

**ALBERTA PIPING PLOVER PREDATOR
EXCLOSURE AND POPULATION
MONITORING PROGRAM**

2002 Field Season Report

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In cooperation with:



*North American Waterfowl
Management Plan*



EXECUTIVE SUMMARY

The piping plover is designated as “Endangered” or “Threatened” throughout its range in North America. Nest depredation has been identified as a significant limiting factor to piping plover reproductive success, and results from past studies in east-central Alberta have shown that the use of predator exclosures can significantly reduce piping plover nest depredation. In addition to protecting nests, annual surveys are needed to gauge population numbers and movement. These surveys also give researchers an opportunity to re-sight piping plovers banded in Alberta in previous years, as well as those banded in other jurisdictions. The information collected from band recoveries assists wildlife managers in determining dispersal patterns as well as adult and juvenile survival.

The predator exclosures used during the 2002 field season were circular, 60 cm in diameter and 40 cm high. These exclosures were small, quick to apply and proved very effective in protecting piping plover nests from potential predators. Forty-six of the 47 nests that had exclosures applied to them hatched. Six of 11 nests that were not exclosed hatched.

Population inventories were conducted on 44 waterbodies. One hundred fifty three adult plovers were located on 20 lakes. During these surveys, 29 band re-sightings were recorded and an additional 99 young plovers were banded in 2002.

All activities carried out during the course of this project were done in support of the “*Alberta Piping Plover Recovery Plan 2002-2004*”. In particular, these activities were conducted to address the Productivity Enhancement and Research components of the Recovery Plan. As a result of the success of the project in 2002, these activities will continue in the spring and summer of 2003.

ACKNOWLEDGEMENTS

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Please note that the results and recommendations presented in this report do not necessarily represent official positions of our funding agencies.

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1.0 INTRODUCTION

The piping plover is designated as “Endangered” in Canada (COSEWIC 2001), “Threatened” in the U.S. (U.S. Fish and Wildlife Service 2000), “Vulnerable” by The World Conservation Union (IUCN 2002) and is listed as “Endangered” under Alberta’s *Wildlife Act* (Prescott 1997). Low productivity, in part resulting from nest depredation, has been identified as a significant limiting factor to piping plover populations in the Great Plains (Whyte 1985, Haig 1992, Heckbert 1994, Richardson 1999). Results from studies carried out in east-central Alberta from 1995 to 1997 showed that through the use of predator exclosures, piping plover nest depredation can be significantly reduced thus increasing productivity (Heckbert and Cantelon 1996, Richardson 1999). A four-year management project implementing the use of predator exclosures on a large-scale basis in Alberta was concluded in 2001. The positive results from this project led the Alberta Piping Plover Recovery Team to endorse the use of predator exclosures as a management technique in the “Alberta Piping Plover Recovery Plan 2002-2004” (Alberta Piping Plover Recovery Team 2002). In addition to exclosure application, this program has been expanded to include additional inventories on many lakes with the potential to support plover populations. These annual surveys will assist wildlife managers in determining population trends and distribution of Alberta’s piping plovers.

2.0 STUDY AREA AND METHODS

The majority of this program is carried out on waterbodies in east-central and southeastern Alberta. Work was also conducted on Reflex Lake, which straddles the Alberta/Saskatchewan border and Freshwater Lake, which is entirely in Saskatchewan. These lakes were included because of their proximity to many of the Alberta lakes included in the program.

Beginning on May 14, potential breeding lakes were checked for returning piping plovers. Initial efforts focussed on ten lakes that historically have had large piping plover populations. Once these were completed, efforts were made to conduct population inventories on other lakes with potential plover populations. Adult surveys were conducted on these lakes, as well as on the initial 10 lakes. Surveys were conducted between 25 May and 7 June, during the peak of breeding activity, and following guidelines outlined by Goossen (1990). These surveys were conducted in an attempt to locate additional breeding pairs found on lakes other than those historically known to support plover populations. Lakes were surveyed by walking approximately 60 to 70% of the way from the waters edge to the vegetation line and stopping periodically to scan for plovers. Location of adult plovers were recorded and mapped. All adults were checked closely for leg bands and all breeding activity was recorded.

In addition to the adult surveys, brood surveys were conducted on the majority of the lakes that had breeding confirmed during the adult surveys. Brood surveys were carried out from 3 to 11 July. Lakes were surveyed by walking approximately 60 to 70% of the way from the waters edge to the vegetation line. Areas where nests had been recorded were checked thoroughly for young plovers. Location of adults and juveniles were recorded and mapped. Adults were again checked closely for bands. All data collected was loaded into a province wide wildlife database.

The locations of nests found during lake surveys were recorded in UTM's by using a Garmin 12XL GPS unit. Those lakes with two or more nests were surveyed regularly in an attempt to locate additional nests. Once located, nests had predator exclosures applied to them within one day of discovery. Predator exclosures were circular in shape, made of a single length of stucco wire approximately 2 m long and 40 cm high. The two ends of the stucco wire were overlapped by three sections and attached using 10 cm nylon cable ties forming a circular exclosure 60 cm in diameter. In an effort to prevent predatory birds from perching on the exclosures, the horizontal wire along the top of the exclosure was removed in order to expose the vertical wires, creating 5 cm spikes around the top of the exclosure. Each exclosure was held in place by five 10 cm nails, bent at the top. The nails were evenly spaced and inserted through the bottom section of the exclosure in order to secure it to the substrate. To protect against aerial predators, the tops were covered with 2 cm x 2 cm plastic mesh, secured with 10 cm nylon cable ties.

Exclosure application and monitoring techniques followed the procedures outlined by Richardson (1997). One researcher carried the exclosure to the nest and secured it to the substrate. After application, each nest was monitored through a spotting scope from 70 to 100 m away until an adult resumed incubation. Enclosed nests were visited at least once a week throughout the incubation period. Changes in nest status were noted including exclosure damage, depredation of eggs, unexplained abandonments and hatching. No exclosures were applied to nests that could not be monitored regularly, or that were deemed to be too close to human activity. In these cases it was believed that the exclosure would draw unnecessary attention to the nest site. Nest success was calculated by dividing the number of successful nests (those hatching at least one egg) by the total number of nests at each lake.

In addition to the population inventories and exclosure application, opportunistic banding of young plovers was also carried out. Young were captured using hand nets and marked with a combination of one metal and two coloured plastic bands. Bands were applied in combinations that allow band re-sightings to be traced back to the lake and year which the bird was banded.

3.0 RESULTS

3.1 Population Inventories

Population inventories were conducted on 46 waterbodies in Alberta (Figure 1). A total of 141 adults were located on 19 lakes during the course of these surveys (Table 1). An additional 12 adults were located in Saskatchewan, four on Freshwater Lake and eight on the Saskatchewan side of Reflex Lake. All 23 Alberta lakes that had adults recorded during the 2001 International Piping Plover Census (Prescott 2001) were surveyed again in 2002. On these lakes, 133 adults were located during 2002, compared to 150 adults located during the 2001 Census. Eight more adults were located on lakes that had no birds during the 2001 Census. Inventories were also carried out on nine lakes never before surveyed, but no new plover populations were found.

Brood surveys were conducted on 15 lakes. These lakes were chosen based on the occurrence of historically high population numbers or having at least two active nests in 2002. A total of 46 young were located in Alberta during the brood surveys, with an additional eight counted on Freshwater Lake and 16 counted on the Saskatchewan side of Reflex Lake.

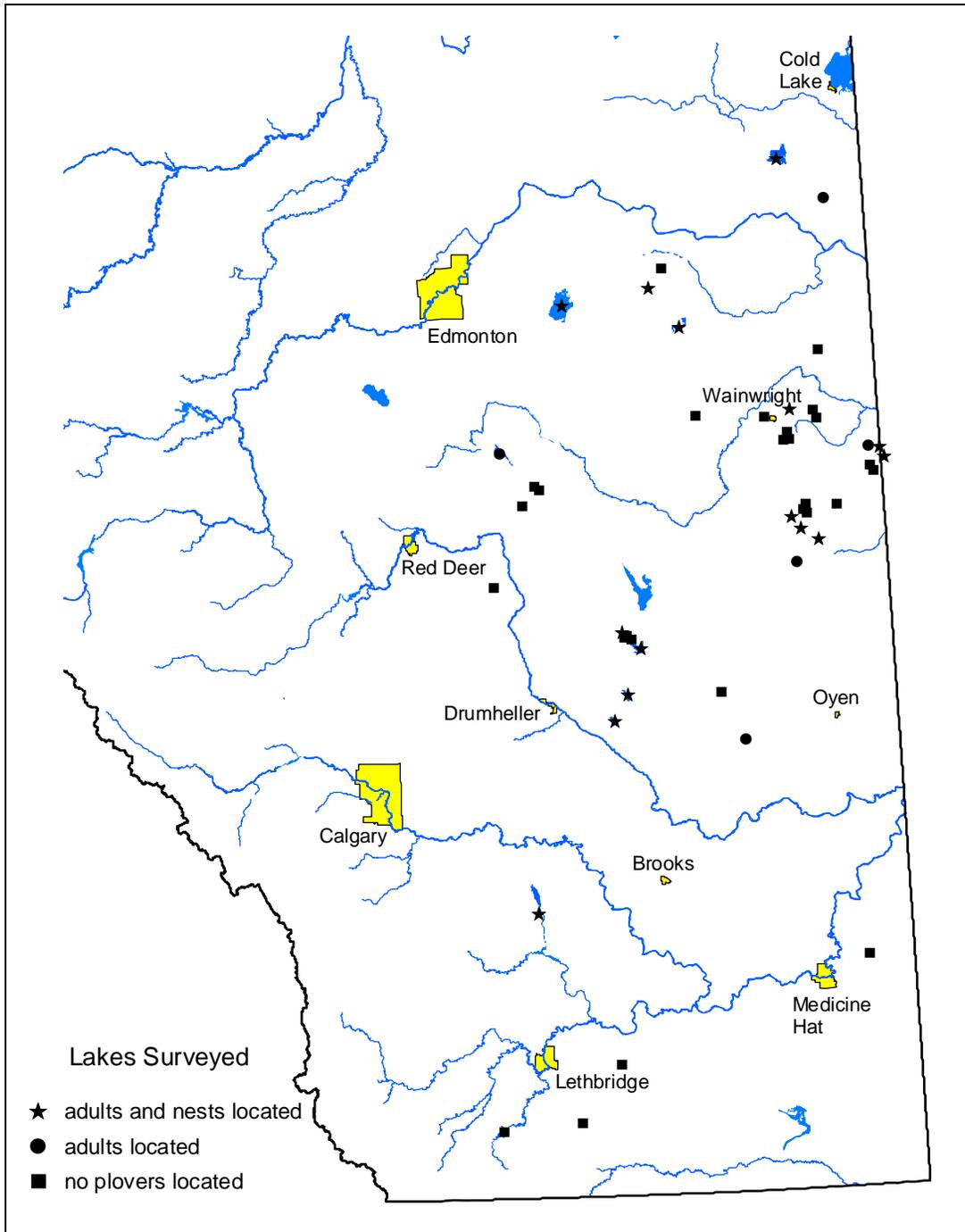


Figure 1. Location of lakes surveyed for piping plovers in 2002.

Table 1. Alberta piping plover population inventories for 2002.

Lake	Adult Survey	Brood Survey		Nests Found	Lake	Adult Survey	Brood Survey		Nests Found
		Adults	YOY				Adults	YOY	
Reflex-AB side (SK side)	21 (8*)	62	39	17	Killarney	0	0	0	0
Muriel	36	NS	PS: 39	10	Leanne	0	NS	NS	0
Dowling	18	9	PS: 8	9	Chain 1(Pearl)	0	NS	NS	0
Baxter	8	NS	6	4	Chain 3A	0	NS	NS	0
Freshwater*	4	4	8	3	Chain 3 (Clear)	0	NS	NS	0
Handhills	6	0	0	3	Plain	0	NS	NS	0
Chain 4	6	3	7	2	Bushyhead	0	NS	NS	0
Birch	PS: 6	NS	3	2	Parsons	0	NS	NS	0
Little Fish	8	7	1	2	Rough	0	NS	NS	0
Lake #1, MD Provost	3	2	PS: 4	1	Norman	0	NS	NS	0
Beaverhill	PS: 3	NS	NS	1	Greasy	0	NS	NS	0
Akasu	PS: 2	NS	NS	1	Stevenson	0	NS	NS	0
Foster	3	NS	NS	1	Chin Coulee	0	NS	NS	0
Horseshoe	3	NS	NS	1	Goosequill	0	NS	NS	0
McGregor	2	NS	NS	1	Chappice	0	NS	NS	0
Frog	9	NS	NS	0	Hansman	0	NS	NS	0
Red Deer	PS: 4	1	3	0	Plover	PS: 0	NS	NS	0
Sunken	0	3	3	0	Rider	PS: 0	NS	NS	0
Cipher	1	0	0	0	Rockeling Bay	PS: 0	NS	NS	0
Piper	0	1	0	0	Milk River Ridge Res.	PS: 0	NS	NS	0
Gooseberry	1	NS	NS	0	Peninsula	PS: 0	NS	NS	0
Blood Indian Res.	1	NS	NS	0	Buffalo	PS: 0	NS	NS	0
Metiskow	0	0	0	0	St. Mary Reservoir	PS: 0	NS	NS	0
Albert	0	0	0	0	Total	153	92	70	58

* In Saskatchewan. PS = Partial Survey NS = Not Surveyed

3.2 Nest Summaries

A total of 58 nests were found on 15 waterbodies (Figure 1, Table 2). Overall, traditional nest success was 90% (52/58). Forty-six out of 47 nests which were treated with exclosures hatched (98%). For nests where exclosures were not applied, six of 11 nests were successful in hatching at least one egg (55%). Out of the 58 nests that were found, 51 young were seen at 18+ days old and were therefore considered to have fledged.

The following is a breakdown of the fates of the 58 nests found during the summer of 2002:

- 46 nests hatched with the exclosures applied
- one nest with exclosure applied was abandoned for unknown reasons
- six nests hatched with no exclosures applied
- five nests were depredated with no exclosures applied

Table 2. Alberta piping plover nest summaries for 2002.

Lake	Exclosed nests			Unexclosed nests			Overall		
	No. of Nests	Successful nests	Nest Success	No. of Nests	Successful nests	Nest Success	No. of Nests	Successful nests	Nest Success
Reflex-AB side (SK side)	10 (3*)	10 (3*)	1.00	3 (1*)	3 (1*)	1.00	13 (4*)	13 (4*)	1.00
Muriel	8	8	1.00	2	1	0.50	10	9	0.90
Dowling	8	8	1.00	1	1	1.00	9	9	1.00
Baxter	4	4	1.00	0	0	n/a	4	4	1.00
Freshwater*	3	2	0.67	0	0	n/a	3	2	0.67
Handhills	3	3	1.00	0	0	n/a	3	3	1.00
Birch	2	2	1.00	0	0	n/a	2	2	1.00
Little Fish	2	2	1.00	0	0	n/a	2	2	1.00
Chain 4	2	2	1.00	0	0	n/a	2	2	1.00
Lake #1, MD Provost	1	1	1.00	0	0	n/a	1	1	1.00
Foster	1	1	1.00	0	0	n/a	1	1	1.00
Horseshoe	0	0	n/a	1	0	0.00	1	0	0.00
McGregor	0	0	n/a	1	0	0.00	1	0	0.00
Akasu	0	0	n/a	1	0	0.00	1	0	0.00
Beaverhill	0	0	n/a	1	0	0.00	1	0	0.00
TOTALS	47	46	0.98	11	6	0.55	58	52	0.90

* In Saskatchewan

3.3 Banding Summary

Ninety-nine chicks were banded in 2002 (Table 3). This brings the total number of young banded since 1996 to 415. Bands were placed in combinations identifying year and lake of origin. In addition to observations of newly banded chicks and adults, 29 re-sightings of birds banded previously in Alberta, Saskatchewan or on the wintering grounds, were recorded.

Table 3. Summary of young banded in 2002.

Lake	Band Combination ¹	No. of young banded
Chain #4	(O, m : B/W, -)	6
Dowling	(-, m : Bl/R, O) (-, m : B/W, O)	9
Freshwater	(B/W, m : -, W)	3
Muriel	(-, m : B/W, G)	31
Reflex	(-, m : B/W, Y)	50
	Total: 99	

¹ Band combinations read as follows: upper left, lower left: upper right, lower right. Dashes (-) mean no bands were located on that part of the leg. The lowercase letter 'm' refers to a metal band, uppercase letters refer to the colours of plastic bands, and letters separated by a slash (/) are striped bands. Consecutive letters mean bands were stacked, where the first letter refers to the colour of the band highest on the leg. B=Black, Bl=Blue, G=Green, R=Red, W=White, Y=Yellow

4.0 DISCUSSION

Activities for this project were undertaken in support of the “*Alberta Piping Plover Recovery Plan 2002-2004*”. In particular, exclosure applications, population inventories and banding of young address recovery actions under section 5.3 Productivity Enhancement and section 5.5 Research.

Nests that were exclosed in 2002 had a much higher success rate than those nests that were not exclosed. Ninety eight percent of exclosed nests hatched compared to only 55% of unexclosed nests. The small exclosures used, initially tested in 2001 (Engley 2001), were very successful and had many advantages over previous exclosure designs. These exclosures were virtually unnoticeable when placed on nesting beaches. Also, the disturbance to the birds was minimized as the small exclosures could be placed over the nest by a single researcher in about 30 seconds. Previous designs have required at least two researchers and generally took between five and 10 minutes to set up. In 1999, adult depredation near exclosures was a problem (Michaud and Prescott 1999). However, since the introduction of the small exclosures, no cases of adult depredation have been recorded and the high level of success achieved has led researchers in Saskatchewan to adopt them as a management tool (P. Goossen, pers. comm).

No evidence of cattle approaching the small exclosures was recorded. Cattle have been inclined to rub against previous exclosure designs, using them as ‘scratching posts’ and in some cases causing nest abandonment (Michaud and Prescott 1999, Engley and Michaud 2000).

Results of the 2002 field season did not support some researchers’ concerns that the low height (40 cm) of the small exclosures would result in a higher rate of abandonment than with previous exclosure designs. The only exclosed nest that was not successful was abandoned for unknown reasons. However, the abandonment rate (1/47) is the lowest recorded in any year, and for any exclosure design, since this project was initiated in 1998.

Eleven nests were found but not exclosed during the course of the 2002 field season. These nests were not exclosed, either because they were found on lakes that would not be monitored regularly or because the nests were deemed to be too close to human activity. In previous years, nest exclosed in high traffic areas have drawn the attention of people in the area. Curiosity resulted in people approaching the exclosure and disturbing the nesting birds. In at least one case this caused the abandonment of a nest (Prescott and Michaud 1999). To address this problem a decision was made not to apply exclosures in areas of high human activity.

Population numbers recorded in 2002 were down slightly from those recorded during the 2001 International Piping Plover Census (Prescott 2001). A total of 141 birds were found on 19 waterbodies in Alberta. During the 2001 census, 150 adults were located on 23 waterbodies. The summer of 2002 was extremely dry in the areas which piping plovers occur. Forty percent of the adults and 47% of the nests were located on two lakes, Reflex and Muriel. Both lakes have good habitat and permanent water. Many lakes that have had historically high plover numbers and good habitat were completely dry this year and had no plovers. There appears to be northerly shift in the plovers’ range, possibly resulting from the dry conditions this part of Alberta has experienced over the past several years.

In addition to the work involved with the population inventories, banding and exclosure application, field staff also assisted with the evaluation of all known piping plover habitat in the province. Field staff filled out habitat evaluation sheets that are currently being used to develop Lake Management Plans for all of the key piping plover lakes in Alberta. These activities were carried out in support of section 5.2 Habitat Protection and Management of the “*Alberta Piping Plover Recovery Plan 2002-2004*” (Alberta Piping Plover Recovery Team 2002).

Determining fledging success is extremely difficult. For the purposes of this study, any young seen that were 18 days or older were considered to have fledged. However, this is a very inefficient and highly labour intensive way of monitoring fledging success. Since young tend to move further from their original nest site as they age, broods would need to be monitored daily after they were 14 days old. Even then, when a brood is seen on day 17 and not on day 18 it is not possible to know for sure whether that brood fledged or if the young were depredated. Not only is the cost associated with this method of observation prohibitive, but monitoring each nest daily is disruptive to the adults and young. This may in itself contribute to brood failure by increasing depredation and decreasing feeding time. Given the difficulties with determining fledging success through observation, it is likely that the number of young that fledged is higher than the 51 birds that were seen at 18 days of age or older.

5.0 RECOMMENDATIONS

A very high hatching success rate has been achieved through the application of predator exclosures. As a result, the application of predator exclosures should continue on as large a scale as funding will allow. A comprehensive report detailing the findings of the past eight years of piping plover research in Alberta is currently being written and will be submitted to a refereed journal in 2003. However, nest depredation is not the only management issue that needs to be addressed with regards to piping plover recovery efforts. Other issues include:

- Restricting cattle from nesting areas during the nesting period (May to July) would reduce degradation of soft nesting substrate by deep hoofprints as well as the possibility of nest destruction. However, cattle should not be excluded entirely from nesting beaches. Allowing cattle to graze on nesting beaches beginning in August would help control the continuing problem of vegetation encroaching on nesting habitat.
- Additional work is still needed to determine a better way of gauging fledging success. Since the goal for Alberta is to achieve a fledging rate of 1.25 chick/pair/year (Alberta Piping Plover Recovery Team 2002), it is essential that a more accurate and method of determining fledging success be developed. Efforts to address this issue will be continued over the upcoming winter in hopes of employing the new methodology in 2003.
- Banding of piping plover chicks should continue. Additionally, capturing adults that have been banded in previous years should be considered. Recovering the metal band numbers would provide more detailed information needed to evaluate the existing banding protocol.

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4. Communication of the results from the program is essential. Annual presentations will be made to the Alberta Piping Plover Recovery Team and at appropriate conferences. The final report will be available to the public or any other organization on the ACA's web page (www.ab-conservation.com)
- Continued input to this program from the Alberta Piping Plover Recovery Team is essential. This will be addressed through the Alberta Conservation Association's membership on the Recovery Team. With a comprehensive piping plover management strategy now in place, field staff involved in carrying out this program may be able to assist in other areas of the plan. These options should be explored further.
 - More survey effort should be focussed in areas not traditionally surveyed for plovers. In particular, this should include areas along the southern fringe of the boreal forest around Cold Lake and Lac La Biche. Surveys in these areas may help to confirm or dismiss the perceived range shift of the piping plover in Alberta.

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APPENDIX 1. Original nest data from 2002 field season.

Nest No. (1)	Exclosed Y/N	Eggs Laid	Eggs Hatched	Comments
AKLA-02-01	N	3	0	nest depredation
BALA-02-01	Y	4	4	successful
BALA-02-02	Y	4	4	successful
BALA-02-03	Y	4	4	successful
BALA-02-04	Y	4	4	successful
BELA-02-01	N	4	0	nest depredation
BILA-02-01	Y	4	4	successful
BILA-02-02	Y	4	4	successful
CH4L-02-01	Y	4	4	successful
CH4L-02-02	Y	4	4	successful
DOLA-02-01	Y	4	4	successful
DOLA-02-02	Y	4	4	successful
DOLA-02-03	Y	4	2	successful
DOLA-02-04	Y	4	4	successful
DOLA-02-05	Y	4	4	successful
DOLA-02-06	Y	4	4	successful
DOLA-02-07	Y	4	3	successful
DOLA-02-08	Y	4	4	successful
DOLA-02-09	Y	4	4	successful
FOLA-02-01	Y	4	4	successful
FRLA-02-01	Y	4	4	successful
FRLA-02-02	Y	4	0	unexplained abandonment
FRLA-02-03	Y	4	4	successful
HALA-02-01	Y	4	4	successful
HALA-02-02	Y	4	4	successful
HALA-02-03	Y	4	4	successful
HOLA-02-01	N	4	0	nest depredation
LFLA-02-01	Y	4	4	successful
LFLA-02-02	Y	4	4	successful
MCLA-02-01	N	4	0	nest depredation
MULA-02-01	Y	4	4	successful
MULA-02-02	Y	4	4	successful
MULA-02-03	Y	4	4	successful
MULA-02-04	Y	4	4	successful
MULA-02-05	Y	1	1	successful
MULA-02-06	Y	4	4	successful
MULA-02-07	Y	4	4	successful
MULA-02-08	Y	4	4	successful
MULA-02-09	N	4	0	nest depredation
MULA-02-10	N	3	2	successful
PIRL-02-01	Y	4	4	successful

APPENDIX 2. (continued)

Nest No. (1)	Exclosed Y/N	Eggs Laid	Eggs Hatched	Comments
RELA-02-01	N	4	4	successful
RELA-02-02	Y	4	4	successful
RELA-02-03	Y	4	4	successful
RELA-02-04	Y	4	4	successful
RELA-02-05	Y	4	4	successful
RELA-02-06	Y	4	4	successful
RELA-02-07	Y	2	2	successful
RELA-02-08	Y	4	4	successful
RELA-02-09	Y	4	4	successful
RELA-02-10	Y	4	4	successful
RELA-02-11	Y	4	3	successful
RELA-02-12	Y	4	4	successful
RELA-02-13	N	4	4	successful
RELA-02-14	Y	4	4	successful
RELA-02-15	N	4	4	successful
RELA-02-16	N	4	4	successful
RELA-02-17	Y	4	4	successful