

The 2013 Loggerhead Shrike Survey in Alberta



Alberta Species at Risk Report No. 151

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Prepared for:
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Prepared by:
David R. C. Prescott

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Alberta Environment and Sustainable Resource Development
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EXECUTIVE SUMMARY

Populations of the loggerhead shrike (*Lanius ludovicianus*) have declined in recent years, and populations in western Canada (*L. l. exubitorides*) are listed by the Committee on the Status of Endangered Wildlife in Canada as being “Threatened”. The species is considered to be of “Special Concern” in Alberta. A prairie-wide roadside survey has been conducted every five years since 1987 to monitor populations of the loggerhead shrike. This report summarizes results of the 2013 survey conducted in Alberta, and compares results with surveys conducted in 1987, 1998, 2003 and 2008 (a 1993 survey conducted in Manitoba and Saskatchewan was not done in this province).

The 2013 survey was conducted by 27 observers along 31 road routes (total of 8224 km) between 10 June and 15 July. Observers recorded 158 shrikes at 130 unique locations, for a linear density of 1.61 indicated pairs (IP)/100 km of route. This value is 1.9% higher than the 1.58 pairs/100 km reported in 2008, but lower (-11.0%) than the 1.81 pairs/100 km reported in 2003 and the 1.99 pairs/100 km found in 1998 (-19.1%). Despite these declines, populations remain substantially higher than in 1987 (0.48 IP/100 km), although values reported that year may be erroneously low. The highest linear density of shrikes was found in map sheets 72M (4.22 IP/100km) and 72L (3.88 IP/100 km). Populations have remained stable in the east-central part of the province since the 2008 survey, but have decreased in most other areas with the exception of the southeastern part of the provincial range. Since surveys began in 1987, populations in all areas of the province have fluctuated significantly especially in areas outside of the core east-central range. Extrapolation of roadside observations to the provincial range suggests a total population of 7508 loggerhead shrike pairs in Alberta during 2013. This represents a 2.8% decline from the estimate made in 2008 and a 9.9% decline from 2003.

Most occupied sites (n=130) were in areas of mixed trees and shrubs (27.1%), followed by shelterbelts (24.0%), occupied farmsteads (16.3%), and thorny buffalo berry shrubs (13.2%). Tame pasture was present at most (70.6%) sites, with cultivation and native grass also well represented (52.2% and 47.8%, respectively). Only three nests (all in willows) were found during the survey.

The continuing decline in loggerhead shrike populations in Alberta and surrounding areas is cause for concern. However the species breeds in a wide variety of natural and anthropogenic habitats, and shifts its distribution within the provincial range in response to local conditions. This adaptability should moderate impacts of the loss of native grassland on the prairies. Continuing range-wide monitoring in Alberta is important for establishing long-term population trends in the province, and thereby determining the need for more intensive conservation and recovery efforts.

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1.0 INTRODUCTION

Loggerhead shrike (*Lanius ludovicianus*) populations have declined in most areas of North America since the mid-1900s (Sauer et al. 2013). In Canada, the eastern subspecies (*L. l. migrans*) has declined to very low levels (<100 pairs), and is now listed as an “Endangered” animal by the Committee on the Status of Endangered Wildlife in Canada (Environment Canada 2010). Populations in western Canada (*L. l. exubitorides*) have also experienced population declines. Breeding Bird Survey data show a decline of about 3.5% per year since 1966 for both Manitoba and Saskatchewan, whereas populations in Alberta have remained unchanged (+0.1%/year) over the same period (Sauer et al. 2013). Populations in western Canada are considered to be “Threatened” (COSEWIC 2012), whereas the species is listed as being of “Special Concern” in Alberta (Alberta Fish and Wildlife Division 2008). Recent estimates have suggested a population of less than 8000 pairs in Alberta (Prescott and Bjorge 1999, Prescott 2004, 2009).

A variety of surveys have been conducted for the loggerhead shrike in Alberta over the past quarter century (Telfer et al. 1989, Bjorge and Prescott 1996, Collister 1996, Bjorge and Kiliaan 1997, Kiliaan and Prescott 2002, Prescott 2003, 2004, 2009). The most useful survey for monitoring large-scale population trends has been the prairie-wide roadside survey conducted at five-year intervals since 1987 (the 1993 survey was not conducted in this province). These surveys have covered between 10,000 and 14,000 km of roadside habitat across the prairies, including between 3800 km (1987 and 1998) and 8000 km (2003 and 2008 surveys) in Alberta. Roadside surveys have shown that populations in Alberta have increased since the 1987 inventory (Johns et al. 2002, Prescott 2004, 2009), with populations in Saskatchewan declining about 45% (St. Laurent et al. 2014, A. Didiuk, pers. comm).

This report summarizes the Alberta portion of the loggerhead shrike roadside survey conducted in 2013.

2.0 METHODS

2.1 Field Surveys

Surveys were conducted along roads within the range of the loggerhead shrike in Alberta. In the 1987 and 1998 surveys, two road routes, averaging about 260 km in length, were established in each of the eight, 1:250,000 map sheets in the southeastern part of the province (total of 3802 km). For the 2003, 2008 and 2013 surveys, the same routes were maintained, but an additional two routes were placed in all map sheets, with the exception of sheet 72L in the southeastern corner of the province, where a paucity of roads permitted the addition of only one route (see Figure 1). The addition of these routes was intended to better monitor local shifts in the population between survey periods, to potentially detect previously unknown concentrations of breeding birds, and to derive population estimates from a higher percentage of the actual breeding population. The 31 routes cover approximately 7880 km, although the actual distance surveyed varies by year due to small differences in routes driven.

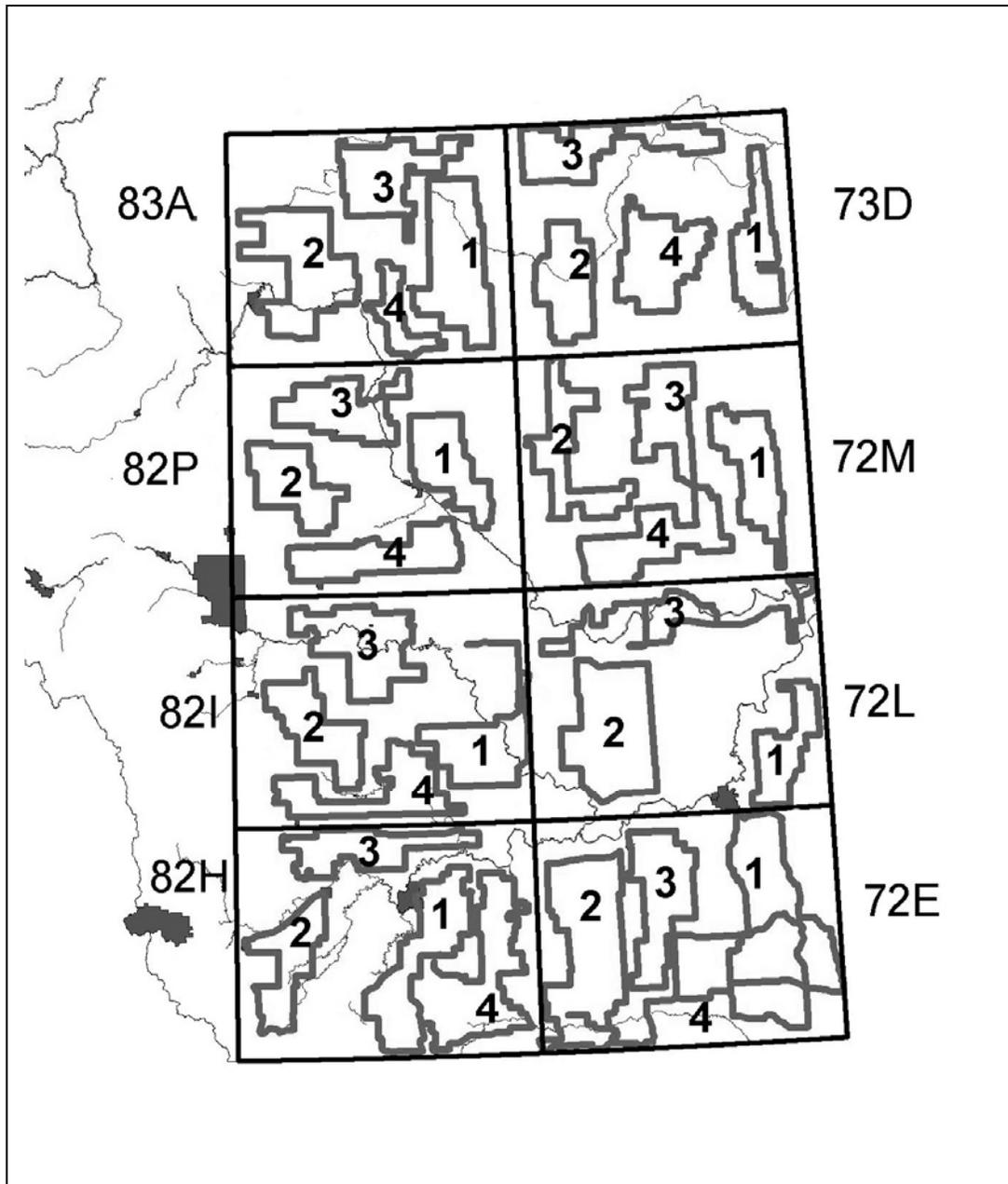


Figure 1. Location of road survey routes used in the 2013 loggerhead shrike survey in Alberta. In each 1:250,000 map sheet, routes 1 and 2 were also surveyed in previous provincial inventories in 1987 and 1998. Routes 3 and 4 in each map sheet were added for the surveys in 2003, 2008 and 2013.

Surveys were conducted using identical methodology to that used in the previous five surveys conducted across the prairies (four in Alberta; see Telfer et al. 1989, Johns et al. 2002, Prescott 2004, 2009). Participants drove routes at speeds of 50-70 km/hr between mid-June and mid-July, and recorded the presence of shrikes using hand-held GPS units (UTM NAD 83). Observers were permitted to slow down or stop in areas of suitable habitat to better determine the presence of birds. Each occupied site was assumed to represent a breeding pair (“indicated pair”), whether or not a pair was observed. Surveys were not to be conducted during inclement weather or temperatures >25°C. In Alberta, we also asked observers to collect additional information on habitats where shrikes were observed, including (1) general description of woody vegetation (abandoned farm, occupied farm, dry slough, aspen [*Populus* spp.] groves, shelterbelt, thorny buffalo berry [*Sheperdia argentea*], upland willow [*Salix* spp.], mixed shrub/tree, other); (2) percentage of different grassland types (native, tame, cultivated) within a 200 m radius of the observation site, and (3) type of nesting shrub, if nest was observed or strongly inferred from adult behavior (generally carrying food). For these summaries, data from road routes were combined with similar data from incidental observations of shrikes collected during the survey period (i.e., while driving to and from routes).

All records of shrikes, including incidental observations made during 2013, were entered into the Fish and Wildlife Management Information System (FWMIS), maintained by Alberta Environment and Sustainable Resource Development.

2.2 Analysis

Shrike observations were compiled for each map sheet (3 or 4 routes combined), and the number of shrikes expressed as indicated pairs (IP) per 100 km. These values were compared across time intervals with data collected during the previous four surveys in Alberta on both a map sheet, and provincial basis.

A population estimate (# indicated pairs) for the each 1:250,000 map sheet was derived from:

$$IP = (\# \text{ observed IP/km}) * (\text{km of roads in map sheet}) * 7.53$$

where 7.53 represents a correction factor calculated by Prescott (2004). This value is determined from the proportion of observed shrikes on roadside surveys that are found within 100m of roads (0.845; calculated from 2003 survey data), divided by the proportion of shrikes within 100 m that are actually detected during these surveys (0.34) and the percentage of shrikes on the landscape that actually occur within 100 m of roads (0.33; determined from block data of Bjorge and Prescott [1996] and Bjorge and Kiliaan [1997]). In other words, each indicated pair of shrikes along a surveyed road actually represents 7.53 pairs on the landscape around those surveyed roads. The product of the observed IP/km, the correction factor, and the km of roads on the map sheet as a whole produces an approximate population estimate for that map sheet. The value derived from each map sheet was then summed to produce a provincial population estimate.

3.0 RESULTS

A total of 27 observers from Alberta Fish and Wildlife, the Alberta Conservation Association, and private volunteers spent 179.6 hours surveying the 31 shrike routes between 10 June and 15 July 2013. The total road distance surveyed was 8224 km, which was 1.6% greater than reported for the 2003 survey (Prescott 2004), and 4.5% greater than in 2008 (Prescott 2009). The difference in these values reflects differences amongst individual observers in how odometer readings were reported, as well as factors such as road conditions (weather, construction and heavy traffic) that resulted in small adjustments to individual routes. These routes represented approximately 10.5% of available roads in the provincial study area, with percentages in individual map sheets ranging from 7.1% (map sheet 82P) to 17.5% (map sheet 72L) (Table 1).

Observers encountered 158 shrikes (103 single birds, 26 pairs, one trio) at 130 unique sites, for a total of 1.61 indicated pairs [IP]/100 km of route. The highest linear density of shrikes was found in map sheets 72M (4.22 IP/100km) and 72L (3.88 IP/100 km), with the lowest number being found in sheet 82H (no shrikes; Table 1). The observed value of 1.61 IP/100 km is 1.9% higher than the 1.58 pairs/100 km reported in 2008, but lower (-11.0%) than the 1.81 pairs/100 km reported in 2003 and the 1.99 pairs/100 km found in 1998 (-19.1%; Table 2). However, populations remain substantially (235.4%) higher than during the inaugural survey in 1987 (0.48 IP/100 km), and are higher on all map sheets compared to 1987 values (except for sheet 82H where shrikes were absent in both surveys (Table 2)). Populations in most map blocks have varied widely since surveys began. Since the 2008 survey, populations have remained stable in the east-central part of the province (map sheets 72L and 72M), where the highest densities of shrikes normally occur. There has also been a substantial increase in numbers in the southeastern part of the province (map sheet 72E), but populations in all other areas have declined. Since surveys began in 1987, populations in all areas of the province have fluctuated significantly especially in areas outside of the core east-central range. The changes have been most marked in northern parts of the breeding distribution (map sheets 83A and 73D which are primarily in the Parkland Natural Region¹) and in sheet 82I on the western edge of the range. These areas experienced large increases in population after the first or second surveys in 1987 and 1998, followed by declines over the past five or ten years.

Extrapolation of roadside observations to the landscape as a whole suggests a total provincial population of 7508 loggerhead shrike pairs in Alberta during 2013. This represents a 2.8% decline from the estimate made in 2008 (7721 pairs; Prescott 2009) and a 9.9% decline from 2003 (8327 pairs; Prescott 2004). This decline occurred despite a slight overall increase in number of pairs per unit length of road in the province (1.61 vs. 1.58 pairs/100 km; see above), and is attributable to disproportionate decrease in shrike density in the map sheets with the greatest amount of roads (Tables 1 and 2). The largest population occurred in map sheet 72M (2197 pairs), and the lowest in map sheet 82H (0 pairs; Table 1).

Characterization of habitat was based on 136 sites (130 on roadside routes, 6 incidental observations) where shrikes were observed during the 2013 survey period. Seven sites had no visible woody vegetation within 200 m of the sighting. Of the remainder, 35 (27.1%) sites

¹ see Natural Regions Committee (2006) for description of Natural Regions and Subregions in Alberta

were best described as being comprised of mixed trees and shrubs, followed by shelterbelts (24.0%), occupied farmsteads (16.3%), thorny buffalo berry (13.2%), upland willow (9.3%), dry slough margins (5.4%), abandoned farmsteads (3.1%) and other (1.6%). Tame pasture was found at 96 of 136 (70.6%) sites, with cultivation and native grass being well represented as well (52.2% and 47.8%, respectively). Forty-nine (36.0%) sites were made up of a single grass type, with native grass being slightly more common (36.7%) than cultivation (34.7%) or tame pasture (28.6%). Eight sites (5.9%) had all three types of grass cover within 200 m of the observation point.

Only three confirmed nests were found during the survey; all were in willow shrubs.

Table 1. Summary of loggerhead shrike roadside survey results in each of eight, 1:250,000 map sheets in southern Alberta in 2013.

Map Sheet	# Transects	Total km Surveyed	Total Roads in Map Sheet (km)	% Road Surveyed	Total Birds	IP	IP/100 km	Population Estimate (pairs) ¹
72E	4	1195	8732	13.7	34	25	2.18	1375.6
72L	3	851	4875	17.5	41	33	4.23	1423.5
72M	4	1089	7175	15.2	51	46	4.04	2282.2
73D	4	936	10796	8.7	10	6	0.64	521.1
82H	4	1084	10545	10.3	0	0	0.00	0.0
82I	4	1131	10460	10.8	3	3	0.27	208.9
82P	4	855	12088	7.1	9	8	0.94	851.7
83A	4	1083	13502	8.0	10	9	0.83	844.9
TOTAL	31	8224	78173	10.5	158	130	1.61	7507.8

¹ see text for calculations

Table 2. Number of indicated breeding pairs (IP) per 100 km of road, and percentage change in population size among four roadside surveys conducted in Alberta. Values are based on 31 routes surveyed in 2003, 2008 and 2013, and 16 routes in 1987 and 1998.

Map sheet	IP/100 km					% change ¹			
	1987	1998	2003	2008	2013	1987-2013	1998-2013	2003-2013	2008-2013
72E	0.82	0.82	1.56	0.87	2.09	154.8	154.8	34.0	140.2
72L	0.95	5.24	5.01	3.75	3.88	308.4	-26.0	-22.6	3.5
72M	1.85	5.19	4.48	4.07	4.22	128.1	-18.7	-5.8	3.7
73D	0.00	0.95	0.91	0.99	0.64	++	-32.6	-29.7	-35.4
82H	0.00	0.00	0.09	0.00	0.00	N/C	N/C	--	N/C
82I	0.22	2.15	0.62	0.49	0.27	11.7	-87.4	-56.5	-44.9
82P	0.00	1.58	0.90	1.21	0.94	++	-40.5	4.4	-22.3
83A	0.00	0.00	0.92	1.26	0.83	++	++	-9.8	-34.1
OVERALL	0.48	1.99	1.81	1.58 ²	1.61	235.4	-19.1	-11.0	1.8

¹ ++ denotes birds now present where previously absent; -- denotes birds absent where previously present; N/C=no change.

² this value was erroneously report as 1.54 in Prescott (2009).

4.0 DISCUSSION

Our surveys, conducted at five-year intervals since 1987 (except 1993) show that loggerhead shrike populations in Alberta remain substantially higher than was reported in the inaugural survey, despite having declined steadily since 1998. However, as pointed out by Prescott (2009), it is quite likely that observer inexperience, or other factors at play during the initial survey led to artificially low values during that year, and results of subsequent surveys (by many of the same observers) were inflated when compared to 1987 values. Thus, comparisons with 1987 values are problematic. However, relatively consistent effort and observer experience since 1998 shows that loggerhead shrike populations have steadily declined in the province, and may now have stabilized at relatively low levels. It is important to note that this 15-year trend is relatively short, and caution must be exercised in extrapolating to a longer time frame. However, the pattern of decline is consistent with range contractions that have been anecdotally reported over the past 80 years in this province. Specifically, loggerhead shrikes once occurred as far north as the Peace River area, but have not occurred there since the 1950s (Salt and Wilk 1958, Prescott and Bjorge 1999). The species was also described as being “common” in the Camrose area in the 1930s (Farley 1932), but this area is now at the extreme northern edge of the species’ range in the province. However it is possible that the more northerly distribution of the shrike in the early part of the 20th century resulted from agricultural expansion that was occurring at the time (Salt and Wilk 1958, Cade and Woods 1997), and that populations are now contracting back to more normal historical levels.

The decline in Alberta is paralleled, and often amplified, in other jurisdictions in prairie regions of North America. In Saskatchewan, roadside surveys similar to Alberta have been conducted since 1987. In the inaugural survey, surveyors found a linear density of 2.17 pairs/100 km. Populations significantly increased in the 1993 survey (3.80 pairs/100 km), but have declined ever since, and were calculated as 1.19 pair/100 km in both 2008 and 2013 (St. Laurent et al. 2014, A. Didiuk, pers. comm.). Manitoba has had very low populations for the past few decades, with populations having declined approximately 40% since 2003 and 70% since 1998 (K. De Smet, pers. comm.). Breeding Bird Surveys, which are the only large-scale and long-term source of population data in other areas show significant declines of 3.8%/year in Saskatchewan since 1966, and an annual decline of 2.5%/year in the Prairie Pothole region of the U.S. and Canadian Great Plains (Sauer et al. 2012). For Alberta, a non-significant increase of 0.1%/year is calculated (Sauer et al. 2013). It should be cautioned that Breeding Bird Surveys are of uncertain accuracy for species with low population size like the loggerhead shrike (COSEWIC 2004). Collectively however, available data show a steady and relatively strong decrease in shrike populations on the Canadian Prairies and adjacent United States in recent years.

The population estimate of 7508 breeding pairs suggests that the loggerhead shrike is not in imminent danger of extirpation in Alberta. However, continuing population declines of a species already listed as “Special Concern” at a provincial level, and “Threatened” at a national level, are clearly cause for concern. As well, threats listed by Prescott and Bjorge (1999) and COSEWIC (2004) as impacting prairie loggerhead shrike populations (habitat loss, pesticide use, predation, weather, disease and vehicle collisions) are generally difficult to mitigate. One

positive factor is that shrikes are able to exploit a wide variety of habitat types, as long as suitable nesting shrubs are present. In fact, during the 2013 survey, shrikes were found almost equally in areas of native grass, tame pasture and cultivation, and occupied shrubby habitat associated with farmsteads, shelterbelts, scattered upland shrubs and wetland margins. This lack of habitat specificity means that shrikes are able to breed in a wide diversity of native and anthropogenic habitats, which should moderate the impact of the loss of native grassland on the prairies. Furthermore, the geographic shifting of populations between surveys suggests that the species is able to adapt to changing habitat conditions between years. Nevertheless, it is prudent to continue, and possibly enhance, the limited conservation efforts that have been employed to assist loggerhead shrike populations in the province, such as habitat stewardship and information/extension activities (Prescott 2009). It is also important to continue monitoring population size and distribution through the five-year roadside surveys, to provide long-term data on shrike populations in the province, and thereby determine the need for more intensive conservation and recovery efforts.

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