

NINE YEARS OF BANDING AND RECAPTURE OF HUMMINGBIRDS IN SOUTHERN BRITISH COLUMBIA

J. Cam Finlay
270 Trevlac Place
Victoria, B.C. V9E 2C4
joyandcamfinlay@shaw.ca

Abstract: A total of 8,611 hummingbirds, including 7,475 Rufous Hummingbirds, were banded during nine years commencing in 1997, on Vancouver Island and the mainland of southern British Columbia. A total of 132 sites were operated, two of them for the entire nine years and two others for six years. Most of the banded birds were Rufous, along with 874 Calliope, 186 Anna's and 76 Black-chinned Hummingbirds.

About 12% of the birds trapped at each site were female rufous recaptured at their original banding site, and two females returned six years after capture, making them over seven years of age. There was indirect evidence that some rufous might nest a second time in the same year. At least four sites in B.C. appeared to be used primarily as refuelling stops, while most were breeding locations.

Twelve rufous, banded or recovered in this project, showed movement within B.C., away from their banding sites. There appeared to be an east-to-west movement from the coastal mainland to Vancouver Island and across the island.

Records provided by other investigators indicate that six rufous banded in the USA were recovered in B.C. One had been banded in Louisiana, moving 3,517 km, the longest recovery to date for rufous movement. This is also the first return indicating a nesting ground for the disjunctive population of rufous that winters along the U.S. coast of the Gulf of Mexico. Another return was 2,319 km from Arizona to the east side of Vancouver Island. These recoveries suggest two migratory pathways, one up the west coast and the other from the central USA to the interior of B.C.

Key words: Rufous Hummingbird, *Selasphorus rufous*, Calliope Hummingbird, *Stellula calliope*, Anna's Hummingbird, *Calypta anna*, Black-chinned Hummingbird, *Archilochus alexandri*, banding, longevity, age, band recovery, recapture, long distance movement, east-west movement, migration, site fidelity.

INTRODUCTION

Banding programs can help in the management and conservation of birds by providing data on distribution and movement of species, relative numbers, annual production and lifespan. The project described in this paper had the objective of documenting those characteristics for hummingbirds in southwestern British Columbia, particularly for the Rufous Hummingbird (*Selasphorus rufus*, hereafter "rufous"). Relatively little banding had been done in B.C. to determine the status of rufous on their breeding grounds, except for a site at Fanny Bay north of Parksville on Vancouver Island and some at UBC in Vancouver. The project seemed particularly relevant since researchers in Arizona and Colorado, (where these birds move through but do not nest) had concluded that numbers of rufous were falling.

This paper describes the project and its findings on numbers, movements, and local activity of Rufous Hummingbirds. At a later date, it is intended to publish other information such as sizes of birds, relative numbers of hatch-year birds, and parallel information on the other species of hummingbirds which were less numerous

METHODS

All birds were trapped at private feeders containing a sugar/water mixture of one part of sugar to 3-4 parts of water by volume. A portable trap was placed around the feeder to catch the birds while banding was underway, and was removed when the day's banding was finished. The first year, 1997, a large box trap was used, approximately one metre cubed with a 50-cm hinged door. The next season the box was replaced with a smaller and less cumbersome container made of hardware cloth, 35 x 40 x 45 cm deep with a door 30 x 25 cm. From early 2004 onwards, a *Hall* trap was used. It has a barrel-like appearance, 55 cm in diameter and 43 cm high with plastic mesh on the top and bottom of a frame, with a drop-net of cheesecloth around the sides, that could be raised or lowered. A feeder was hung inside. With the net raised there was a vertical space of about 15 cm near the base of the feeder, allowing a bird to enter from any direction. Once the bird started to drink, the net was dropped around the bird by triggering a lightweight cord. Once a bird was caught it was removed from the trap by a slot on the side or by carefully lifting the net.

Two traps were generally used at each banding site from 1998 onward. Trapping generally began shortly after sunrise and lasted three to four hours, terminating when few

birds came to the feeders. From 2004, trapping started at dawn and continued for five hours, a standard regime that resulted from joining the Hummingbird Monitoring Network programme (HUMMNET). This regime applied at nine sites (Saanich, Port Alberni, Franklin, Mt. Washington, Galiano Is., Gabriola Is., Rossland and two at Vernon).

At the beginning of the season in mid-March and early April birds were scarce and hence only low numbers were trapped. Similarly in summer when the birds began to leave in late June and early July, numbers of trapped birds decreased.

The trapping team usually consisted of one person who manned the trap and removed the trapped bird. A second person did the banding, weighing, measuring and recording. If trapped birds were numerous, a third and sometimes a fourth person would assist in these tasks. After the HUMMNET programme began, numbers of assistants increased to a minimum of four with two people manning the two traps, a bander and a recorder.

Table 1. Major banding sites used in this study. Further detail is given in Appendix 1.

General area	Code name of site [person's residence or exact place]	N. latitude and W. longitude	No. of sites	Years contributing information
Greater Victoria	Saanich [J.C. Finlay res.]	48° 29' 123° 26'	42	1997 to 2005
	Langford [Rocky Pt]	48° 23' 123° 42'	5	1998 to 2005
	Goldstream [Park]	48° 29' 123° 33'	1	1997 to 2005
Central Vancouver Island	[Port] Alberni [Thompson res. and Evans res.]	49° 19' 124° 52'	3	2004 2005
	Duncan [Capt. Morgan B & B]	48° 45' 123° 35'	3	2001 to 2005
	Nanaimo [Jingle Pot Rd]	49° 11' 124° 03'	2	2001 to 2005
	Franklin [Millsite S. of Alberni]	49° 06' 124° 18'	1	2004 to 2005
	North Van. Isle [Woss]	50° 13' 126° 36'	7	2000 to 2005
	Mt. Washington [ski resort]	49° 44' 125° 18'	1	2003 to 2005
Southern Gulf Islands	Galiano [Island]	48° 51' 123° 21'	2	1997 to 2005
	Salt Spring [Island]	48° 46' 123° 27'	4	1999, 2005
	Mayne [Island]	48° 50' 123° 16'	2	2005
	Gabriola [Island]	49° 07' 123° 41'	11	2000 to 2005
SW mainland	Squamish [Brackendale]	49° 49' 123° 09'	3	2001 to 2005
	Gibsons	49° 27' 123° 42'	1	2003
	Vancouver [general area]	49° 21' 122° 39'	4	2005
W. Central mainland	Quesnel [Churchill res.]	53° 06' 122° 34'	1	2004
	Dunster [E. Mcbride]	53° 08' 119° 51'	2	2004 to 2005
S. Central mainland	Vernon [Paul, lakeshore, and Boyd, hills above Vernon]	50° 12' 119° 28'	9	2004 to 2005
	Rossland/Castlegar	50° 11' 119° 04'		
		49° 03' 117° 48'	9	2004 to 2005
	Creston	49° 03' 116° 26'	3	2005
	Shuswap [Lake, at Salmon Arm, Sky Blue motel]	50° 46' 119° 18'	1	2003 to 2004
SE B.C.	Invermere	50° 30' 116° 02'	1	2000 to 2005
	Fort Steele	49° 31' 115° 27'	1	2004 to 2005
SW Alberta	Canmore/Kananaskis	51° 06' 115° 23'	5	2005
	Kootenay Plains	52° 03' 116° 25'	2	2000, 2002
	Hinton	53° 33' 117° 48'	1	2002

Species and sex were determined. Standard measurements were made of wing chord and culmen (beak) length. Weight and ecto-parasites were noted. With a female bird in hand, the egg-laying status was diagnosed according to four stages: (1) slightly swollen abdomen, (2) quite swollen, (3) so swollen that the white egg shell was visible through the translucent skin, and (4) the final stage shortly after an egg is laid with the bird having a protruding cloaca. During the nesting season from early April until mid-May it was common for a female bird to show one of these stages. For example, a seven-year-old bird, one of the oldest rufous that we retrapped, was gravid the day we recaptured her in 1999.

Bands were supplied by the Canadian Wildlife Service (CWS). They are made of an aluminum alloy and come in a sheet of 300 with numbers stamped in numerical sequence, ten to a row. A row is cut out, individual bands snipped off and then each is shaped with a special tool. The formed bands are stored in bees wax in numerical order. Once a bird was trapped, a band was attached to the right leg with special banding pliers and each number and pertinent data were recorded together with the sex and age of the bird. These records were then submitted to the CWS Banding office in Ottawa. The information was then entered into a data bank held in the U.S. Banding Office in Patuxent, Maryland.

When a previously banded bird was caught, we followed the standard procedure that two people must read the band number independently. Very occasionally that checking procedure lapsed because of excitement among the workers from catching many birds in a short time. Unfortunately, if there was contradictory information about the band, the recapture could not be counted; for example, if the original bander said that the band had been placed on another species. One such situation is mentioned below in the Results section.

One other technique was used for three successive years at one site (Saanich, the author's residence). To determine whether males remain on territory from the time of first arrival in the spring, the first six males to appear were colour-marked.

Locations were chosen in part for their proven (or potential) abundance of hummingbirds, and were often at the residences of people who had long-standing interest in maintaining the feeders. A total of 132 sites contributed records to this study. Some were in the same general area as the most heavily-used sites that are listed in Table 1, and are referred to by those site names. The first column of Table 1 gives general locations, the second column names the *sites* with the code-names that are used in this paper, and other columns provide additional documentation. Details of all major sites are given in Appendix 1, again grouped by general location. To assist in the project, sub-permits were issued to assistants beginning in the Saanich area in 1998, Invermere in 2000, Canmore in 2001 and Mt

Washington in 2003. With the additional work required on joining HUMMNET, sub-permits were issued to people manning Port Alberni, Franklin, Gabriola, Galiano, Vernon and Rossland in 2004. Then in 2005 more sub-permits were issued to people at Dunster and Fort Steele. These new locations were set up to obtain further information on migration routes.

RESULTS

Numbers of individuals.

The number of banded birds increased from year to year as more banding locations came into play, and the number of species increased as sites were established eastwards from the coast, in the southern part of the mainland (Table 2). The decrease in birds banded per hour from 1997 for the next four years was caused by a significant drop in numbers of rufous at sites such as Saanich and Goldstream, sites that previously had numerous birds. Another factor was the addition of several sites to trap Anna's Hummingbirds (*Calypta anna*, hereafter "anna's"). The anna's locations seldom had more than two birds every two or three hours of banding, compared to 20-50 birds at rufous sites. The sudden doubling of birds per hour from 2001 to 2002 resulted from the addition of several sites on Gabriola which had many rufous, as well as an absence of sites for anna's. The major increase in numbers of banded birds in 2003 resulted from more than doubling the number of sites (13 to 28). An additional increase in 2004 was due to expansion of activity into the interior of the province, and adding sites at Franklin, Dunster, Vernon, Rossland and Fort Steele.

The correspondence can be seen between the banding effort in columns two and three of Table 2, and the resulting number of birds in the succeeding columns. In general, it was typical to trap anywhere from 25 to 60 birds in a single day at any given location, with some days close to 100. For example 114 rufous were banded on 20 May 2000 at the Gabriola site. Similarly, 112 rufous were banded at Franklin on 16 June 2004 in 3 hrs and 47 minutes by a sub-permittee starting at 11:20 am.

Table 2. Numbers of hummingbirds banded during nine years. The second column is the total number of individual locations that were used in a given year. The third column represents the total of hours spent banding at all the sites. [i.e., 4 hours banding on one day at one site contributed a value of 4 to the total shown for a given year.]

Year	Number of sites	Total hours of banding	Birds per hour of banding	Number Banded				
				Rufous	Anna's	Calliope	Black-chinned	Totals
1997	3	51.5	6.5	333				333
1998	14	84	1.6	103	29			132
1999	17	99	3.1	294	11			305
2000	32	197.5	3.1	571	45			616
2001	29	160.5	2.3	372	14	27		413
2002	13	80	7.1	557	1	6		564
2003	28	233	6.2	1360	0	76	4	1440
2004	35	311	7.0	1894	42	235	6	2177
2005	60	513	5.1	1991	44	530	66	2631
Totals	231	1729.5	[average] [4.98]	7475	186	874	76	8611

Breeding locations and migratory locations

Most sites where extensive banding took place appeared to be used as breeding locations by Rufous Hummingbirds. Among 132 locations used for banding, only four appeared to be partly migratory or "refuelling" sites with few breeding females (Goldstream, Franklin, Degnen Bay on Gabriola and Mt Washington). These sites had lower proportions of females among the trapped birds, and usually had lower percentages of gravid females.

Trapping at Goldstream, a migratory site, from mid-April to mid-May of 1997, when rufous were quite abundant, produced 45% females with only 19% of them gravid. Over the same time period at Saanich, a probable breeding site which was eight km to the east, females made up 74% of the trapped birds, with 53% of them gravid. Similarly, initial banding at the Franklin migratory location (early April to mid-May of 2004) 55% of rufous were females of which 16% were gravid. In the same spring, thirty km to the north at the Alberni site (a probable breeding location) 69% were female of which 42% were gravid. At the migratory site of Degnen Bay on Gabriola, over the spring banding period of 2004, 35% were female with 47% gravid. At the main Gabriola site near the water 1.5 km to the east, 66% were females with 45% gravid.

Thus, the four refuelling spots had a lower percentage of females than nearby breeding sites even though they had

some gravid females. The high percentage of females at the migratory Franklin site probably resulted from birds moving through, because only 16% were gravid compared to 41% at Alberni

Evidence of Breeding Seasons

When the rufous returned to the southern Gulf Islands and southern Vancouver Island in mid-to-late March, males usually arrived first and immediately began establishing a breeding territory. They vigorously defended sites and resultant fights could be quite intense. The successful males remained until late May or early June, at which time they started their southern migration.

Males moved on if they did not succeed in displacing a territorial male. At Saanich, the first six males to arrive were colour-marked for three years in a row. For two of those years only one of the six males was sighted off and on all spring and was apparently the only one that remained. The third year, two of the six marked males were seen a few times during the nesting season. Unsuccessful males apparently departed quickly as they were not seen again. A male trapped on the southeast side of Salt Spring Island east of Victoria on 2 May 1999 hit a window three days later, on the Saanich Peninsula six km to the southwest (Table 3 and Figure 1).

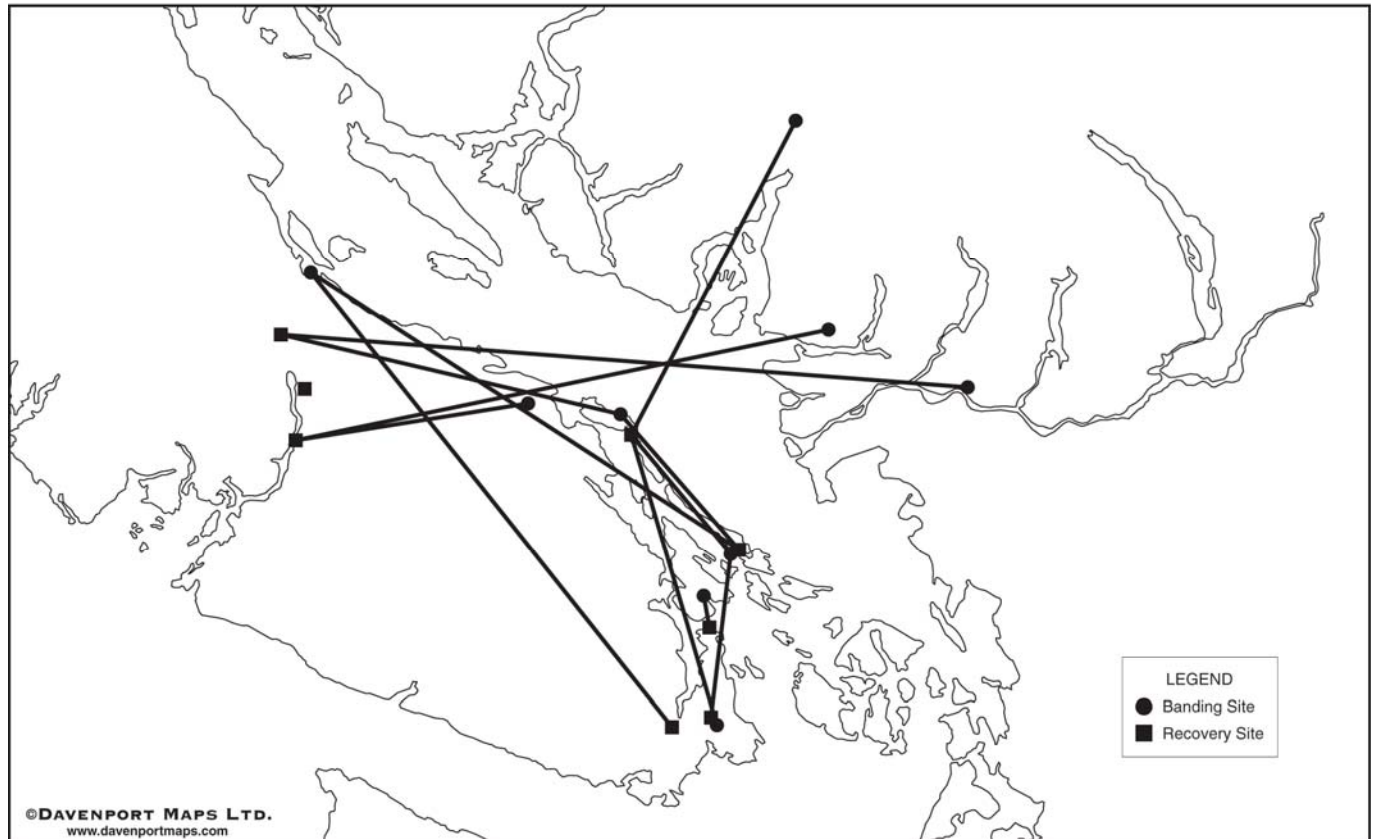


Figure 1. Recaptures of Rufous Hummingbirds away from the banding site in southwestern B.C.

Depending on how early spring arrived (judged by the flowering of red currant) the arrival of females in numbers could be as early as the first week of April. Arrival times can be judged by the following records from Saanich, a well-monitored site. Early arrival was the case in 1997, when numbers of new birds were high in the first week of April, continued high for the next two weeks, then dropped off. At the same site in 1998, peak numbers of new birds occurred between the second week of April and early May. The same timing occurred again in 1999 and 2000, but there was a delay in 2001 when early May marked the peak arrival. In 2002, new arrivals were again somewhat retarded, starting in mid-April with high numbers continuing until the end of May. Similar later arrival prevailed in 2003, with numbers of new birds high from the third week of April to the third week of May. The following year, 2004, had an early start with a flood of birds in the first week of April, then lesser numbers in mid-April and again in early May. The following year, 2005, very few birds arrived at Saanich throughout the season. New arrivals at any given site tapered off until early June when south-moving birds appeared.

Most females apparently stayed at the breeding sites where they had arrived. For example a female rufous trapped at Goldstream 17 April 1997 was again trapped there with an egg on 17 May. At the Alberni site, the first

trapping session on 7 April 2004 banded 54 female rufous. Returning on 21 April, we caught 55 birds of which seven were from the previous session. On 5 May we caught 88 birds of which 40 had been banded there earlier, and 19 May we captured 31 birds with 20 repeats from previous sessions that spring.

By the end of the third week of April, most rufous females were apparently nesting. For example at the Alberni site, on 7 April 76% of the 54 females trapped were gravid. Two weeks later on 21 April, only 27% of the 51 females trapped were gravid, and two weeks further along on 5 May, only 23% of the 48 captured females were gravid. Then on 19 May, of the 13 birds trapped, again 23% were gravid. Egg laying ceased by the end of May. During the nesting season from early April until mid-May it was quite common to find a female showing one of the egg-laying stages, as indicated in the preceding paragraphs. Twice in 1997 we trapped a bird carrying an egg and later that morning the same bird was retrapped with no egg. The first time was 5 April at 07:10 Standard Time with an egg, and then at 11:14 without an egg. On 14 April 1997, a rufous female carrying an egg was banded at 09:35 and retrapped at 10:20 when she had no egg.

Indications of breeding habits

Female rufous appeared to arrive at feeders from a direction which had favourable habitat for nesting. That was observed from the start of banding at Saanich (4 April 1997), where almost all females arrived from the direction which had a dense grove of Douglas-fir, providing good cover. It was presumed that nests were situated there. On the first visit to Gabriola (20 May 2000), 114 birds were trapped in 5.6 hours; of which 105 were females and 20% were gravid. They came from two directions. The larger number appeared to fly from a northerly grove of Douglas-fir to feeders on that side of the residence, while the others came to south feeders from the southerly side, an open area interspersed with fruit trees and Douglas-firs. As far as we could observe, birds seldom flew over the house to the feeders on the opposite side of the building. It seemed likely that there was a scattering of nests on each side of the house, although a search was not successful. Similarly, in trapping at the main site on Galiano (Kennedy) females carrying eggs were observed coming from the north of the house where there was a heavy cover of Douglas-fir.

Trapping at both Gabriola and Galiano found very high proportions of females, suggesting that there were groups of nests in the same general area. At Galiano in both 2001 and 2002, females made up 89% and 72% of the total numbers trapped each year. Similarly at Gabriola numbers of females in the same years were 94% and 92%. The apparent concentration of nests was not verified by searches, which were unsuccessful.

For Rufous Hummingbirds, the present study provides some indirect evidence that there might be two broods in one year. A gravid female was trapped on 17 April 1997 at Goldstream and then retrapped at the same site carrying an egg on 14 May, a month later. That might represent re-nesting since a female needs at least 15 days for incubation (Campbell et al. 1990) and an estimated 21 days to fledge young. However, it could represent the start of a second brood, if she was commencing it before the first young fledged, as is known to occur with Anna's Hummingbird (Scarfe and Finlay 2001)

A gravid bird was trapped at Brackendale on 8 May 2001 and then retrapped 17 days later, 87 km southwest on Gabriola (Table 2, Fig. 1). I suggest that she may have been making a second attempt to produce a clutch, after losing her first. The next year this bird was recaptured again at Brackendale, carrying an egg on 13 May 2002.

Recapture at the same site in the same year

Some information on this topic was given above, as it was relevant to particular topics. The overall recaptures "at home" during the same season were examined for the four sites which had operated most regularly (Saanich, Gabriola, Galiano and Goldstream, Table 3).

When returning to trap at a site it was not uncommon to catch a bird that had been banded there earlier in the season, as seen in Table 3. At the three breeding sites on the left of the table, the totals show two to four times as many retrapped females as males. At Goldstream the numbers were about equal for the sexes. This again illustrates that Goldstream was a refuelling stop as the birds moved up or down the islands.

Of the 2,290 individual rufous females captured at the four sites in Table 3, 160 of them were trapped more than once at the same location during the same season, a rate of 7.0% recapture. For the 1,183 individual rufous males, 76 of them were repeat captures, for a rate of 6.5%. This indicates that both females and males will return to a site and be caught again during the same season, even though total numbers of recaptured males were one-half of female recaptures. Apparently both sexes have the same affinity for re-entering traps during the same year.

Recaptures at the same site in different years

By 1998 and later, as expected, there were recaptures of birds that had been banded in earlier years. The recapture data were examined for the same four sites noted above which had operated most regularly. Combining numbers of females and males, the average numbers of Rufous Hummingbirds that were recaptured in a later year at a given site, compared to the total number trapped at that site during the years of trapping, were: Saanich 15.1%, Gabriola 17.0%, Galiano 14%, and Goldstream 9.0% (Table 4).

For the first three sites ("rearing sites") the combined-sex average for recaptures in a later year was 15.1%, of which 13.5% were females and 1.7% were males. At Goldstream, the migratory site, later-year recaptures were only 9.0%, of which 5.5% were females and 3.5% were males. If all four sites are combined, the 493 birds retrapped in a later year represent 14.3% of the total number trapped (3,453), of which 12.0% were females and 2.2% were males (Table 4).

Table 3. Repeat captures of Rufous Hummingbirds at the same site, later in the same year.

Year	Saanich		Gabriola		Galiano		Goldstream	
	Male	Female	Male	Female	Male	Female	Male	Female
1997	4	25	-	-	-	-	14	21
1998	0	0	-	-	2	3	2	0
1999	0	2	-	-	2	2	2	2
2000	1	0	-	-	15	12	10	10
2001	0	1	0	0	0	0	0	0
2002	1	2	1	14	1	0	-	-
2003	3	3	1	11	2	6	-	-
2004	6	12	3	8	1	14	-	-
2005	0	0	5	6	0	6	0	0
Totals	15	45	10	39	23	43	28	33

Table 4. Numbers of Rufous Hummingbirds that were recaptured in a subsequent year, at four major banding sites. The totals are for all the years of operation at a given site.

Site	Sex	Total no. of birds trapped	No. returning from a previous year	Percentage returning
Saanich	female	473	98	20.7%
	male	341	25	7.3%
Gabriola	female	697	136	19.5%
	male	157	9	5.7%
Galiano	female	948	165	17.4%
	male	349	16	4.6%
Goldstream	female	172	17	9.9%
	male	316	27	8.5%
Total	female	2290	416	18.2%
	male	1163	77	6.6%
	both	3453	493	14.3%

Thus it was relatively common to have a female rufous return to the same banding site from an earlier year. Most of the retrapped birds were females, and some of them returned several times. At the same four sites, three rufous females returned for three years, five returned for four years, and five returned for five years with one of these latter birds returning to be retrapped at the same banding site all five years. Usually a bird would skip a year before being retrapped at the home site; possibly that resulted from being trap-shy. It was quite common to see a bird move towards a trap and then veer off and not enter.

The oldest rufous ascertained by retrapping in the present study had been banded as an adult female at Saanich 22 April 1997, and was retrapped at the same site on 28 April 1999 and again on 24 April 2003, making it at least 7 years old. A second bird had been trapped at Goldstream on 11 May 1999 as an adult female and retrapped at the same site June 5 2005, which would make it also, 7 years of age or older.

Recaptures within B.C.

In this project, there were 12 recoveries of banded rufous that travelled within the province. That includes birds banded in this project and recovered away from the banding site, as well as birds banded by someone else and recaptured in the present project (Figure 1 and Appendix 2). The longest distance among the recoveries was for an adult female rufous banded in 29 April 2000 at Fanny Bay (location in Appendix 1). The bird was retrapped a year later at Galiano, 208 km to the southeast. The closest return was a male banded in 1999 at Salt Spring Island (a sub-site of Galiano, Table 1) which then travelled 6 km south to hit a window in Sidney (Saanich Peninsula) three days later (Figure 1, Appendix 2).

Most of the recoveries showing travel within B.C. are from banding sites of the present study (see below and Appendix 2). However three female rufous were banded by others and recovered in our project. A bird banded at Fanny Bay on 19 June 1991¹ was retrapped at Goldstream, 141 km to the southeast, almost six years later on 24 March 1997.

The other two bands applied outside our project were on rufous females banded on the mainland² and recovered in the Port Alberni area, thus illustrating east-to-west movements (Figure 1, Appendix 2). The longest of these movements was for a bird banded near Langley (about 35 km east of Vancouver) on 10 April 2004 and recovered 169 km to the west, north of Port Alberni, five weeks later on 15 May 2004. The other bird was banded on the side of Fromme Mountain (near Grouse Mt.) in North Vancouver at an elevation of 305 metres on 05 June 2004. We recaptured it only one day later at the Franklin site, 131 km away, at 5 metres above sea level.

Two recaptures within the present study also suggested east-west movements (see again, Figure 1 and Appendix 2). A rufous female banded on Gabriola on 27 May 2003 was recaptured 86 km to the west at Port Alberni a year later on 02 June 2004. Another rufous banded at Nanaimo, on the east side of Vancouver Island on 20 April 2004 was recaptured 56 km to the west at Franklin on 16 April 2005

Other recaptures involving the present project showed rufous moving in various directions. One banded in Saanich reached Gabriola to the north. One banded in Gabriola travelled southeast to Galiano. Two banded on Galiano moved south to Saanich and west to Gabriola. A final rufous moved southwest from Squamish on the mainland to Gabriola (Figure 1 and Appendix 2).

Long distance movements involving B.C.

Within the present project, there was only one recovery to or from places outside B.C., and that one was not countable because of an unsolved technical contradiction

(see below). The relevant observations of other workers have been gathered and described here since all of them have not previously been reported in the open literature.

The Canadian Wildlife Service Banding Office indicated that six rufous had been banded in the USA and recovered in B.C. A further two birds had been banded in B.C. and then recovered in the USA (Figure 2, Appendix 3). We obtained details of those records from Calder (1993) and by personal enquiries to the banders.

The six rufous banded in the USA were a single bird from Baton Rouge, Louisiana on the Gulf of Mexico, a single bird from Arizona, two birds from Colorado, and two more from Montana (Figure 2). Three of these rufous were recaptured on the east side of Vancouver Island as follows. The furthest movement was from Louisiana, where a bird banded and colour-marked in December of 2000 remained in the same yard until March, and was then found dead in May at Black Creek, north of Courtenay-Comox on east-central Vancouver Island. The next greatest distance was a bird banded at Paradise in southeast Arizona on 28 July 2002 and recovered on Lasqueti Island (northeast of Parksville on Vancouver Island) on 10 May 2004. The third bird to reach the east side of Vancouver Island had been banded high up in the mountains of Colorado on 16 July 1990 and found south of Nanaimo almost a year later on 19 June 1991. The remaining three rufous from U.S. bandings were recovered in the interior of British Columbia. One had been banded west of Denver, Colorado on 26 August 2000 and found northwest of Cranbrook on 25 May 2001. The two others were banded in the northwest corner of Montana, and moved north and west into B.C. One banded on 26 August 2000 was found near Salmon Arm in southern B.C. on 19 May 2001. Because this bird was banded in mid-summer it was probably moving south, and when it was recovered the following May it was probably moving north or else nesting, since May is the time of nesting for rufous in the B.C. Interior. The second Montana-banded rufous (10 July 1994) was recaptured the next year in July 1995, (day unknown) north of Prince George in northwestern B.C.; since both events are in mid-summer the bird was probably moving south on each occasion.

A seventh rufous was banded near Baton Rouge, Louisiana 8 February 2003, but is not shown in Figure 2 since its recovery that summer, although close to B.C., was in the Crowsnest Pass of southwestern Alberta (personal communications, A. Hurly, Prof. of Bioscience, Univ. of Lethbridge and Nancy Newfield, Master Bander in New Orleans area).

¹ Banded by Master Bander Dr. Gayle Brown, Biological Station, Nanaimo, B.C.

² Banded by volunteer Master Bander Derek Matthews of North Vancouver.

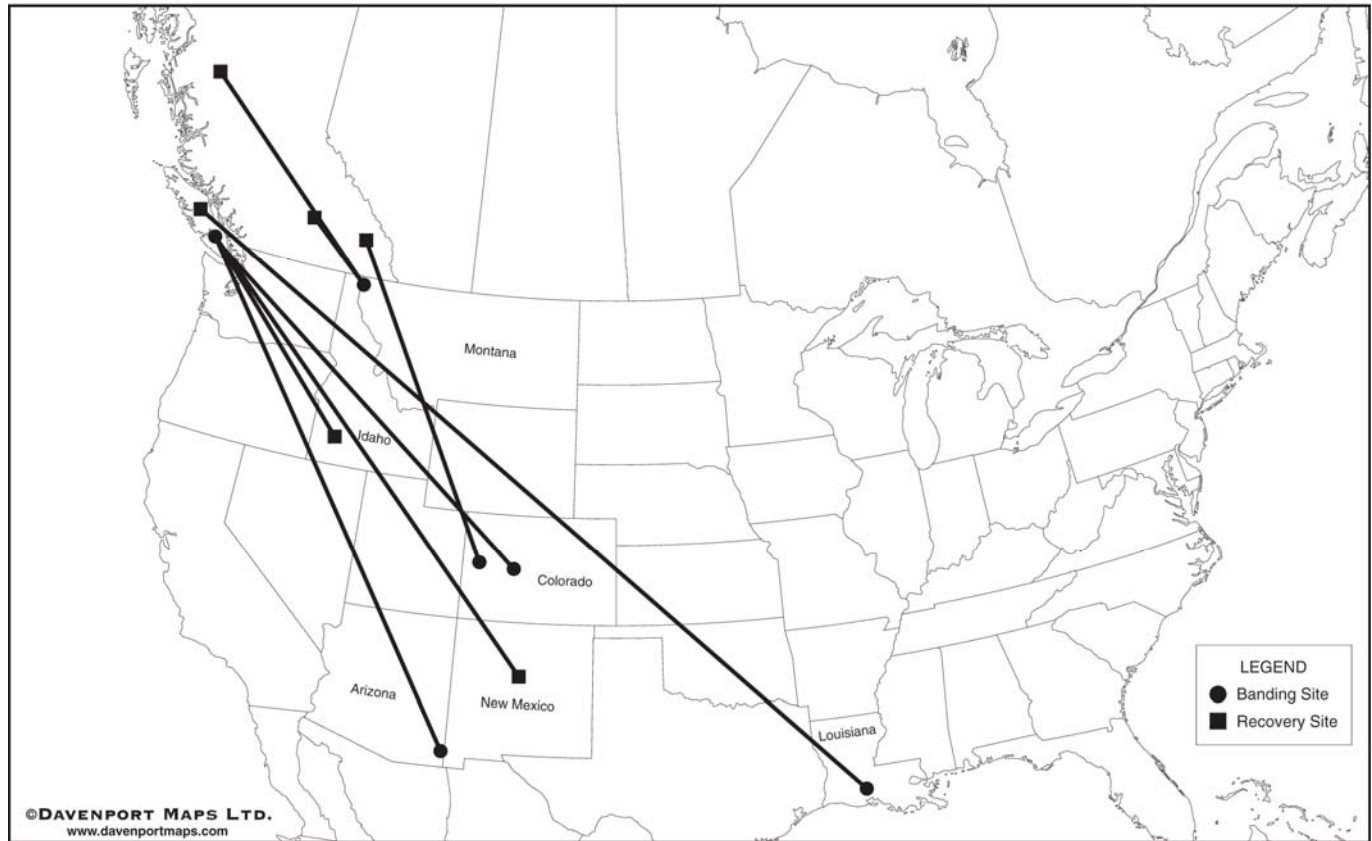


Figure 2. Long-distance recoveries and banding sites for Rufous Hummingbirds.

One more female rufous did not provide valid data because of procedural difficulties. We recaptured it at Gabriola on 22 April 2002 and discovered that its band had been issued to a bander in Texas. Contacted by telephone, the Texas bander was certain that the band had been placed on a Black-chinned Hummingbird (*Archilochus alexandri*), although a female rufous had been banded that day with a number that was two higher in the series. Unfortunately, because the present study was trapping a large number of birds on the day of recovery, a second person had not confirmed the observations on the recaptured bird, and thus the return could not be accepted by the Canadian Banding Office in Ottawa.

Two rufous banded in B.C., but not as part of the present study, were recovered in the USA. Both had been banded at Fanny Bay, north of Parksville³. One was banded 30 May 1994 and trapped west of Albuquerque, New Mexico six weeks later on 13 July 1996. The other was banded 25 June 2002 and trapped east of Boise, Idaho less than a month later on 18 July 2002. From these dates the birds must have been moving south both times.

³ Master Banders were Dr. Gayle Brown, Biological Station, Nanaimo, B.C. and Ms. Betty McGinnis, resident of Fanny Bay, B.C.

DISCUSSION

Age of birds

A total of 15 rufous females were retrapped at three, four or five years after the original banding. The two oldest rufous females banded and recaptured within the present study were 7 years old. That is almost as old as the 8 years and 11 months recorded as the oldest rufous by the Banding Office of the Canadian Wildlife Service (Klimkiewicz 2002). Another bird in B.C. approximates that record age; outside the present study, an adult female rufous banded at Fanny Bay in June 1996 was retrapped at the same home site in May 2004⁴.

In this project, very few male rufous were retrapped during the second or third year after banding. It seems that males soon become trap-shy or else they live a very short life. Since so few males were retrapped, it is not reasonable to attempt an estimate of male longevity.

Evidence on breeding seasons

In coastal southwestern British Columbian, male Rufous Hummingbirds returned in mid-to-late March and immediately defended breeding territories. This continued

⁴ Personal communication, Ms. Betty McGinnis, Fanny Bay, B.C.

until late May or early June when they started to move south.

Female rufous started to arrive on southern Vancouver Island at the end of March, with some beginning to lay near the start of April or shortly thereafter. But the greatest numbers of females appeared during the second and third weeks of April. By the end of that third week most of those that had arrived were apparently already nesting. By the end of April it was common to trap females carrying eggs. These dates agree in general with the very broad range of 30 March to 10 July for clutches of eggs, reported by Campbell et al. (1990). More typically, they state that half of the clutches were laid between 15 May and 14 June, but then they say that egg-laying on the B.C. coast can begin up to six weeks ahead of the interior. Thus, mid-to-late April might correspond to their estimate of starting time for half of the coastal clutches.

Female and nestling rufous on the west coast were generally gone by late June to mid-July. We seldom trapped birds in mid-July or later. The occasional juvenile appeared as late as September, probably as the result of migration from the interior of the province and north as far as Alaskan breeding sites.

Same-site recaptures and breeding habits

About 12 to 18 percent of the birds (usually females) returned to the original banding site within one or two years of first banding. Thus rufous females have fairly good site fidelity. The average of 18% female recaptures at four sites (Table 4) is similar to that found by others for rufous, or appreciably lower. Calder (1993) reports recaptures at the original sites in northwest Montana, with returns of 22.2% females and 8.3% males for one bander (Mrs. Burk), and 48.3% females and 19.6% males for another bander (E. Jones).

At certain sites used in this study, we noted that female rufous appeared to be approaching the feeder area from one or two fixed directions, suggesting that there were groups of nests in those directions. That observation agrees with a report by Bent (1940) that female rufous tend to nest in loose clusters of up to 20 nests, the cluster being relatively close to a source of food. In view of the site fidelity of females we showed by retrapping, this suggests that females at a given site might be closely related. Rufous females might tend to return and nest at their natal site whereas males might tend to move around as the result of territorial disputes. This hypothesis could be tested by DNA measurements.

The present study provides some indirect evidence that Rufous Hummingbirds might raise two broods in a season, although there was no direct evidence. This could occur, since Anna's Hummingbird is known to have raised two broods per season in Victoria (Scarfe and Finlay 2001). Campbell et al. (1990) do not mention the possibility of two broods but give 10 July as the latest date for eggs, which might indicate a second brood. Calder (1993) suggests that

two broods per season could occur but does not present any documented cases. Since Calder's publication there do not appear to be any reported cases of two broods for rufous.

The banding project has shown that some sites (Franklin, Goldstream, Degnen Bay and Mt. Washington) may be largely refuelling stops during migration, with relatively little nesting. Such stopover sites are important as Calder (1993) pointed out, because these birds can fly only 450 to 800 km before refuelling to build up a fat reserve to carry them further.

Recaptures and migration routes

The long-distance recoveries of Rufous Hummingbirds (Figure 2) can be interpreted to follow the accepted migration pattern outlined by Calder (1993). In the spring the rufous move north up the west side of the continent. After completion of breeding, they move inland to come south along the mountain ranges, utilizing mountain flowers. Most of the banding-recapture lines shown in Figure 2 could be interpreted in that way. That includes one rufous banded in mid-summer in Colorado and recovered in June near Nanaimo the next year.

Some Rufous Hummingbirds retrapped in this study suggest a mid-summer east-to-west movement from the mainland onto Vancouver Island and continuing across the island. That would fit the accepted pattern (above) of moving across the mainland coast then turning west to reach the islands. Similarly, it is possible that birds move up the coast in the spring and then turn inland to nest in the interior of B.C.

However, it appears that there might also be an inland migratory route to the B.C. interior. That is indicated by the two rufous banded in northwest Montana and recovered to the north and west in B.C. (Figure 2). The one banded and recovered in mid-summer was probably moving south on both occasions. The other was also banded in mid-summer, so was probably also moving south, but was recovered the following May in B.C. and was probably moving north or else nesting. Another bird banded in Colorado was recovered in south-eastern B.C. the following spring, providing further support for the idea of an interior migration route. In addition, the rufous male banded in Louisiana and found in southwest Alberta shortly thereafter (T. A. Hurley and N. Newfield, personal communication) could also have moved north along an interior route.

Accordingly, there could be two northward routes in the springtime, one up the coastal west side and a slightly later one up the interior of the continent. Such speculation requires more banding along the possible routes to the B.C. interior. To attempt to answer this question, the later stages of this project set up banding sites across southern portions of B.C. Sub-permittees are expected to continue work at those sites to answer questions on migration routes.

The interior banding sites might also help in determining whether rufous from B.C. winter on the U.S. coast of the Gulf of Mexico. Rufous Hummingbirds

normally winter in southern Mexico, but some overwinter on southerly U.S. coasts, particularly the Gulf Coast, from south Carolina west to Louisiana with concentration in Alabama and Louisiana. In those locations, banders (Bob Sargent, Nancy Newfield and others) have banded close to 500 in the past few winters. There was little or no information on the breeding territories of these birds until the two recoveries were made, one on Vancouver Island at Black Creek and the other in southwest Alberta.

ACKNOWLEDGEMENTS

Shortly after we moved to Greater Victoria, Dr Gayle Brown gave a demonstration on hummingbird banding at our home in spring of 1997. Dr Geoff Holroyd, of the Canadian Wildlife Service was there. After Gayle left, Geoff convinced me to try this activity, since we both had Master Banding permits, even though I had no experience with hummingbirds and he very little. The next morning at first light we began. Five hours later we had handled 76 Rufous Hummingbirds (we banded 43 plus 33 that had been banded by Gayle the previous day) and I was hooked.

The numerous volunteers who came to man the traps and assist in the processing of hundreds of birds are far too many to list. Many have been with me almost from the start plus numerous others who came on stream later, and it is greatly appreciated that their work ensured that we were able to handle the trapped birds. Often there were up to eight people at a site, all doing different tasks to ensure a bird was not held for more than a half hour. In addition, a special mention must be made of the assistance provided by Ann Nightingale who made the Hall traps which were used by us and by almost all of the distant sub-permitees. For many of the sites she also shaped and/or oversaw the manufacture of literally thousands of hummingbird bands for our Victoria team, and for some other sites. Traps and band shaping are the main necessities for such a project. Without Ann's help this project would not be nearly as complete. Banding the large numbers of hummingbirds in this project could not have been accomplished without several dedicated sub-permitees including Victoria people: Ann Nightingale, Rick Shortinghuis, Jessica Murray, Paul Levesque, Tom Gillespie, Susanne Beauchesne and Claudia Riveros. Vancouver Island and Gulf Islands people included Keith Poulton at Gabriola, Mike Hoebel on Galiano, Sue Walker at the top of Mt. Washington, Stan Acton in Port Alberni with Sandy Mrcuer, and Bruce Cousins and Charlene Lee of Nanaimo. On the mainland, Roy Teo and Devin Manky of Greater Vancouver became sub-permitees near the end of this period. To the east George Garden and wife Sandra of Canmore, Alberta became sub-permitees near the start of the project. Later when we wanted to expand east, George drove out to help band many birds in the interior of B.C. He was also a key person in the training and evaluation of the interior people including Gail Loughridge of Vernon, Linda Szymkowiak and Don Young of Rossland, Gary Lelliot of Castlegar, Tom Roberts of Fort Steele, allowing them to obtain their sub-permits. Earlier, Curtis Culp of Dunster earned his sub-

permit under my guidance as did Larry Halverson at Invermere and Jim Wisnia formerly of Brackendale.

I am exceedingly grateful for the many home-owners who shared their feeders with us, particularly Betty Kennedy of Galiano where we have banded every year since start-up in 1997, Jim Tyhurst who allowed us to use his many feeders on Gabriola from 2000 onward, and the staff at Goldstream Nature House where we also began banding in 1997.

I sincerely acknowledge the assistance of Dave Lynn who made the maps. I thank Louise Laurin from the Canadian Wildlife Service Banding Office in Ottawa for supplying all the returns. A special note of appreciation goes to the banders who gave me permission to use their records including Dave Patton, Bill Calder (deceased), Ruth Russell, Mrs. Burk (deceased), Susan Wethington, Betty and Jim McGinnis and Gayle Brown. Some expense monies were supplied by the Canadian Wildlife Service through Wendy Easton for one season. Bird Studies Canada and the British Columbia Field Ornithologists provided significant financial assistance for the final year of this project. Without their help it would have been a major draw on our financial resources. Thank you all.

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APPENDIX 1. LIST OF ALL THE SITES USED FOR BANDING HUMMINGBIRDS DURING THE NINE YEARS OF THIS STUDY.

This list is organized according to the sites listed in Table 1. For each of those main sites, the various nearby sites are listed with brief explanations of their locations and in some cases, other information. The sites are in underlined bold type, the sub-sites are indented in bold type.

GREATER VICTORIA

Saanich. Includes the Saanich Municipality and lies to the north of the city of Victoria proper. These 42 locations were at private residences and often only trapped one or two Anna's Hummingbirds. Once the local bird was trapped the site was usually not visited again. The main location, Finlay's home, 270 Trevlac Place, was by far the busiest location and resulted in most birds trapped from this area (Lat. 48° 29', Long. 123° 26'). Initially one feeder had been used here, but as numbers increased by the end of the study six feeders were present during the breeding seasons and one the rest of the year.

Langford. West-central part of greater Victoria. Some of the volunteers at the Rocky Point Observatory had sub-permits and thus banded hummingbirds netted at this site. Operated 2002 to 2005. Once the MAPS programme began in 2002 a sub-permitee banded hummingbirds trapped in their nets. In addition, an excellent location near the Sooke Museum just outside of that community had abundant birds that we banded in 1998 and 1999. Unfortunately the owner-resident died so the site was terminated. (Lat. 48° 23', Long. 123° 42')

Goldstream. Goldstream Park, western part of greater Victoria, at foot of Saanich Inlet. The Park Nature House maintains the feeder. Operated from 1997 to 2005. (Lat. 48° 29', Long. 123° 33')

CENTRAL VANCOUVER ISLAND

Alberni. Port Alberni.

Thompson. N.W. of Port Alberni. Rural residence of Art Thompson. Operated 2004. (Lat. 49° 19', Long. 123° 52')

Evans. West side of Port Alberni. Rural residence of the Evans. (Lat. 49° 17', Long. 124° 52') Operated 2005.

A third site north a few km from Thompson was visited once in each of 2004 and 2005.

Duncan

Captain Morgans B & B. East of Duncan about 15 km. On a bay, with large numbers of hummingbirds, both breeding and refuelling. Many feeders. Banded 2004 to 2005. (Lat. 48° 45', Long. 123° 35')

Two other minor sites, one on north side of Duncan and one west of the town. 2001 through 2004.

Nanaimo

Jingle Pot Road. N.W. part of city. Private residence of Dorrit Olsen, Jingle Pot Road. Operated from 2003 to 2005. (Lat. 49° 11', Long. 124° 03')

Nanaimo south. South end of city. Private residence, operated 2003.

Franklin. 30 km S. of Port Alberni at Franklin Saw Mill on Alberni Inlet at sea level. Operated from 2004 to 2005. Caretaker had erected feeders several years earlier, which attracted numerous hummingbirds during migration. (Lat. 49° 06', Long. 124° 18')

North Van Isle. Includes Strathcona Lodge west of Campbell River in 1999, and six sites at private residences in the Woss area, half-way between Campbell River and Port Hardy. (Lat. 50° 13', Long. 126° 36')

Mt. Washington. Ski resort, NW of Courtenay. Private residence. Operated from 2003 to 2005. (Lat. 49° 44', Long. 125° 18')

Black Creek. North of Courtenay and S. of Campbell River. Private residence. No banding, but site owner recovered a bird banded in Louisiana.

Lasqueti Island. Northeast of Courtenay. Private residence. Did not band, but site owner found a banded rufous in her garage.

Fanny Bay. Near Bowser, 30 km north of Parksville on easterly coast of Vancouver Island. Residence of Master Bander Betty McGinnis. Operated by Ms. McGinnis from early 1990s and ongoing, and not part of the present study. (Lat. 49° 20', Long. 124° 50')

SOUTHERN GULF ISLANDS

Galiano (Island)

Galiano. Residence of Betty Kennedy, SW end of island near Active Pass. Owner has fed hummingbirds for many years, and operated throughout this project. (Lat. 48° 51', Long. 123° 21')

Galiano # 2. Residence of Dora Fitzgerald in central part of the island. Operated in 2005. (Lat. 48° 57', Long. 123° 30')

Salt Spring. Island, close to, and parallel with Galiano Island, westerly from it. Four private residences, two on SE end of island, operated in 1998, and two on SW side of island operated in 2005.

Mayne. Island, SW across the channel from Galiano Island. Two sites on the west side were visited once in 2005.

Gabriola. Island, adjacent to Nanaimo.

Gabriola. Residence of Dr. James Tyhurst, on SW corner of the island. Owner had been feeding hummingbirds for many years. Operated from 2000 to 2005. (Lat. 49° 07', Long. 123° 41')

Degnen Bay. This was 1.5 km west of Tyhurst residence but appeared to be a refuelling stop. It was operated from 2002 through 2004 when the owner moved away. There were nine other sites on the southern end of Gabriola, some of which were operated for a year and others for two years from 2002 to 2003.

SOUTHWEST MAINLAND

Squamish. Brackendale Outdoor School on north side of Squamish. Staff at this school have been feeding many hummingbirds for years. This site visited once in mid-May each year from 2001 onward. (Lat. 49° 49', Long. 123° 09')

Two other sites. One was half-way between Squamish and Whistler, and was visited in 2004. Another in the Whistler community was used for banding in 2003.

Gibsons. North of Vancouver on the Sunshine Coast. Private residence. Operated in 2003 by a sub-permittee. (Lat. 49° 27', Long. 123° 42')

Vancouver Area

Langley. NE of Vancouver. A park, the banding site of Master Bander Derek Matthews. (Lat. 49° 03', Long. 122° 35')

North Vancouver. Residence of Master Bander Derek Matthews on Frome mountainside near Grouse Mt. Continuing as a banding site. (Lat. 48° 20', Long. 123° 03')

WEST CENTRAL MAINLAND

Quesnel. Rural home of Dan Churchill, several km west of Quesnel. One visit was made in 2004. (Lat. 53° 06', Long. 122° 34')

Dunster. Lying east of Mcbride and west of Jasper National Park, Alberta. Rural private residence where sub-permittee began banding in 2004 and 2005. (Lat. 53° 08', Long. 119° 51')

SOUTH-CENTRAL MAINLAND

Vernon. Nine banding sites, all private residences. Seven were banded once or twice in either 2004, 2005, or both. The other two, Paul and Boyd, were visited every two weeks, Paul in 2004 and 2005 and Boyd in 2005. Paul lies along the west shore of Okanagan Lake at Lat. 50° 12', Long. 119° 28'. Boyd is in the hills east of Vernon and 215 metres higher than Paul. (Lat. 50° 11', Long. 119° 04').

Rossland/Castlegar. Nine sites lying close to the U.S. border, all private residences, and some of them very active. Three were visited in 2004 and seven in 2005, one of them every two weeks in 2005. (Lat. 49° 03', Long. 117° 48')

Creston. Three sites were used in 2005 with none producing many birds, because it was too late in the season. (Lat. 49° 03', Long. 116° 26')

Shuswap. Sky Blue Waters Motel on the NW side of Shuswap Lake, across from Salmon Arm. The owners have several feeders which have been up for many years. This site was visited once in both 2003 and 2004. (Lat. 50° 46', Long. 119° 18')

SOUTHEAST B.C.

Invermere. Private residence. Operated by sub-permittee from 2000 to 2005. Very few birds were trapped. (Lat. 50° 30', Long. 116° 02')

Fort Steele. Rural private residence about 10 km south from the town, near extreme SE corner of B.C. Operated by sub-permittee from 2004 to 2005. (Lat. 49° 31', Long. 115° 27')

SOUTHWEST ALBERTA

Canmore/Kananaskis

Canmore had three sites around the town, but they were very sparse in birds. Operated 2001 to 2005. (Lat. 51° 06', Long. 115° 23')

Kananaskis had two sites, one half-way between Calgary and Canmore, and the other in the far SW corner of Alberta. Operated in 2005. Two birds were banded at each site.

Kootenay Plains was along the David Thompson Highway, 35 km east of the Jasper-Banff highway. Operated in 2000 and 2003. (Lat. 52° 03', Long. 116° 25')

Hinton. The site was 10 km NW of the town. Operated in 2002, when two birds were banded. (Lat. 53° 33', Long. 117° 48')

APPENDIX 2. RECAPTURES OF BANDED RUFOUS HUMMINGBIRDS AWAY FROM THEIR BANDING SITE, BUT WITHIN BRITISH COLUMBIA.

These are the data shown in Figure 1. The observations are ordered according to the month of the year when the birds were banded. The sites are explained in Appendix 1. The last column provides the straight-line distance and the direction in true degrees, between the banding and recapture sites.

The persons who banded the birds, in the same order as items in the table, were as follows: Rick Shortinghaus, sub-permittee, Central Saanich; Derek Matthews, Master Bander, North Vancouver; J. Cam Finlay, Master Bander, Saanich (author); Ann Nightingale, sub-permittee, Central Saanich; Betty McGinnis, Master Bander, Fanny Bay; J. Cam Finlay, as above; J. Cam Finlay, as above; Bruce Cousins, sub-permittee, Nanaimo; Rick Shortinghaus, as above; J. Cam Finlay, as above; Derek Matthews, as above; Dr. Gayle Brown, Master Bander, Biological Station, Nanaimo.

Banding data				Recovery data			
Site	N. latitude W. longitude	Date	Band no.	Site	N. latitude W. longitude	Date	km, direction
Gabriola	49° 07' 123° 41'	06 Apr 2004	N24775	Galiano	48° 51' 123° 21'	18 Apr 2005	38, SE 140°
Langley	49° 03' 122° 35'	10 Apr 2004	N25722	Alberni	49° 19' 124° 52'	10 May 2004	169, NW 281°
Saanich	48° 29' 123° 26'	15 Apr 2002	Y37762	Gabriola (Degnen)	48° 08' 123° 42'	22 Apr 2002	86, SW 198°
Nanaimo	49° 11' 124° 03'	20 Apr 2004	N25092	Franklin	49° 06' 124° 48'	16 Apr 2005	44, W 207°
Fanny Bay	49° 28' 124° 46'	29 Apr 2000	Y36362	Galiano	48° 51' 123° 21'	28 May 2001	208, SE 149°
Salt Spring	48° 45' 123° 26'	02 May 1999	Y35747	Sidney	48° 42' 123° 27'	05 May 1999	6, S 192°
Squamish	49° 49' 123° 09'	08 May 2001	Y38798	Gabriola	49° 07' 123° 41'	25 May 2001	87, SW 207°
Gabriola	49° 09' 123° 43'	27 May 2003	N24421	Alberni	49° 19' 124° 52'	06 Jun 2004	86, NW 283°
Galiano	48° 51' 123° 21'	31 May 2004	N26175	Saanich	48° 29' 123° 26'	29 May 2005	41, S 189°
Galiano	48° 51' 123° 21'	01 Jun 2000	Y38501	Gabriola	48° 07' 123° 42'	08 May 2003	86, S 198°
N.Vanc.	49° 20' 123° 03'	04 Jun 2004	N25782	Franklin	49° 06' 124° 48'	16 Jun 2004	131, W 258°
Fanny Bay	49° 28' 124° 46'	19 Jun 1991	X21321	Goldstream	48° 29' 123° 33'	24 Apr 1997	141, SE 140°

APPENDIX 3. LONG-DISTANCE RECOVERIES OF BANDED RUFOUS HUMMINGBIRDS AS DOCUMENTED BY OTHER WORKERS.

These are the data shown in Figure 2. North-bound movements are listed first, from longest to shortest, then the

south-bound movements. The last column provides the straight-line distance and the direction in true degrees, from the banding to the recapture site, and also the number on the band. Information was obtained from the Banding Office of Canadian Wildlife Service in Ottawa, Ont.

Activity	Location	N. latitude and W. longitude	Date	Distance, direction and band number
Banded	Baton Rouge, Louisiana	30° 15' 92° 00'	05 Dec 2000	3517 km NW 317.7° Y03114
Departed	as above	as above	mid-March 2001	
Recovered	Black Creek B.C.	49° 50' 125° 00'	19 May 2001	
Banded	Paradise, S.W. Arizona	31° 50' 109° 10'	28 Jul 2002	2319 km NNW 331.3° R87326
Recovered	Lasqueti Island B.C.	49° 20' 124° 20'	10 May 2004	
Banded	Mountains, W. Colorado	38° 50' 106° 50'	16 Jul 1990	1165 km NW 315.3° T31618
Recovered	S. Nanaimo B.C.	49° 00' 123° 50'	19 Jun 1991	
Banded	W. of Denver, Colorado	39° 00' 108° 20'	26 Aug 2000	1402 km NNW 336.4° R14450
Recovered	N.W. Cranbrook B.C.	50° 20' 116° 10'	25 May 2001	
Banded	N.W. corner Montana	48° 40' 115° 50'	10 Jul 1994	1078 km NW 316.5° T96089
Recovered	Northern B.C.	55° 10' 127° 30'	Jul 1995	
Banded	N.W. corner Montana	48° 40' 115° 50'	08 Jul 2000	349 km NW 315.0° Y64610
Recovered	Salmon Arm B.C.	50° 50' 119° 20'	19 May 2001	
Banded	Fanny Bay B.C.	49° 28' 124° 46'	30 May 1994	2216 km SE 130° T78037
Recovered	W. of Albuquerque, New Mexico	34° 50' 106° 20'	13 Jul 1994	
Banded	Fanny Bay B.C.	49° 28' 124° 46'	15 Jun 2002	994 km SE 132.9° R43818
Recovered	E. of Boise, Idaho	43° 00' 115° 50'	18 Jul 2002	

The banders of these birds are listed in the same order as the paired observations in the table: Dave Patton of Baton Rouge, Louisiana; Susan Wetherington of Paradise, Arizona; Bill Calder of Colorado; Ruth Russell of Denver,

Colorado; Mrs. Burk of Montana (two bands); Dr. Gayle Brown, Nanaimo, B.C.; and Betty McGinnis of Fanny Bay B.C.