 90 degrees and close firmly again. This should close the band tight with no risk of overlapping and no need to “dip” the butt-ends.

The butt-ends of the Darvic bands were heat sealed with a butane soldering iron purchased at Canadian Tire. Starting in 2002, the two colour bands that are located on the same leg were sealed together to reduce the chance of either or both bands on this leg being removed.

In 2002, a total of 10 colours was used as follows: dark green (restricted to Bruce/Manitoulin or zoo/release birds), light green, orange (restricted to Carden Plain or zoo/release birds), brown, dark blue, light blue, grey (restricted to zoo/release birds), red, yellow, white). All zoo/release birds have grey in their combinations and may or may not include orange and/or dark green White bands are used exclusively on adults. When we moved to Darvic bands in 2001, dark pink and mauve were lost as available colours to use, but brown and grey were available to replace them.

Use of a 4-band combination with 10 colour choices permits the unique identification of over 6000 shrikes, so there is no risk of running out of potential combinations for many years. Band combinations in use are tracked on the master colour-band table made in 2000 which lists all potential band combinations and indicates any restrictions on their use (e.g. white bands can not be used on nestlings, grey bands can not be used on wild birds).

By using a four-band combination on all birds, we are able to more accurately gauge the amount of band loss by looking at how many birds return with one or more colour bands missing. However,

because a variable number of colour bands (one or two) were used in 1999 and 2000, in some cases it is not possible to determine whether or not a bird with less than three colour bands has actually lost any bands. Therefore, any bird with less than the full four-band combination must be re-trapped to determine its true identity (using the band number). All re-trapped birds are brought up to a full four-band combination using Darvic colour bands, this could result in the colour band combination being changed, e.g. if it had previously been banded with a colour no longer available.

Adults were aged and sexed according to Pyle (1997). Sexing of adults was based upon observation of either a brood patch (female) or cloacal protuberance (male). In addition, we again examined bill colouration of adult birds in 2002 to see whether there was any relationship between the colour of the lower mandible and either sex or age. The area examined was the basal third of the lower mandible; colour was judged as either “black” or “pale” (pinkish/grey). As in previous years, a tail feather was collected from each bird for DNA analysis.

To minimize handling time and time at the nest, no biometric data are being routinely collected under the current protocol. Due to concerns about appropriate band sizes, in 2002 leg diameter measurements were taken on most nestlings and adults. These measurements were made with an electronic caliper after the birds had been banded. The measurement was made on whichever leg had the metal and colour band combination. The maximum diameter of the leg between the two bands was recorded to the nearest 0.1 mm.

RESULTS AND DISCUSSION

BANDING PROGRAM OVERVIEW

Since 1999, a grand total of 597 shrikes now outside of captivity have been coloured banded in Ontario. Of these, 91 were banded as adults and 506 as nestlings or fledglings (see Appendix for details).

This total includes:

- 183 shrikes (33 adults and 150 young) banded between 25 May and 28 July 1999, representing 28 different sites (all at Napanee except for two young from one site on the Carden Plain);
- 158 shrikes (27 adults including 2 birds released from the Toronto zoo and 131 young) banded between 31 May and 24 July 2000, representing 27 different sites;
- 123 shrikes (15 adults and 108 young, including 11 pen-reared young from three release pens at Smiths Falls) banded between 20 May and 18 July 2001 from 26 sites; and
- 135 shrikes (18 adults and 117 young, including 19 pen-reared young at Smiths Falls, one of which subsequently died) banded between 30 May and 13 August 2002 from 29 sites. Numbers banded are summarized by region in Table 1.

In 2000, 16 shrikes banded in 1999 (9 as adults and 7 as nestlings) were known to have returned (re-sightings and re-traps). In 2001, a total of 17 shrikes (1 adult and 4 nestlings banded in 1999 and 8 adults and 4 nestlings banded in 2000) were known to have returned. In 2002, a total of 30

shrikes were known to have returned (almost one-third of all adult shrikes sighted or trapped in Ontario).

The 2002 returns included 3 birds banded as nestlings in 1999, 3 birds banded as adults in 2000, 2 birds banded as nestlings in 2000, 2 birds banded as an adult in 2001, and 13 birds banded as nestlings in 2001. The original banding dates and locations of the other 7 colour-marked birds sighted in 2002 are not known because they could not be positively identified (re-sighted only and missing colour bands or problems reading all colour bands). All 7 of these returns of unknown origin were sighted in Napanee region and are presumed to have been banded in that region. Return data by region are summarized in Table 2.

The 135 shrikes banded in 2002 came from 15 of 25 active sites on the Napanee Plain, 10 of 13 active sites in Carden Plain, 1 of 1 active site in Grey-Bruce, and from 4 of the 6 release cages being used at Smiths Falls (see Table 1). No single birds were trapped as they had all moved on before an attempt could be made to catch them. There were no shrikes reported from Manitoulin Island or the Ottawa area in 2002.

In 2002, two birds originally banded at Carden in 2001 were found in the Napanee area and one bird banded in 2001 at Napanee was found nesting at Carden. This is the first time we have ever had any of the banded birds move between the core areas, and clearly establishes that gene flow is occurring between these two subpopulations..

Table 1. Summary of Loggerhead Shrike banding in Ontario in 1999 to 2002.

Region	1999			2000*			2001**			2002***			1999-2002		
	1999 Total	Adults	Young	2000 Total	Adults	Young	2001 Total	Adults	Young	2002 Total	Adults	Young	Total	Adults	Young
Napanee	181	33	148	119	22	97	69	6	63	60	10	50	429	71	358
Smiths Falls				6	0	6	11	0	11	19	-	19	36	0	36
Carden	2	0	2	18	0	18	43	9	34	54	7	47	117	16	101
Bruce				5	1	4	0	0	0	2	1	1	7	2	5
Manitoulin				8	2	6	0	0	0	-	-	-	8	2	6
TOTALS	183	33	150	156	25	131	123	15	108	135	18	117	597	91	506

* 2000 data excludes two captive-reared females that were banded and released at Carden Plain in 2000. ** 2001 data includes 11 pen-reared young banded at Smiths Falls.
***2002 data includes 19 pen-reared young banded at Smiths Falls.

Table 2. Summary of Loggerhead Shrike returns in Ontario in 2002 (as proportion of number banded).

Region where banded	Banded in 1999			Banded in 2000*			Banded in 2001			Year banded unknown**	1999-2001 combined		
	1999 Total	Banded as Adults	Banded as Nestlings	2000 Total	Banded as Adults	Banded as Nestlings	2001 Total	Banded as Adults	Banded as Nestlings		Total	Adults	Nestlings
Napanee	3 of 181 (1.7%)	0 of 33 (0%)	3 of 148 (2.0%)	7 of 119 (5.9%)	3 of 22 (13.6%)	2 of 97 (2.1%)	6 of 69 (8.7%)	0 of 6 (0%)	8 of 63 (12.7%)	7***	23 of 369 (6.2%)	3 of 61 (4.9%)	13 of 308 (4.2%)
Smiths Falls				0 of 6 (0%)	0 (0%)	0 of 6 (0%)	0 of 11 (0%)	0 of 0 (0%)	0 of 11 (0%)	0	0 of 17 (0%)	0 (0%)	0 of 17 (0%)
Carden	0 of 2 (0%)	0 (0%)	0 of 2 (0%)	0 of 18 (0%)	0 of 0 (0%)	0 of 18 (0%)	7 of 43 (16.3%)	2 of 9 (22.2%)	5 of 34 (14.7%)	0	7 of 63 (11.1%)	2 of 9 (22.2%)	5 of 54 (9.3%)
Bruce				0 of 5 (0%)	0 of 1 (0%)	0 of 4 (0%)	0 of 0 (0%)	0 of 0 (0%)	0 of 0 (0%)	0	0 of 5 (0%)	0 of 1 (0%)	0 of 4 (0%)
Manitoulin				0 of 8 (0%)	0 of 2 (0%)	0 of 6 (0%)	0 of 0 (0%)	0 of 0 (0%)	0 of 0 (0%)	0	0 of 8 (0%)	0 of 2 (0%)	0 of 6 (0%)
TOTALS	3 of 183 (1.6%)	0 of 33 (0%)	3 of 150 (2.0%)	7 of 156 (4.5%)	3 of 25 (12.0%)	2 of 131 (1.5%)	13 of 123 (10.6%)	2 of 15 (13.3%)	13 of 108 (12.0%)	7	30 of 462 (6.7%)	5 of 73 (6.8%)	18 of 389 (4.6%)

* 2000 data excludes two captive-reared females that were banded and released at Carden Plain in 2000. ** Incomplete or ambiguous band combination, therefore age and location of banding unknown (but presumed to be have been banded in Napanee region as all were sighted there in 2002).

INJURIES/MORTALITIES DURING BANDING

Once again there were no direct injuries, mortalities or predation associated with the banding program. Moreover, there have been no known injuries sustained to either adults (N =99 wild birds banded plus recaptures) or wild nestlings (N = 485) as a result of the banding operation in any of the years from 1999 to 2002.

This year there were, however, problems with some of the banded pen-reared birds. After fledging but prior to release, one young bird got its band caught on a thorn and subsequently was found dead. Two other pen-reared birds sustained some injury to their legs, cause unknown, and were therefore not released. Due to these incidents and out of concern for potential risk, the colour bands on all the pen-reared birds were removed prior to their release.

These problems are believed to be restricted to the pen-reared birds, which are kept confined in a relatively small area with many obstacles (pen walls, tunnels, shrubs) for 4 to 6 weeks following banding. We suggest that pen-reared birds are subject to more stress (and potentially more boredom) than birds in the wild, and hence may display displacement behaviour to redirect high levels of aggression/boredom. There was no evidence of leg injuries on any of the 30 returning birds or wild-born fledglings in 2002, nor in any previous year.

ASSESSMENT OF TRAPPING METHODS FOR ADULT SHRIKES

Trapping Effort

A stated goal of the banding program is to catch and colour mark the entire adult shrike population. However, due to concerns about interfering with the breeding activity of adult shrikes, the banding protocol establishes restrictions on when adults can be trapped. Paired birds cannot be trapped until they have successfully bred and the young have fledged. Starting in 2002, single birds could be trapped starting 10 days after the first sighting, unless a second shrike was seen at the site.

Of the 93 adult shrikes reported in Ontario in 2002, 83 were potential candidates for trapping either because they were apparently unbanded (N=63) or there was some potential problem with their colour marking (N=20). The apparently unbanded category includes 49 birds whose legs were checked and found to be unbanded and 14 birds whose legs were not examined. The 20 birds with problem colour markings included birds with less than a full four-band combination (some of whom could still be positively identified) and birds whose combinations were not fully read. Only 10 of the adult shrikes, which could be positively identified by their unique four-band combinations, were not trapping targets.

Of the 19 reported single birds, two had been previously banded but did not have four-band combinations and the other 17 were apparently unbanded (12 known to be unbanded and 5 whose legs were not checked). All of these birds were trapping targets but all had disappeared before the 10-day waiting period had ended. Therefore, for single birds, none of the 19 trapping candidates were “available” under the current protocol and there were no capture attempts.

Of the 74 known paired birds, 64 were trapping targets including 46 birds that were apparently unbanded (37 known unbanded and 9 undetermined banding status) and 18 with problems with their existing colour combinations. Of these 64 birds that were potential targets for trapping in 2002, 3 were never seen by the trappers (only one adult with fledged young seen), and another 13 birds were not available under the current banding protocol because their nests failed and the birds disappeared shortly thereafter.

One or more trapping attempts were made for 41 of the 48 (85%) of the available adult trapping candidates, resulting in 23 of the target birds being captured. Trapping was not attempted in seven cases, because all would have involved a long drive and there was some uncertainty as to whether the birds would still be present. Just over half (56%) of the adults that we attempted to catch were eventually trapped. In several cases trapping was attempted on more than one occasion.

As can be seen from the data presented in Table 3, the main impediment to banding 100% of the adult shrike population is the many birds (35 of 83 in 2002) which disappear before they become available for trapping under the current guidelines. This is especially true of single birds. Trapping was attempted for a high proportion (85%) of the available birds. The 56% success rate for the current trapping methods is quite good.

Table 3. Adult shrike trapping effort in 2002.

Breeding status	Total	Potential trapping target	Available under current protocol	Trapping attempted	Trapping successful
Single	19	19	0	0	0
Paired	74	64	48	41	23*
TOTAL	93	83	48	41	23

* 3 additional adult shrikes that were not trapping targets were captured while trying to catch their mate.

Re-trapping Effort

Eight previously banded birds were re-trapped in 2002. Of these, five were targeted birds with less than a full four-band combination and the other three were mates of targeted birds.

The success rate for re-trapping banded birds was lower than for trapping unbanded birds. If only the targeted birds are considered, then the re-trapping success rate was 5 of 11 attempted or 45%. If the mates of targeted birds are included, then the re-trapping success rate was 8 of 18 attempted or 44%. This compares to a rate of 18 of 30 attempted or 60% for unbanded adults.

It appears that the re-trapping success rate is higher for birds banded as nestlings (which have never experienced a trap) and is comparable to the trapping success rate of unbanded birds. Seven of the eight retrapped birds had been banded as nestlings. The success rate for catching

targeted birds banded as nestlings was 71% (5 of 7 birds attempted) and the overall rate for birds banded as nestlings was 58% (7 of 12).

The retrapping success rate is much lower for birds originally banded as adults (i.e. previously caught in a trap). In 2002, one or more trapping attempts were made for five (three targeted) of the seven returning shrikes that were known to have been banded as adults (including two birds which could not be positively identified but had white colour bands and were therefore banded as adults). Only one adult-banded bird (from 2000) was retrapped (not a targeted bird). Therefore, the success rate for adult-banded targeted birds was 0% (0 of 3) and for all known adult-banded birds was 20% (1 of 5). An unsuccessful trapping attempt was made for one other returning bird whose identity and age at banding is not known.

The above results suggest that shrikes that are exposed to trapping events learn trap avoidance. This makes it difficult to inspect and verify the numeric bands of birds that have lost one or more colour bands.

Trapping Methods

Of the 26 adult birds that were trapped (including 8 retraps of returning birds), 11 (42.3%) were trapped in the Potter traps and 15 (57.7%) were trapped in the Chardonneret traps. As noted last year, both trap types again yielded good results, and we will continue in the future to deploy these type of traps as the main method for the capture of adults.

In 2002, there were mice available from the pet shops at Belleville although they do run out of them occasionally. The pet shop at Napanee is no longer carrying mice. Sometimes small mice can be hard to find, so they need to be obtained a few days before heading into the field. Shrike banders need to keep in mind that the mice will grow as the season progresses and will probably need to be replaced occasionally when they become too large. Black-and-white mice can be seen in the traps readily, but the pale brown ones are more natural. If possible, large beetles and grasshoppers/crickets should also be obtained in advance, as they can be hard to find in the area and are usually too small to stay in the bait cages until larger ones are found later in July.

Some birds are not interested in the traps no matter what the prey item inside them is. Even when the prey item in the trap (wild grasshoppers) was the same as what the adults were feeding on and the wild grasshoppers were scarce, some birds were still not interested in the trap and were impossible to catch. For example, birds at one site were not interested in the traps and neither of the adults were captured although four traps were in operation for 6 1/2 field hours over two days (26 trap hours). At some other sites, both adults were caught within 15 minutes of the traps being set.

ASSESSMENT OF NESTLING BANDING METHODS

Time Spent at Nest Sites for Banding Wild Nestlings

The nestling banding protocol (see Appendix A) recommends that banding should take no more than 5 minutes per bird and the total time at the nest should not exceed 30 minutes. This figure is

based on applying and sealing three colour bands, applying the metal band, collecting a tail feather for DNA analysis, and putting the chicks back into the nest. In 2002, two additional steps were added: heat-sealing the two colour bands that are located on the same leg and measuring the diameter of the other leg. Even with these additional steps, the target of less than 5 minutes per bird was achieved. The average time per nestling in 2002 was 4.6 minutes.

The total time spent at nest sites to band all the nestlings was recorded at 26 of the 27 nests in 2002 (N = 113 nestlings). Excluding the nests in the release cages (see next section), it took an average of 19.7 minutes (range 3 to 32 minutes) to band all the young (range 1-7 chicks per nest). Only two nests took longer than 20 minutes.

On average, adults resumed nest-tending duties within 10.7 minutes of the completion of banding (range 2 to 30 minutes). In 54.9% of cases, adults returned to the nest within 10 minutes, which is slightly down on the 66.6% of birds that did so last year (see Table 4). Total time spent at a nest site from the time when the first nestling was removed until the adults resumed nest tending averaged 30.4 minutes (range 7 - 67 minutes), slightly up on the 26.4-minute average of last year.

Table 4. Time taken for adults to resume nest-tending duties following the banding of wild nestlings in 2000 to 2002.

Interval Class (minutes)	2000		2001		2002	
	# of Nests	% of Nests	# of Nests	% of Nests	# of Nests	% of Nests
1-10 minutes	13	50.0%	12	66.7%	12	54.5%
11-20	6	23.1%	4	22.2%	8	36.3%
21-30	5	19.2%	2	11.1%	1	4.6%
31-40	1	3.8%	0	0.0%	1	4.6%
> 40 minutes	1	3.8%	0	0.0%	0	0%
Total	26	100%	18	100.0%	22	100%

Banding nestlings in release cages

The nestlings banded in the release cages are dealt with separately because the adults can see everything that happens since they cannot go any farther from the nest than 3-4 metres. The average time taken to band a chick was 5.82 minutes, slightly longer than for the wild nests. This was primarily due to the 'clock' being started as soon as we entered the pen, and included having to try to drive the adults into the next pen, and keep them there while the banding of the chicks

took place.

Five broods were banded in the release pens this year, three pairs each had a clutch of four chicks and the fourth pair was double-brooded, with clutches of five and two chicks.

On average, the nests in the release cages took 24.8 minutes (range 21 - 30 minutes) to band all the young (range 4 - 5 chicks per nest; average of 5.82 minutes per nestling). The last brood of birds to be banded (2 birds) took only four minutes as no colour bands were put on. The adults resumed their nest-tending duties an average of 21.4 minutes after we left the pen (range 7 - 49 minutes). Total time spent at a nest site from the time when the first nestling was removed until the adults resumed nest tending averaged 42 minutes (range 18 - 74 minutes).

Following last year's recommendation, food was placed in the feeding troughs as we left the pen to encourage resumption of parental duties. Only one pair took longer than 20 minutes to resume parental duties. This pair flew over the nest within 1 minute but did not take food to the nest until 49 minutes after we left the pen, although the female did start feeding herself within 13 minutes. The return times with the exception of that one pair, was an average of only 14.3 minutes, only slightly longer than the average for the wild birds.

COLOUR BANDING

The success of the colour banding program depends, in part, on the birds retaining their colour markings from year to year and in part on the ability of observers to correctly "read" the colour band combinations in the field. A third factor that affects the number of returning birds that can be positively identified is the fact that a variable number of colour bands were used on birds banded in 1999 and 2000. Moreover, it is often very difficult to recapture some of these birds, particularly if they had been previously exposed to trapping devices (see above). Due to the combination of these factors, about half of the returning birds could not be positively identified with 100% certainty from the re-sighting data.

Colour band resightings

When dealing with colour band resightings, it is critical that in analysing resighting data we can assume that all the colours have been read correctly in the field. Some band colours can be difficult to differentiate in poor light conditions, as in white and light blue and also dark pink and red. Even in good light, light blue can appear white if the sun catches the band the right way, and this holds true for all colours. Any band shining in the sun can appear to be white or even to look like a bright shiny metal band. Each bird needs to be checked two or three times during the season to ensure the correct combination has been recorded.

The main observer(s) in each region should each have a reference set of all the colour bands in use (including the old style bands). In addition to recording the colour combination, they should try to indicate if the colour bands are large bands (new type darvic bands) or small bands (older type celluloid bands). This could help eliminate some colour combinations, enabling some birds to be identified that would otherwise have to have been classed as unknowns.

Loss of Colour Bands

Of the 30 returning banded birds, 10 had a full complement of three colour bands (plus a numbered metal band), 14 had two colour bands, 3 had a single colour band, 2 had no colour bands (just metal band) and one had an undetermined number of bands. One bird at Napanee had two colour bands when first sighted but subsequently lost one colour band.

Because a variable number of colour bands (one or two) were used in 1999 and 2000, some birds with fewer than three colour bands have not actually lost any colour bands. Therefore, band loss can only be determined for the 23 birds that were positively identified, either by their colour markings or by re-trapping and reading their numbered band. Of these 23 known birds, only 5 birds had lost one or more colour bands. All five of the known birds with missing bands had been banded as nestlings in 2001 and been given a full four-band combination at that time. Two birds had lost all three colour bands, while the other three birds had each lost one band (and one subsequently lost another band).

Of the 7 banded birds whose identity was not positively identified, 4 had at least two colour bands, 2 had at least one colour band and the other bird had an undetermined number of bands. It is not possible to determine how many of these birds had lost one or more colour bands without re-trapping them to find out who they were and how many bands they had to start with.

The fact that 5 of the 13 (38%) returning birds that had been banded as nestlings from 2001 had lost one or more colour bands in a one-year period is a cause for concern. This represents a 20% rate of band loss (total of 39 bands used, of which 8 were lost prior to the bird being re-sighted in 2002). Neither of the two returning birds that had been banded as adults in 2001 had lost any bands (even though it was expected that band loss would be higher in adults than nestlings). Therefore, the overall rate of band loss for the Darvic bands used in 2001 was 17.8%. This is substantially higher than the 3% rate of band loss on returning birds in previous years, when celluloid bands were being used.

The bands on all eight previously banded birds that were retrapped in 2002 were carefully examined. One of the re-trapped birds had been banded as an adult in 2000 and the other 7 had all been banded as nestlings in 2001. None of the colour bands on these birds appeared to be damaged.

Any missing colour bands were replaced and all birds were brought up to a four-band combination if less than four bands had been previously used. For birds with the older celluloid bands, all colour bands were replaced with the equivalent Darvic bands.

Two of the birds banded as nestlings had chewed their aluminum bands. One of these birds had also removed all three colour bands, while the other had not removed any of its colour bands. On the former bird, the aluminum band was replaced with a stainless steel band because the band numbers were hard to read. The numbers on the aluminum band on the latter bird were still easily read and the band was not replaced.

The above results may suggest that loss of Darvic colour bands is higher than loss of celluloid colour bands. This may reflect inadequate heat-sealing of the Darvic bands (versus acetone welding of the celluloid bands).

Leg Diameter and Band Size Concerns

In 2000, it was noted that the XCL colour bands (with an internal diameter of 3.1 mm) being used were a rather tight fit on some birds, especially on some nestlings, despite the fact that this band size is recommended by the Bird Banding Office. In January 2002, we found that none of the captive birds at Toronto Zoo would take the recommended size 1A (3.18 internal diameter) USFWS band, because their leg diameters ranged from 3.1 to 4.0 mm.

In 2002, we measured leg diameters of a total of 108 wild birds, both adults and young, from all the core areas. The findings are set out in Table 5.

Table 5. Leg diameters of adult and young shrikes in 2002.

	Napanee HY	Napanee AHY	Carden HY	Carden AHY	Smiths Falls HY	All HY	All AHY	All birds
N =	32,0	10	43,0	8	13	88	18	106
Range	2,8-3,5	2,9-3,4	2,7-3,4	3,0-3,4	2,9-3,5	2,7-3,5	2,7-3,4	2,7-3,5
Average	3,19	3,12	3,08	3,15	3,22	3,14	3,13	3,14
# that would fit (<3.1 mm)	5	4	17	3	2	24	7	31
# that wouldn't fit (≥3.1 mm)	27	6	26	5	11	64	11	75
% that would fit	12,5 %	40,0 %	37,2 %	37,5 %	15,4 %	27,3 %	39,0 %	29,2 %
% that wouldn't fit	87,5 %	60,0 %	62,8 %	62,5 %	84,6 %	72,7 %	61,0 %	70,8 %

The above results clearly demonstrate that the internal diameter (3.18 mm) of the size 1A USFWS band makes the band too small for over 70% of the shrikes measured (legs 3.1 mm or larger). The next band size up, a size 2 band (internal diameter of 3.8 mm) was used on all birds handled later in the season, due to the concerns with the leg size of the birds. As two of the aluminum bands on the retraps handled this year had been chewed to some extent, it is recommended that in future a size 2 stainless steel band be used on all Loggerhead Shrikes banded in Ontario. This would eliminate any confusion of band size and would mean that only one size of band needs to be carried in the field.

Table 6. Leg diameter changes in nestling shrikes.

Band #	Original leg dia.	Date measured	New leg Dia.	Date re-measured	Leg difference between the two dates
1182-00182	3.2	30 June	3.2	13 August	=
1182-00183	3.5	30 June	3.2	13 August	-0.3mm or -8.8%
1182-00184	3.5	30 June	3.0	13 August	-0.5mm or -14.2%
1182-00186	3.5	30 June	3.2	13 August	-0.3mm or -8.8%
1182-00199	3.1	5 July	3.0	13 August	-0.1mm or -3.2%
1182-00200	3.1	5 July	3.2	13 August	+0.1mm or +3.2%
1182-00213	3.5	18 July	3.4	13 August	-0.1mm or -3.2%
1182-00214	2.9	18 July	3.2	13 August	+0.3mm or +10.3%
1182-00215	3.1	18 July	3.3	13 August	+0.2mm or +6.4%
1182-00216	3.1	18 July	3.2	13 August	+0.1mm or +3.2%

Due to perceived band problems at the release cages, the colour bands on the birds to be released were removed a few days before the release took place. This gave an opportunity to re-measure some of the chicks in order to check leg sizes again, at four to six weeks after banding (see Table 5). All the birds had been banded with a size 2 band. Of these birds, only two (# 184 & #199) would have taken a size 1A band at release, the rest still needed a size 2 band. Of note is 1182-00214; this bird's leg diameter increased considerably after banding, rather than shrink (the more typical occurrence in young birds). If a standard size 1A had been fitted at the original banding, this bird would have had a band too tight for its leg less than four weeks later, and this could have resulted in it losing that leg due to lack of circulation.

PROPORTION OF POPULATION THAT WAS BANDED IN 2002

In summer 2002, the total known, wild adult population of shrikes in Ontario numbered at least 93 individuals (37 pairs and 19 singles; see Table 7). In calculating the known population, all sightings of unbanded single or paired birds at different sites were assumed to represent different individuals (even though it is suspected that some unmarked birds shifted sites) and a second bird was presumed present at sites where only one adult was seen with fledged young. Of the adult population, 30 birds had been previously banded and an additional 18 birds were caught and banded in 2002. Hence, 48 birds (52%) of the total known adult shrike population in Ontario carried bands by the end of the 2002 breeding season. The banded proportion of the known paired birds was much higher, 46 of 74 birds (62%), than for single birds, 2 of 19 (11%).

Because banding effort was more concentrated in the Napanee region in all years, the banded population there is higher than in other regions: 34 of 56 adults (61%) and 32 of 46 (70%) paired adults. At Carden, 13 of 34 adults (38%) and 13 of 26 paired birds (50%) were banded. The only other area where wild shrikes were reported was the Grey-Bruce region, where one pair (actually an adult with fledged young) was found and the one adult was trapped and banded (50% of known adult population). A single bird was reported at Smith Falls but was not banded.

In 2002, 98 young shrikes from a total known pool of 110 wild young (89%) were banded. The 13 unbanded wild young were from 4 sites (one at Carden, two at Napanee and one at Grey-Bruce) that were not found until after the young had fledged. An additional 19 pen-reared young were banded at Smith Falls. Of the pen-reared birds, 16 were released, two were kept in captivity due to leg injuries, and one died.

Table 7. Proportion of the known Loggerhead Shrike population that was banded in 2002.

Region	Banded Adult Population			Known Adult Population			Nestlings	
	Returns	Banded in 2002	Total banded population	Pairs	Singles	Total known population	Banded chicks	Known chicks
Napanee	24	10	34	23	10	56	50	54
Smiths Falls	0	0	0	0	1	1	19#	19#
Carden	6	7	13	13	8	34	47	54
Bruce	0	1	1	1	0	2	1	3
Others	0	0	0	0	0	0	0	0
TOTALS	30	18	48	37	19	93	117	130

19 pen-reared chicks banded at Smiths Falls

Yearly changes in the number and proportion of shrikes banded

Annual banding totals by region for the 1999-2002 banding program are presented in Table 1.

The 2002 total of 135 newly banded shrikes is up from the 123 birds banded in 2000 but down 26.3% on the 1999 banding total of 183 birds, in part because of the increasing numbers of previously banded adults in the population. Also, only 16 of 25 active sites at Napanee produced young in 2002.

The banded proportion of the total known adult population has varied from 53% in 2000 to 42% in 2001 and 57% in 2002. The main difference from year to year is due to differences in the number of known single birds (11% of population in 2000, 26% in 2001 and 20% in 2002), most of which are not banded. The banded proportion of the paired population increased slightly from 57% in 2001 to 62% in 2002.

The proportion of the known hatch-year population being banded has increased over time (89% in 2002, 84% in 2001 versus 82% in 2000) but the proportion in the Napanee region has remained constant with 100% of the known available nestlings being banded in each of the past 3 years. The number of active sites being located only post-fledging increased to 4 in 2002.

SEX RATIO OF BANDED ADULTS

A breakdown of the age and sex information for all adult shrikes banded since 1999 is presented

in Table 8.

Of the 18 adults that were banded in 2002, 9 were male and 9 were female. Over the four years we have been banding, 45 adult males and 45 adult females were trapped. Because all adults captured were paired, this balanced sex ratio indicates that males and females are equally likely to be trapped.

There is no reason to believe that the sex ratio of the shrike population as a whole is not balanced, but the banding data do not necessarily reflect the overall population, as single birds are not being captured and sexed. Therefore we do not know if the single birds are mostly males, mostly females or are an equal mix of males and females.

Although equal numbers of males and females have been trapped over the four-year program, an examination of the breakdown of age classes reveals a marked difference between the sexes. In SY birds (N =32), 62.5% of those trapped were females as opposed to 37.5% males. In ASY birds (N=51), only 41.2% of the birds trapped were females and 58.8% were male. Hence, the paired population is dominated by ASY males and SY females. Rather than being an actual representation of the population as a whole, it is more likely to reflect the fact that males are more site-faithful than females. We believe that it is entirely possible that many ASY females are in fact in the population, but are merely overlooked because of their tendency to disperse from the previous year's nest sites to sites as yet unfound.

Table 8. Age and Sex Breakdown of Adult Banding Totals, 1999 - 2002

Age -Sex Class	1999	2000	2001	2002	Total
# Banded as SY-M		3	3	6	12
# Banded as SY-F	4	6	5	5	20
# Banded as ASY-M	16	9	3	2	30
# Banded as ASY-F	10	4	4	3	21
# Banded as AHY-M	2			1	3
# Banded as AHY-F	1	2		1	4
# Banded as AHY-U		1			1
Total banded as adult	33	25	15	18	91
Total banded as adult-M	18	12	6	9	45
Total banded as adult-F	15	12	9	9	45
Total banded as adult-U		1			1

AGE RATIO OF BANDED ADULTS

As noted in previous years, the proportion of the newly banded adults which are aged as SY has increased from 13% of adults banded in 1999, to 41% in 2000, 53% in 2001 and 69% in 2002. Although the technique for distinguishing SY and ASY birds is relatively new, there are no indications that it is not reliable. With the exception of 2001, the proportion of the banded adults

that could not be aged as SY or ASY has been fairly consistent (ca. 10%). The above figures do not represent the overall age structure of the population, since they deal with newly banded adults only, and do not include adults returning from previous years (see below).

The increase in the proportion of SY birds being caught since 1999 may be due to older birds becoming trap shy, or to the operator becoming more proficient at catching SY birds, or to changes in population structure, or a combination of the above.

There was a change in the catching protocol between 1999 when a variety of methods were tested including mist nets and with lures and bow traps, and subsequent years when only Potter and Chardonnet traps were used. It is possible that the mist nets, which were very effective at catching adults in the 7 days following fledging (McCracken et al. 2001), are less age-selective than the traps now in use.

A reliable estimate of the age structure of the population is very important for population modeling purposes. It is recommended that the use of mist nets (at the nests) be tested again in 2003 to determine if the current trapping method is age-biased. Unfortunately, mist nets are likely not an effective method for catching single birds or failed breeders which account for most of the unbanded birds.

Unfortunately, there is no published information in the literature on age ratios. However, Susan Craig (pers. comm.) reports that at least 60% of shrikes in spring in Colorado were aged as SY. In Florida during the winter, she found that 38% of the birds were SY. One would expect that ASY birds would dominate the shrike breeding population because for bird populations in general older birds have higher return rates, lower mortalities, and shorter dispersal distances than young birds. Also, search effort by shrike surveyors is focused on known territories, which probably bias the results in favour of detecting returning ASY birds.

Just over half (52%) of the 25 known-aged returning birds were SY birds (banded as nestlings in 2001). The 2002 paired population as a whole (74 birds) included 23 (11 newly banded and 12 returns) known SY birds, accounting for 31% of the total known paired population, and only 17 (5 newly banded and 12 returns) known ASY birds (23%).

In 2002, 13 pairs were discovered in sites that have not been used recently (at least not during the last four years), one on the Bruce, seven at Napanee and five at Carden. Of the 26 adults at these new sites, five were banded SY birds, three were new SY birds, one was a new ASY bird and the other adults were of an unknown age. It appears that the proportion of known SY birds is the same (31%) at both known and "new" sites.

At present we have reliable age ratio for less than half of the known paired population and only one single bird (known SY). If roughly two-thirds of the known Ontario breeding population is in fact comprised of SY birds, then this suggests that there is good recruitment into the population, and hence very good overwinter survivorship of young-of-the-year (or, less likely, potentially high over-winter mortality of ASY birds).

ESTIMATION OF ACTUAL ONTARIO POPULATION SIZE

In 2002, the known adult shrike population in Ontario consisted of a maximum of 93 adult birds. However, we know from previous years that a substantial proportion of the actual population is not being found. Only 13 of the 24 known SY birds found in 2002 were previously banded, even though 84% of the young produced from the 28 known active sites in 2001 were banded.

Based upon mark/recapture calculations that take into account differential rates of return of birds that were originally banded as nestlings and adults, and depending on how to assign unknown aged birds returning in 2002, application of the Jolly population formula provided a population estimate for 2001 ranging from 134 to 226 adults. [Note that the Jolly method is limited by the fact that population estimates can only be calculated for a **previous** year, **not** the current time period. With only three years of band return information on shrikes, an estimate can only be provided for two years (2000 and 2001)].

The precision of the Jolly estimate increases with more years of mark/recapture data. If banding/resighting is continued for at least another 2 years, the recovery team will be able to provide much more reliable annual population estimates. Additional resources are required to apply more sophisticated statistical analysis using “MARK” software.

In the meantime, we believe that the Jolly estimate for 2001 (134 to 226 adults) is fairly realistic. While intensive annual shrike surveys have been extremely useful and informative over the years, these surveys have been very localized in their scope and carried out by only a handful of dedicated and skilled people. Ontario is a very large province, and it is not surprising that intensive, localized surveys do not necessarily reliably track province-wide population levels.

RETURN RATES OF SHRIKES IN 2002

It is important to point out that “return rates” of previously banded birds is always difficult to interpret because not all surviving birds are found. Return rate is dependent on many factors including search effort, the detectability of the species, the ease in which a returning bird can be identified by reading some sort of marker (e.g. colour band), and the permanence of the marker. As noted by Pruitt (2000), shrike territories are frequently re-occupied by a different bird in consecutive years, so return rate cannot be estimated simply by territory reuse. Return rates should always be viewed as minimum estimates. While return rate to previously held territories can be fairly accurately determined, this information is of limited value in the understanding of a species’ population dynamics. If a particular bird does not return to occupy a formerly held territory, this does not mean that it failed to return (unnoticed) to the same proximity or even the same general region. For this reason, return rates have limited use in estimating survivorship. This is particularly true of second-year birds, which tend to disperse widely across the landscape in their first year of breeding. In migrant passerines, adults are much more prone to returning to previously defended territories than are young. Young birds effectively play the role of colonists.

In 2002, at least 89 of the 93 adult shrikes in Ontario had their legs examined, either in the field or in the hand. Of these, 30 (33.7%) had been previously colour banded (either as adults or

nestlings) in 1999 to 2001.

Return rates of adult shrikes

Information on returning shrikes by region and year and age at banding is presented in Table 2.

Of the 73 shrikes banded as adults between 1999 and 2001, at least 7 returned in 2002, including 3 of 25 adults banded in 2000, two of 15 adults banded in 2001, and two adults whose year of banding is not known (could not be positively identified but had white colour band indicating banded as an adult). In addition, 3 of 150 birds banded as nestlings in 1999 and 2 of 131 birds banded as nestlings in 2000 returned in 2002. Therefore, at least 12 birds of the 30 returning birds are ASY (after-second year) birds.

Only 13% (2 of 15) of the adults banded in 2001 were resighted or retrapped in 2002. This is much lower than the adult return rates in 2001 (28%) or of those of 2000 (27%) and is lower than the return rates for adult Loggerhead Shrikes reported from other areas:

41% in Indiana (Burton and Whitehead 1990, cited by Pruitt 2000)
 32% in Alberta (Collister and DeSmet 1997),
 16% in Manitoba (Collister and DeSmet 1997), and
 14% in North Dakota (Haas and Sloane 1989).

The low adult return rate in 2002 may not be significant due to the large number (7 of 30) of returning birds that could not be positively identified and whose year of banding is therefore not known. In other years, all returning birds were positively identified. Given the high rate of band loss observed in the returning birds banded as nestlings in 2001, it is likely that several of the returning birds that could not be positively identified were banded as an adult in 2001.

Return rate for nestlings

Of 108 young shrikes banded in 2001, 13 (12%) were resighted in 2001. This is an amazing return rate and much higher than in any previous year, indicating a good survival last winter. It is also much higher than any of the comparable return rates reported elsewhere:

3.6% in Virginia (Luukkonen 1987, cited in Pruitt 2000),
 2.4% in Indiana (Burton and Whitehead 1990, cited in Pruitt 2000),
 1.7% in Virginia (Blumton 1989, cited in Pruitt 2000),
 1.2% in Alberta (Collister and DeSmet 1997),
 1.1% in Missouri (Kridelbaugh 1982, cited in Pruitt 2000),
 0.8% in Manitoba (Collister and DeSmet 1997),
 0.8% in North Dakota (Haas 1995), and
 0.0% in Minnesota (Brooks and Temple 1990).

Baed upon three years of information, return rates for Ontario birds banded as nestlings seem to be as good as, or better than, other areas.

DISPERSAL OF RETURNING BIRDS

Returning adult birds were quite site faithful, especially those originally banded as adults. Of the 10 returning ASY birds with known identities, all returned to within 0-47 km (mean = 8.5 km) of their original banding locations of 1999, 2000 and 2001 and to within 0-15.5 km (mean = 3.42 km) of last year's nest site. Only one ASY bird moved more than 30 km from the previous year's nest and only one returned to the same site.

The 13 returning SY birds (banded as nestlings in 2001) moved from 0-145 km (mean = 47 km). One SY bird (a male) returned to its natal territory. Seven SY birds moved more than 30 km (30-145 km), including three birds that moved between the core areas (110-145 km, two from Carden to Napanee and one from Napanee to Carden). These are the first reported movements of birds between core areas in Ontario. If you exclude the three birds that moved between the core areas, returning SY birds moved an average of 21 km.

These dispersal distances are four times the distance for adults and nestlings found by Collister and DeSmet's (1997). They found that returning adults dispersed an average of 2.7 km, while returning "nestlings" moved an average of 14.7 km. Collister and DeSmet suggested that 95% of adults can be expected to return within 4.7 km of their previous year's nest site.

FEATHER SAMPLING

In 2002, tail feather samples were collected from 26 adults (including 8 that were re-trapped from 1999/2000/2001), plus 113 nestlings. Samples were not collected from 4 nestlings, because feather growth was insufficient at the time of banding. All feather samples were forwarded to Dr. Stephen Lougheed at Queen's University for DNA analysis.

RELATIONSHIP OF BILL COLOUR AND AGE AND SEX

Bill colour was recorded for all 72 of the adults that were captured and sexed in 2000, 2001 and 2002 (Table 9). For males, 28 (87.5%) had all black mandibles. Conversely, 37 (92.5%) females had pale lower mandibles. This is a highly significant relationship (Yates' corrected $X^2 = 52.14$; $p < 0.001$). These results confirm that bill colour is a useful sexing technique for shrikes, at least during the breeding season. This study should be extended to include the captive population of shrikes, to corroborate the field findings and to assess the seasonal onset and regression of the bill colour character.

Table 9. Contingency table for bill colour of adult male and female shrikes captured in 2000, 2001 and 2002.

Bill Colour	2000 Male	2000 Female	2001 Male	2001 Female	2002 Male	2002 Female	Total Male	Total Female	Total
Pale	1	12	0	11	3	14	4	37	41
Black	11	3	8	0	9	0	28	3	31
Total	12	15	8	11	12	14	32	40	72

Bill colour was recorded for 68 of the adults that could be aged as either SY or ASY in 2000, 2001 and 2002 (Table 10). For SY birds, 18 (60%) had pale bills, while roughly equal proportions of ASYs had black bills (53.4%) and pale bills (46.6%). Hence, bill colour does not seem to be a very useful indicator of age. Though there is a tendency for young birds to have pale bills, this is not statistically significant (Yates' corrected $X^2 = 1.14$; $p > 0.05$).

Table 10. Contingency table for bill colour of SY and ASY shrikes captured in 2000, 2001 and 2002.

Bill Colour	2000 SY	2000 ASY	2001 SY	2001 ASY	2002 SY	2002 ASY	Total SY	Total ASY	Total
Pale	7	6	6	5	5	3	18	14	32
Black	3	9	3	5	6	2	12	16	28
Total	10	15	9	10	11	5	30	30	60

FOREIGN BAND RECOVERIES

Although we have now banded 597 shrikes to date, there have as yet been no foreign recoveries of shrikes banded in Ontario. Based upon 7336 shrike bandings in Canada, Brewer *et al.* (2000) calculated that the encounter rate was only 2 per 1000 banded (0.2% recovery). Such low rates are typical for similarly-sized songbirds.

RECOMMENDATIONS

1. In 2003, it is again very important that the return rates of shrikes banded in previous years are determined. A concerted effort needs to be made to retrap any returning birds for which colour band combinations, based upon resightings alone, are insufficient to accurately identify the unique band histories of the birds.
2. Continued banding (and feather sampling) should occur in all core regions in 2003, with the focus on adults, followed by young. Additional work should be considered in the Ottawa/Smiths Falls area if any captive release birds return there.
3. A sophisticated mark/recapture analysis should be conducted at the conclusion of 2003 if not before.
4. In the previous Ontario Breeding Bird Atlas 20 years ago, annual shrike “blitzes” were routinely organized. These were extremely successful in thoroughly covering off all key atlas regions of potential interest, and were very good at locating previously unknown locations for shrikes. Volunteers should be organized in such a way again in 2003-05. It will be important that any birds found are reported as early in the field season as possible, so that the Ontario shrike coordinators can get somebody to follow up. It should be emphasized that these reports need to be made promptly, since the banding window is so short and already fledged birds are harder to catch.
5. In 2002, there were some pairs that failed in their nesting attempts and had band combinations that were incomplete (not the four band combination currently being used) or had some bands missing. No attempt was made to capture these birds because there was a chance, as stated in the protocol, that they might try to breed again and we should not disturb them. Most of these failed breeders then disappeared, with the result that we were not sure who they actually were, thereby biasing or confusing the resight/return data. Consideration should be made next year to capture immediately any birds with missing bands that fail on their first breeding attempt. We can currently catch them as soon as the young leave the nest, and some have in the past gone on to produce a second brood, with no bad responses to having just been caught.
6. As the aluminum bands on two of the retrapped shrikes handled this year had been chewed to some extent, it is recommended that in future a size 2 stainless steel band be used on all Loggerhead Shrikes banded in Ontario. This would eliminate any confusion of band size and would mean only one size of band would need be carried in the field
7. It is recommended that the use of mist nets (at nests) be tested again in 2003 to determine if the current trapping method is age-biased.

RECOMMENDED CHANGES TO THE BANDING PROTOCOL

1. The banding protocol should be updated to reflect recent changes in band size, improved trapping techniques, the list of contacts, the banding of single birds, and so on.
2. It would be useful if the captive breeding facilities could provide some large locusts to use as bait for catching the adults in the field. These insects would be kept in containers and not be released into the wild. They would need to be large enough to not go through 1/4 inch wire mesh; ideally they would need to be about 3-4 cm long.
3. A cassette tape of nestling begging calls and/or nestling distress calls should be made for the next season to aid with capture of hard-to-catch adults.
4. Banding of pen-reared chicks scheduled for release should be done early in the morning in conjunction with their normal feeding time. There should be food placed in the release cage when the bander/helper leaves the cage, in order to help compel the parents to quickly resume feeding the nestlings. It would also be helpful to have a removable drop-down blind to hang between the cages so that the parents do not become too disturbed by the bander at work.
5. In 2003 we will again try to catch single birds. None were trapped in 2002 because they had all moved on before we could trap them. Any banding of single adults will follow the protocol created in 2002 (i.e. the birds must be present alone at a site for 10 days, with follow up visits conducted if they are trapped).
6. The main observer(s) in each region should each have a reference set of all the colour bands in use (including the old style bands).

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