

# SWAINSON'S HAWK LONGEVITY, COLOUR BANDING AND NATAL DISPERSAL

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I reviewed all banding records for North American Swainson's Hawks through the year 2000, and added 21 more recent encounters of Swainson's Hawks banded under my permit through 2003. I was interested in three topics: longevity (how long individuals live), where hawks spent the year after they hatched, and natal dispersal (movements from birth location to first breeding location) of Saskatchewan-born birds. Details of the 12 banded hawks that died from monocrotophos poisoning in Argentina are presented in a separate table and results of a colour banding experiment near Kindersley, SK in 1988-1995 are given special attention.

## History of Saskatchewan banding

Saskatchewan is fortunate among all North American jurisdictions in having

available banding data on the great majority of birds prior to computerization of banding records in 1955. All of the pre-1955 recoveries and encounters of Saskatchewan birds have been computerized whereas North American banding data have been computerized retroactively only for game birds. ('Encounter' is the all-inclusive term that includes birds found dead or alive, whereas the term 'recovery' should be restricted to birds found dead.) Between 1924 and 1941, seven Saskatchewan banders banded 76 Swainson's Hawks, with the then-prevailing high rate of recoveries (14 or 18.4%; 13 of the 14 had been shot) (Table 1). Hartley Fredeen of Macrorie, Saskatchewan, was the first North American bander to have a Swainson's Hawk recovered anywhere in South America, in Argentina on 23 December 1941.<sup>4</sup> From 1955 to 2001, 13 Saskatchewan

Table 1

### Saskatchewan banders of Swainson's Hawks, 1924-2001

Bander #	Name	Locality	Years	# banded	# recov		Total	percent
					dead	alive		
14	Carter, RH	Muscow	1924	6	1	0	1	
14	Lloyd, R	Davidson	1931-32	3	2	0	2	
180	Holmes, CF	Dollard	1934-36	15	5	0	5	
362	Hedlin, R	Renown	1938	14	1	0	1	
237	Hammond	Cupar	1939	5	1	0	1	
369	Fredeen, FJH	Macrorie	1940	29	3	0	3	
443	Bird, Dick	Avonlea	1941	4	1	0	1	
Total, 1924-1951				76	14	0	14	18.4%
460	Houston, CS	widely	1946-2001	4046	130	16	146	
755	Anaka, W	Spirit L.	1958	4	1	0	1	
5460	Hamerstrom, F	Flaxcombe	1959	3	0	0	0	
10061	Millar, J	Swift Current	1962-63	5	1	0	1	
10066	Fyfe, R	widely	1974-80	5	0	0	0	
10076	Fox, GA	Regina	1962	1	0	0	0	
10079	Sealy, SG	Scentgrass	1962	1	0	0	0	
10108	Lein, R	widely	1962-65	16	0	0	0	
10168	Maher, WJ	Matador	1968	3	0	0	0	
10214	Whitfield, DWA	widely	1968-70	17	2	0	2	
10242	Scott, RL	widely	1969-81	29	1	0	1	
10299	Nieman, D	Saskatoon	1981	2	0	0	0	
10486	Harris, WC	widely	1986-90	859	44	0	44	
Total, 1955-2001				4991	179	16	195	3.9%

banders banded 4991 individual Swainson's Hawks with a recovery rate of dead hawks of 3.6% or, with inclusion of live birds, a total encounter rate of 3.9% (Table 1).

### **Longevity**

Two recent Swainson's Hawk recoveries indicating unusually long survival led me to review all North American band encounters of this species. An earlier analysis of 550 encounters of 541 individual hawks banded in North America through 1992 had revealed that the four oldest birds had died at 13, 14, 15 and 18 years.<sup>8</sup>

The Canadian Wildlife Service banding office provided an electronic record of the 762 encounters from North American banding through the year 2000. The twelve banded Swainson's Hawks among the 1,690 that died from monocrotophos poisoning in La Pampa province of Argentina in January 1995 and January 1996 are part of this data set.

To increase the accuracy of the data from the hawks I had personally banded, I contacted most of the band finders by telephone or letter. Information from these people led to 32 changes in "how found" (four since the banding office printout mentioned above), and 19 corrections of latitude or longitude or both, in "where found."

Eight Swainson's Hawks in the banding office records are now known to have survived more than 17 years, one of which was still alive at last report (Table 2). Inclusion of live birds is at the suggestion of Brownie that sparse recaptures of live birds can be combined with recoveries of dead birds.<sup>2</sup> The oldest hawk was one banded in Colorado and found dead of monocrotophos poisoning in Argentina at 19 years, 6 months.

The two hawks listed as alive in Table 2 are of special interest. One hawk had been banded by Joe Schmutz near Hanna, Alberta

in 1975, and then trapped and released about 10 km distant in 1982, 1985 and 1986, where it had been resident in the same group of trees every year. In 1994, when 19 years old, it moved less than a kilometer to a new site, but in 1995 it was not seen and was presumed dead (J.K. Schmutz, pers. comm.). The second was a hawk banded at Lostwood Refuge, North Dakota, on July 14, 1983, by R.K. Murphy. On January 1, 2001, it was caught by hand, unable to fly, on an airport runway at Palmira, Colombia, only three degrees north of the equator. It was thought to have been poisoned from feeding in sugar cane fields nearby. It no doubt would have perished had it not been sent to a raptor rehabilitation facility operated by Luz-Stella Castillo. It was released after more than three months, able to fly, on April 16 (R.K. Murphy, pers. comm.).

At least one unreported encounter, not yet entered into the computerized central records, exceeds those within the system. Brian Woodbridge (pers.comm.) has had a 24-year-old hawk return alive to its breeding site in northern California, where it was trapped by Peter H. Bloom in 2004.

Details of all banded Swainson's Hawks recovered after the massive poisonings in Argentina are presented in Table 3. The 12 poisoned hawks are of special interest because of their high average age, and because five of the twelve originated in Saskatchewan and three in Alberta. Only incomplete details have been published previously.<sup>5</sup>

### **Mortality of Saskatchewan-banded hawks**

There has not been a single undisputed recovery/encounter of a first year Swainson's Hawk banded in the area covered by the Kindersley 1:50,000 topographic map sheet (51 to 52 degrees latitude north and 108 to 110 degrees longitude west). To study this unexpected absence during the calendar year after hatching, when the hawks were 10 to 16 months old, before and just after

Table 2

### Swainson's Hawks 17 years and older, banded as nestlings anywhere in North America

Band #	AGE Yrs, Mos	DATE AND LOCATION ENCOUNTERED			How Found	DATE AND LOCATION Banded							
		Mo/dy	Year	Location		Lat	Long	Mo/day	Year	State	Lat	Long	Bander
098709858	19, 6	Jan 23	1995	Argentina	-351	633	Poison	Jul 11	1975	CO	370	1024	Andersen
098740999	19, 2	Oct 2	2001	SK	500	1040	Found dead	Jul 24	1982	SK	513	1090	Houston
087709325	19, 0	Aug 5	1994	AB	512	1114	Alive, last seen	Jul 28	1975	AB	513	1114	Schmutz
098742132	18, 11	Jun 14	2002	SK	501	1093	Found dead	Jul 8	1983	SK	501	1092	Houston
098703868	18, 1	Sep 1	1991	Texas	355	1015	Injured	Jul 14	1973	CO	382	1033	Andersen
098730629	18, 0	Aug 16	1996	Colorado	403	1043	Car	Jul 31	1978	CO	403	1042	Orde
072703163	17, 5	Jan 25	1996	Argentina	-352	640	Poison	Jul 29	1978	AB	505	1113	Fyfe
098774203	17, 5	Jan 1	2001	Colombia	32	763	Alive, rehab	Jul 14	1983	ND	483	1022	Murphy

-352 indicates between 35 degrees 20 minutes and 35 degrees 30 minutes South Latitude

370 indicates between 37 degrees 00 minutes and 37 degrees 10 minutes North Latitude

1024 indicates between 102 degrees 40 minutes and 102 degrees 50 minutes West Longitude

Table 3

## Swainson's Hawks recovered due to monocrotophos poisoning near Alta Italia, Argentina

Band #	Age Yrs, Mos	Recovery Data			Banding Data			Distance from nest (km)	Location Lat Long	Date Mo/Dy	Year	Location		State/ Prov	Bander	Age Loc
		Date Mo/Dy	Year	Lat	Long	Lat	Long									
0987-09858	19, 6	Jan 23	1995	-351	0633	8960	8960	370	1024	CO	CO	Andersen	Loc			
0987-61386	7, 5	Feb 2	1996	-352	0640	10160	10160	475	1075	MT	MT	Eng	Loc			
0987-63107	11, 6	Feb 2	1996	-352	0640	10350	10350	415	1215	CA	CA	Bloom	Loc			
1807-42732	0, 6	Jan 23	1995	-351	0633	10400	10400	415	1215	CA	CA	Woodbridge	ASY			
0727-03163	17, 4	Jan 25	1996	-352	0640	10560	10560	505	1113	AB	AB	Schmutz	Loc			
0987-45045	9, 6	Jan 29	1996	-352	0640	10880	10880	531	1133	AB	AB	Pletz	Loc			
1807-08648	1, 6	Jan 31	1996	-352	0640	10550	10550	505	1104	AB	AB	Jones	Loc			
0987-88629	5, 6	Jan 25	1996	-352	0640	10210	10210	493	1051	SK	SK	Harris	Loc			
0987-88579	4, 5	Jan 23	1995	-352	0633	10350	10350	501	1062	SK	SK	Harris	Loc			
0987-46660	9, 6	Jan 30	1996	-352	0640	10560	10560	513	1092	SK	SK	Houston	Loc			
1807-08126	5, 6	Feb 2	1996	-352	0640	10490	10490	511	1082	SK	SK	Houston	Loc			
1807-12745	0, 6	Jan 30	1996	-352	0640	10450	10450	505	1081	SK	SK	Houston	Loc			

\* Loc - flightless young (locals), hatched at banding location

\*\* ASY - After Second Year adult

For explanation of latitude and longitude abbreviations see footnotes to Table 2

Table 4

Life Table of Swainson's Hawks banded in Saskatchewan, 1923-2001, by years, ending June 30, after banding year

Recovery Location	Age in months				Age in years															Disqualified	Totals			
	1-9	10-12	13-21	22-24	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			17	18	19
Sask/Alta	98	1	1	3	8	8	6	3	3	2	3			1	1			1	1	1	1	1	6	149
USA	7	6	1		5	2	1	1															1	24
S of Rio Grande	6	2	4	1	6	2	1	4	3	1	1	1	1		1								2	37
	111	9	6	4	19	12	8	8	6	3	4	1	1	2	1	1	0	1	1	1	1	1	9	210

their first birthday, I compiled a life table based on all Saskatchewan banded Swainson's Hawks (Table 4). A life table shows the complete mortality data of a population, with respect to age, i.e. the age at which known deaths have occurred, and gives an idea of how long individual birds are likely to live.<sup>9</sup>

Some of the age categories in Table 4 require explanation. A recovery made in Jul-Dec of the "calendar year of hatching" is what banders call a "direct recovery;" I have extended this to include the wintering area in Argentina, Paraguay and Uruguay through the end of March, when the birds are 9 months old. A recovery in Apr-Jun of the subsequent year leading up to July 1 when the bird is deemed to have had its first birthday, I have called "semidirect." Birds are classed as one year of age starting July 1 of the year after banding, but those encountered during the spring of the subsequent calendar year, when 21 to 23 months old, are ones that have made two trips to South America and back. These two categories of year-old birds have been separated in Table 4.

Five questionable records, initially within the age range of 9-12 months, were re-assigned the status of "direct" recoveries in Table 4, for the following reasons. Reports of two different hawks, mailed in on March 23 and March 29, were dated before any Swainson's Hawks had returned, and must have originated from the banding year. A skeleton of a dead bird that had never left its nest was not reported until a year later. A band on a skeleton, found by a highway cleaning crew on April 5, clearly had been

there all winter. A May 5 hawk leg with a band on it near a coyote den most probably dated from the previous year. The remaining April-June record was a letter posted on 17 April that failed to mention a date of finding; the band finder could not be contacted, and hence this record, the sole entry for the age category of 10-12 months, remains somewhat doubtful without a confirmed date of finding. The single Saskatchewan entry for 13-21 months was a hawk found fatally injured after its first birthday, within 10 km of its banding site, on August 31. The band finder could not be reached for confirmation.

With other species, in contrast with the banding results of Swainson's Hawk, the second-highest number in a life table is of birds in their second year of life. The other three "one-year-olds" were 22-24 months old before June 30 in the summer after their second trip to South America. Note the paucity of records for year-old hawks aged 13-24 months in Table 4, lower than for ages 2 and 3 years.

Nine-month-old Swainson's Hawks in their first journey back north from Argentina seem to lag behind mature birds, if one accepts the accuracy of band reporting dates. One such hawk was shot in Argentina on the late date of May 5, and another was behind schedule when it was shot in Colombia on an unspecified day in April. Similarly, individuals shot in Oklahoma and in South Dakota, both on May 10, and those found dead in Nebraska on June 1 and in South Dakota on an unspecified day in June, were unexpectedly far south for the date. These hawks would fit with my hypothesis that they were destined to spend their first

summer somewhere south of where they had been raised the year before.

As is the case with all bird species studied to date, the peak of mortality is in the first nine months after banding, from July to March. But, in striking contrast to all other species I have studied, year-old Swainson's Hawks do not form the second largest number in the life table. This almost total lack of year-old birds returning to their breeding locality is similar to the experience of Woodbridge et al., who found a "virtual absence" of subadult hawks in their California study area. They suggested that "these birds spend their second summer elsewhere."<sup>14</sup>

The absence of year-old banded birds is supported by a lack of sightings of banded or unbanded first-year plumage birds in the Kindersley area. Some first-year Swainson's Hawks are presumed to show the very white plumage pictured in the extreme lower left figure on page 120 of Sibley as one of the three colour variations at this age, and in Brian Wheeler's plates, pages 291-292.<sup>12, 13</sup> Only in 2004 did we twice see the light plumage as far north as Bickleigh, southwest of Rosetown, Saskatchewan.

In striking contrast are the observations of Martin Bailey in a 110 by 13 km band of land paralleling highways 39 and 6 between Weyburn and Regina.<sup>1</sup> Bailey has reported up to 200 hawks in this light-coloured plumage, presumptive year-old Swainson's Hawks, in late June and early July, 1997, suggesting that substantial numbers of non-breeding hawks may return north only as far as extreme southern Saskatchewan. We hope others will be stimulated to watch for the light plumage of presumed year-old hawks, keeping track of locations and dates.

### Colour banding

My eight-year colour banding project, begun in 1988 and restricted to the aforementioned Kindersley map sheet, had

three objectives: to see if we could increase the number of band encounters by using a second band with an easily readable number; to learn whether or not Swainson's Hawks return to the approximate area where they were raised; and to learn where they spend their second calendar year. Swainson's Hawks are relatively tame, perch on poles and fenceposts and often allow a close approach. On such occasions it is possible to obtain a clear view of unfeathered tarsi.

I purchased anodised alpha-numeric bands from A-Craft in Edmonton, each with one letter of the alphabet and one number in white on the colour background. These colour bands cost \$4.70 and \$4.75 each. In each instance, the numeral was on top and the letter below, repeated four times around the circumference of the band,

e.g.    9 9 9 9  
          D D D D

My helpers and I applied green bands to the left leg of 107 nestling Swainson's Hawks in 1988 and 93 to the right leg in 1989. Black bands were applied to the left leg of 128 hawks in 1990, and to the right leg of 97 in 1991 and 75 in 1992. Orange bands were applied to the right leg of 37 hawks in 1993, the right leg of 128 in 1994, and the left leg of 19 in 1995. Each nestling had a standard aluminum band applied to the other leg.

In each subsequent year, two or three weekends were spent in the Kindersley area in the last half of June, banding Ferruginous Hawk nestlings, and in the last half of July, banding Swainson's Hawk nestlings. During each of these visits, we scrutinized each perched Swainson's Hawk carefully. Some hawks did not sit still long enough for us to focus binoculars on the legs of the sitting bird, but others were close enough that at least the presence or absence of leg bands could be determined without doubt.

The Swainson's Hawk usually does not breed until at least three years of age.<sup>14</sup> We

Table 5

## RECOVERY RATES FOR SWAINSON'S HAWKS, 1988-1995

Banding Year	Encounters with aluminum and colour bands		Encounters with aluminum bands only	
	Number banded	Number encountered	Number banded	Number encountered
1988	107	1	56	1
1989	93	4 *	28	0
1990	128	3	64	1
1991	97	5	35	4
1992	77	2	68	1
1993	37	2 *	20	0
1994	128	1	46	2
1995	17	1	104	4
Total	684	19 2.8%	421	13 3.1%

\* another two each year were sighted near nest before achieving flight

fully expected that Swainson's Hawks would return to breed near their nest of origin at three or more years of age, and thus, beginning in 1991, we should have seen some breeding hawks with two bands, one aluminum and one coloured,

Throughout this study, we saw over 80 adult unbanded Swainson's Hawks each year, and counted our maximum number of unbanded adults, 102, during 1994. We sighted an aluminum band on two different hawks, but saw none with a colour band. Brian Woodbridge found no harmful effects from his long-term studies in northwestern California, where he sights or recaptures many birds each year,<sup>14</sup> so I doubt that the second band was harmful in any way, for example by impeding prey capture.

Clearly, the addition of the readable colour band did not improve the band reporting rate. Only 23 of the 684 hawks colour-banded in these eight years were recovered elsewhere by band finders. This is a slightly smaller percentage than the number of encounters of birds with aluminum bands alone during the identical time period (Table 5).

We were therefore surprised when sightings of two of our colour bands were made at a distance.

A female nestling with green 4T colour band applied near Mantario, Saskatchewan, on July 24, 1988, was sighted twice at its nest by Schmutz near Richdale, Alberta, on July 15, 1991 (presumably its first year of breeding), and on June 5, 1995. The other hawk with a colour band near a presumed nest site, banded as a male nestling with green 9A near Mantario on July 29, 1989, was trapped and released by a falconer near Caronport, Saskatchewan, on June 4, 1998.

#### Natal dispersal of Saskatchewan-banded hawks

We next studied natal dispersal, the direction and distance of movement from the birth location to first breeding location (breeding dispersal refers to movements between successive breeding sites).<sup>5</sup>

To determine natal dispersal distances within Saskatchewan and Alberta, I restricted myself to evidence from 200 recoveries of dead birds and another 12 encounters of live

Table 6

## NATAL DISPERSAL WITHIN SASK AND ALTA OF SASKATCHEWAN-BANDED NESTLING SWAINSON'S HAWKS

Band number	Recovery data			Banding data									
	Age when found (yr)	Date	Distance km	Location		How found*	Date	Location		Bander			
				Lat	Long			Lat	Long				
HAWKS RECOVERED DEAD DURING THE BREEDING SEASON (mean 33.3 km)													
2605205	1	May	1938	150	505	1081	SK	1	Jul 12	1936	493	1083	Holmes
98785227	1	Jun 18	1988	12	495	1092	SK	45	Aug 1	1986	495	1093	Harris
84790170	2	May 2	1972	22	513	1050	SK	45	Jul 6	1969	512	1051	Houston
98785137	2	Aug 10	1988	0	492	1051	SK	0	Jul 29	1986	492	1051	Harris
98787696	2	Jun 16	1992	0	512	1091	SK	0	Jul 23	1989	512	1091	Houston
98746002	2	Jul 6	1987	57	510	1091	SK	0	Jul 21	1985	513	1092	Houston
61722056	3	May 1	1976	138	523	1092	SK	0	Jul 19	1972	514	1075	Houston
61722191	3	Aug 11	1977	22	512	1061	SK	0	July 7	1974	510	1060	Houston
180779714	3	Jul 11	2003	19	522	1064	SK	45	Jul 24	2000	521	1064	Houston
180779778	3	Jul 23	2003	23	520	1065	SK	14	Jul 27	2000	520	1063	Houston
180712717	4	May 17	2000	0	520	1063	SK	0	Jul 28	1995	520	1063	Houston
98725094	4	May 18	1982	74	521	1090	SK	45	Jul 16	1977	513	1090	Houston
98728588	4	Jun 15	1986	39	505	1080	SK	14	Jul 25	1981	511	1081	Houston
98785854	4	Jul 28	1991	19	495	1092	SK	0	Jul 28	1987	500	1092	Harris
98785226	4	Jul 5	1990	12	495	1092	SK	45	Aug 1	1986	495	1093	Harris
41667604	4	Jul 19	1945	22	495	1045	SK	1	Jul 9	1941	500	1050	Bird
98742016	5	May 6	1989	12	513	1084	SK	0	Jul 23	1983	513	1085	Houston
98785325	6	May 28	1994	74	490	1084	SK	45	Jul 14	1987	491	1094	Harris
72704432	8	Aug 31	1988	22	514	1090	SK	45	Jul 13	1980	513	1085	Houston
98785043	8	Aug 10	1995	22	514	1091	SK	0	Jul 21	1987	513	1090	Houston
180712857	8	Jul 16	2004	22	505	1082	SK	54	Aug 4	1996	504	1081	Houston
62719633	15	May 23	1979	18	500	1074	SK	0	Jul 26	1963	501	1074	Miller
98724596	17	Jun 10	2001	37	514	1063	SK	14	Aug 4	1984	520	1063	Houston
98742132	18	Jun 14	2002	12	501	1093	SK	0	Jul 8	1983	501	1092	Houston
HAWKS ENCOUNTERED ALIVE DURING THE BREEDING SEASON (mean 208.6 km)													
98727491	2	Aug 4	1985	197	512	1115	AB	89	Jul 14	1979	513	1090	Houston
98746012	3	Jul 26	1988	189	511	1120	AB	89	Jul 21	1985	513	1092	Houston
98787604	7	Jun 5	1995	133	513	1113	AB	52	Jul 24	1988	511	1094	Houston
98787604	3	Jul 15	1991	133	513	1113	AB	52	Jul 24	1988	511	1094	Houston
98728505	5	Aug 6	1986	310	512	1115	AB	89	Jul 24	1981	501	1075	Houston
180714344	8	Jun 4	1998	279	503	1055	SK	89	Jul 29	1989	511	1094	Houston
HAWKS RECOVERED DEAD, SEPTEMBER TO NOVEMBER (mean 213.5 km)													
72703871	2	Oct	1981	508	512	1130	AB	0	Jul 28	1979	513	1054	Houston
98786874	2	Sep 28	1989	30	512	1093	SK	0	Jul 23	1987	511	1095	Houston
61722135	2	Oct unk	1975	433	495	1034	SK	4	Jul 21	1973	512	1092	Houston
180710996	2	Oct 6	1996	168	494	1075	SK	45	Aug 1	1994	511	1081	Houston
72704473	5	Oct 5	1985	98	514	1092	SK	54	Jul 20	1980	511	1081	Houston
61722183	6	Nov 26	1980	30	513	1094	SK	0	Jul 13	1974	512	1092	Houston
98786906	7	Sep 25	1994	0	510	1080	SK	45	Jul 28	1987	510	1080	Houston
98785844	7	Sep 15	1994	279	502	1053	SK	0	Jul 28	1987	495	1092	Harris
38685644	11	Sep 8	1951	227	520	1100	AB	1	Jul 21	1940	511	1070	Fredeen
98787636	12	Sep 20	2000	187	512	1090	SK	0	Aug 7	1988	520	1063	Houston
98740999	19	Oct 2	2001	389	500	1040	SK	0	Jul 24	1982	513	1090	Houston

\*How found: 0 - Found dead of unknown cause; 1- shot; 4 - in trap; 14 - hit by car; 45 - on highway; 52 - read by telescope; 54 - electrocuted; 89 - trapped & released in a different 10-minute block from where banded

birds, including 21 reports of hawks received after the computer printout of hawks banded through 2001. I deleted encounters in the first 12 months and the 34 encounters in subsequent migrations beyond Canada. (The addition of my 2001-2003 data was acceptable only because I was the only Saskatchewan bander during the years of those late additions).

Distances between the birth site and the first breeding site were calculated from banding encounters of three types of birds within Saskatchewan and Alberta: those found dead during the breeding season (May to August) in subsequent years; those found alive during the breeding season; and those found dead within Saskatchewan during fall migration. This information is presented for

each group, sorted by age (years after banding, with July 1 as the first day of each biological year), separately in Table 6.

Mean distances from the nest where the hawk had been raised and its nest as an adult during the breeding season were 33.1 km for 23 hawks encountered dead and 206.8 km for six encountered alive. If we average these two breeding season groups by including six re-trapped or sighted alive at Hanna, Alberta and Caronport, Saskatchewan, the mean distance for all breeding season hawks is 66.7 km.

If one could assume that the direction of dispersal from the natal area to the new breeding area is random (probably false because of habitat variability), and chose 67 km as a mean dispersal distance, then the area of the circle with a radius of this natal dispersal distance, gives us 14,108 square kilometers— an area sufficient for 1410 to 2820 Swainson's Hawk territories in good habitat assuming one to two pairs per 5 km<sup>2</sup>. These figures, similar to those for Great Horned Owls in Alberta and Saskatchewan,<sup>7</sup> represent a conundrum. Simply and inexplicably, they do not "square" with our total absence of colour band sightings on and adjacent to the Kindersley map sheet area, at any age. If the absence of colour band sightings could be given credence, then one might postulate that the Kindersley area is a "source" of hawk breeding stock, rather than a "sink."<sup>10</sup> A net movement away from the Kindersley area by future breeders is supported by the overall population decline there.<sup>11</sup>

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