2023 Fall Report
Canada Jay Research Project
Paradise Meadows, Strathcona Provincial Park
British Columbia

Dan Strickland, October 28, 2023
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This was the seventh year of the Canada Jay project at Paradise Meadows. It updates a previous "2023 Interim Report", dated July 5, chiefly through the completion of a fall census involving multiple sightings and re-sightings of all the occupants of the study area and the banding of 13 new, mostly juvenile, immigrants. To this point, the principal findings and new developments for 2023 are as follows.

1. Dr. John Reynolds (Fig. 1; Simon Fraser University) joined Dr. Ryan Norris (Fig. 2; University of Guelph) and me this year as a third principal investigator conducting and supporting this research. In particular, Dr. Reynolds and Dr. Norris provided the salary of this year's field assistant, Donna Talluto (Fig. 3), for a full four months, March through June (as opposed to just two months, March and April, for assistants in previous years). A further addition to our team was that of Dr. David Green (Simon Fraser University) who will be co-supervising, with Ryan Norris, a new PhD student who will be studying the ontogeny and consequences of intragroup dominance behaviour (see No. 7 below).

2. With the help of important clues from volunteers, Heather Holmes, George and Sharon McLeod, Donna and I found 34 nests (including 1 re-nest) of 33 pairs on 22 territories (Fig.s 3, 4). Of these territories, 13 had just a single breeding pair, 7 had two breeding pairs, and 2 had three (alpha, beta, and gamma) breeding pairs.

3. From June 9 to July 5, a total of 39 fledgling juveniles (Fig. 5) were banded on 24 territories in or adjacent to the study area although 4 of the 39 had probably dispersed into the study area from elsewhere (Fig. 5). Notably, the one re-nest we observed in 2023 produced 4 offspring that survived to banding at the end of June and also attracted a fifth juvenile of unknown origin at the same time. Even more remarkable, all five of these juveniles are still alive (October), four of them on their natal/adoptive territory and one as an immigrant 4-5 territories away. This is the only example of 100% over-summer survival of 4, let alone 5, same-territory juveniles observed in 7 years of study. Overall, the production of juveniles in 2023 was three times greater than in the exceptionally poor year of 2022 (only 11 juveniles)—but still well below the record 53 juveniles produced in 2019. A further 13 juvenile immigrants were banded during the 2023 fall census, partly compensating for the June-to-fall loss of 17 of the original 39 fledgling juveniles.

4. From the beginning of the Paradise Meadows study genetic samples (blood and/or single rectrices) have been sent to Dr. Theresa Burg, University of Lethbridge, for molecular sexing and parentage analysis (mostly by Dr. Brendan Graham, a post-doctoral fellow now at the University of Alaska). This year, samples from 56 additional adult and juvenile birds were sent to Dr. Burg for similar analyses.

5. The great majority of Canada Jay nests at Paradise Meadows are so high and so well hidden in clumped branches of Mountain Hemlock or Amabilis Fir that close observation of nesting behaviour is impossible. An exceptional circumstance occurred in 2023, however, in that the alpha and beta pairs on the "NewGroup" territory both built nests that were originally only at head height and, even after

the 2-3 metres of snow cover melted, could still be satisfactorily observed from the ground and be reached by ladder (see Fig.s 6-8). This afforded two rare opportunities to determine clutch size, hatching success, feeding rates, and relative contributions to nestling care by males vs females, and to observe many other important details of nesting behaviour (see Fig.s 9-11).

6. The fact that the NewGroup's alpha and beta nests were both observable and the further fact that we had two observers meant that we were able to do simultaneous watches at the two nests and look for possible interactions between the two pairs at their respective nests. The Beta pair was seldom observed near the Alpha nest but, especially after the Beta eggs hatched (two weeks behind the Alpha nest), the Alpha pair was often observed near the Beta nest. The Alpha male and female typically screamed and begged at each other while near the Beta nest (something they never did near their own nest) and, starting on Beta nestling period Day 3, we started to see violent attacks and fights variously involving both members of both pairs. Four days later (i.e, when the Beta nestlings were a week old) I witnessed and obtained video of the final demise of the Beta nest. Figure 12, taken from the video, is a frame from the violent struggle of the two females on the Beta nest; this resulted in the Beta female's eviction from her own nest. Seconds later, the Alpha male went to the undefended nest and was recorded pecking at, and removing from the nest, what turned out to be the second of the two original Beta nestlings (Fig. 13).

7. While this has been the only proven case of an Alpha pair destroying (and presumably consuming) the progeny of a lower-ranked pair in its social group, reason exists to suspect that such behaviour is not unusual. In the seven years of study there have been two cases where males appeared to have been injured in the nesting season and it has been normal at that time of year to see breeders with conspicuously disturbed plumage consistent with the individual having been struck on the back or having been in a face-to-face grappling struggle. See Figures 14 and 15 other cases of alpha males showing signs of having been struck on the back late in the nesting season. To properly appraise the extent to which Beta and Gamma pairs must defend their nests against "infanticidal" Alpha pairs, it will be very important to find a way to obtain systematic observations on the fate of Beta and Gamma nests and to determine the extent to which the reproductive success of low-ranked breeding pairs depends on their relatedness to Alpha birds.

8. Related to this question, we modified, for use with Paradise Meadows Canada Jays, a protocol developed in Sweden for systematically determining dominance relationships among members of Siberian Jay social groups from standardized (15-minute) video recordings of interactions at observer-provided baits of high-quality food (in our case cheese). We also expanded and field-tested the protocol to include comparing the number of times, and the time spent, on the bait by each group member (on the expectation that time spent on the bait would be proportional to the nutritional benefit gained and positively related to dominance rank). Preliminary results suggest that this is indeed the case. In one early test involving the six-member (4 males, 2 females) NewGroup, for example, the percentages of total watch duration spent on the cheese by the 4 males were: alpha male 43%; beta male 20%; gamma male 6.5%; delta male 2%. Moreover, the two females had access to the cheese only when their respective mates were also there (and consequently prevented lower-ranked males from shooing the females away; Figure 16). We expect that the new protocol will be a key component of a proposed future PhD study that would explore the relationships between dominance, the resultant nutritional (food-storage) benefits, and reproductive success.

9. On her own initiative, and with the guidance of collaborator John Woods (retired Parks Canada biologist in Salmon Arm, BC), Donna undertook, as often as possible, to make sound recordings of Canada Jay vocalizations. By narrating these recordings with the identity and status of vocalizing birds,

plus the social context in which the vocalizations were made, Donna was able to uniquely leverage the value of her recordings and, we hope, to make real progress towards understanding the meaning of specific Canada Jay vocalizations and developing a true Canada Jay "dictionary".

10. A further innovation in this year's Canada Jay work, also undertaken by Donna, was the preparation of a digital map of the study area, identifying and naming territory centres and including our own, often personally invented geographic place names (Fig. 17). The map has already proved helpful for volunteers and will no doubt be of similar help for future field assistants who need to learn the study area quickly and have a standardized method for producing unambiguous field notes.

11. Based on a visit to the study area on March 24 by writer Brian Payton and two visits, on March 30 and May 19, by staff photographer Bennett Whitnell, an article on the Paradise Meadows Canada Jay research project will be published, possibly in late 2023, in Hakai Magazine.

12. As suggested by BC Parks ranger, Mattias Morrison, we produced laminated cards this year that we now insert into the temporary bait holders that we often put up in jay territories when we have been initially unsuccessful in finding the local jays. Although we almost always put the baits up for just a few hours and usually far enough away from managed trails that they are seldom discovered by the public, we agree that it is advisable to have an explanation of what the bait station is and that it is authorized by the park (Fig. 18).

13. A Zoom lecture describing the Paradise Meadows research and contrasting the social behaviours of the Pacific and Boreal morphotypes was given by D. Strickland to 3rd-year Animal Behaviour students at the University of Guelph on October 27 and a similar address will be delivered on November 8th for the Rocky Point Bird Observatory community on Vancouver Island.

14. Although only peripherally connected to the work at Paradise Meadows, a new paper was published in October that, along with our work at Paradise Meadows, will have an important bearing on the eventual decision on whether or not the Pacific morphotype of the Canada Jay should be re-elevated to the status of separate species:
    B. A. Graham et al. 2023. Habitat and climate influence hybridization among three genetically distinct Canada jay (*Perisoreus canadensis*) morphotypes in an avian hybrid zone complex. Heredity, https://doi.org/10.1038/s41437-023-00652-3

Figure 1. Dr. John Reynolds (right) on a successful nest-finding visit to the study area March 29, 2023

Figure 2. Dr. Ryan Norris banding one of two Beta fledglings on the JackRabbit territory, June 22, 2023

Figure 3. Donna Talluto pointing to the still-under-construction replacement nest she discovered of the GreatBigView (GBV) pair, April 21, 2023. Although this was a replacement nest, it produced 5 fledglings (banded on June 23 and July 1).

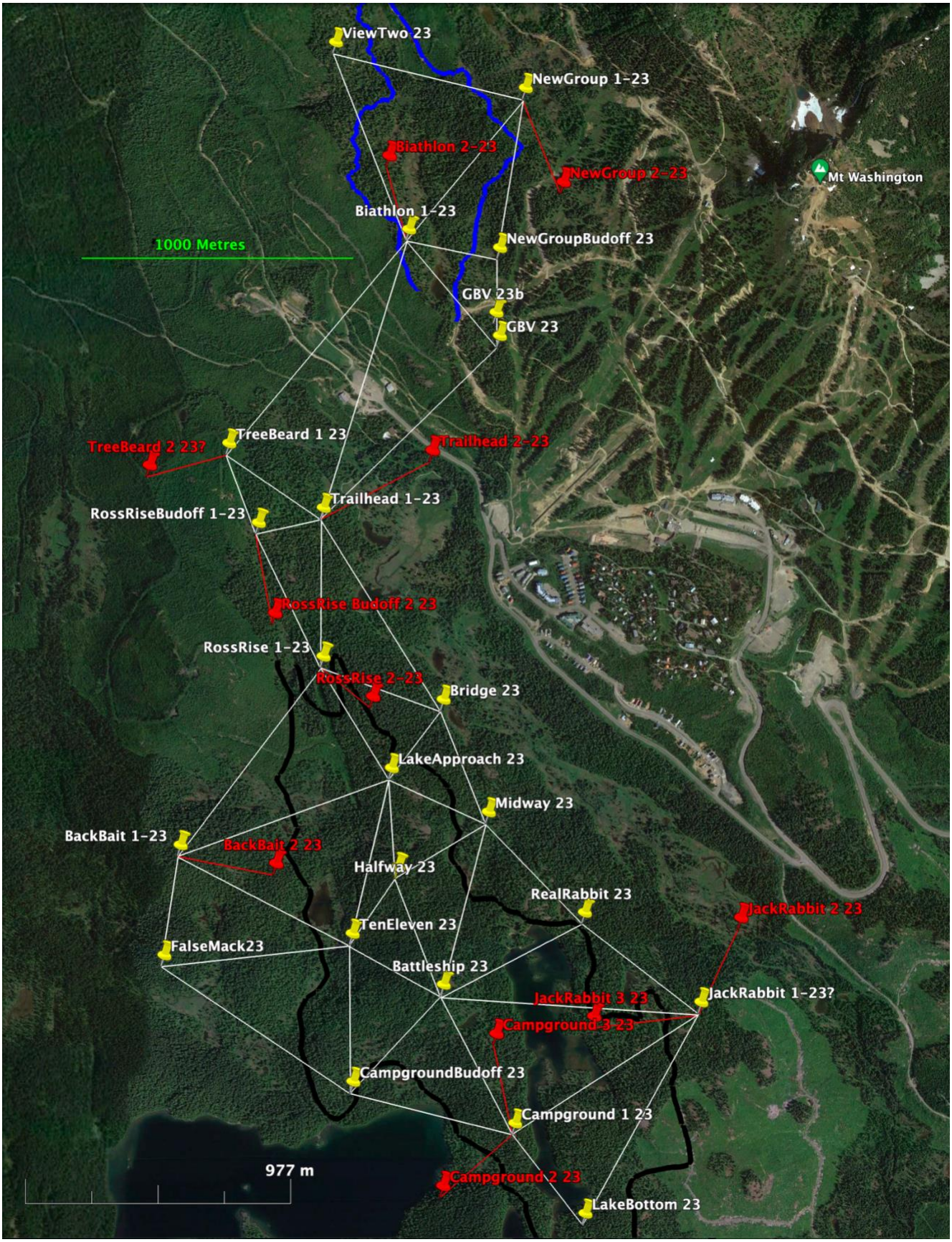


Figure 4. Locations of the 33 nests (plus one re-nest, on the GBV territory) found in 2023. The nests of 22 alpha (primary or only) pairs on each territory are indicated by yellow icons and white labels. The nests of 9 Beta (secondary) pairs and 2 Gamma (third-ranking) breeding pairs are indicated by red icons and labels with red lines connecting their nest locations with that of their associated alpha pair.

June-Fall Composition of Paradise Meadows Canada Jay Social Groups to OCTOBER 28, 2023 (Contact Dan Strickland: perisoreus1@gmail.com)

2023	ViewTwo		Biathlon[2]		NewGroup[2]		NewGroup Bud-off	
	June	Fall	June	Fall	June	Fall	June	Fall
"ADULTS"	BOSLWR$_{m17}$	BOSLWR$_{m17}$	LOSLRR$_{m09-}$[1]	LOSLRR$_{m09-}$[2]	TOYLPOSR$_{m19-}$	TOYLPOSR$_{m19-}$	GOSLYOPR$_{m20}$	
	POSLTR$_{fe15-}$	POSLTR$_{fe15-}$			OOSLPOBR$_{fe9-}$		OOBLGOSR$_{fe21-}$	
			OOSLWOPR$_{m18-}$	OOSLWOPR$_{m18-}$	WOTLLOSR$_{fe19-}$	WOTLLOSR$_{fe19-}$		
			TOSLROBR$_{fe19-}$	TOSLROBR$_{fe19-}$	RLSR$_{fe22-}$	RLSR$_{fe22-}$		
			YOSLTORR$_{22}$	YOSLTORR$_{22}$	GOSLYOLR$_{m19-}$	GOSLYOLR$_{m19-}$		
				GOSLYOPR$_{20}$	LOBLYOSR$_{m20}$	LOBLYOSR$_{m20}$		
	WOSLLOBR	WOSLLOBR						
	WOLLKOSR$_{fe21}$	WOLLKOSR$_{fe21}$						
YOUNG Hatched Locally in 2023	*BOYLGOSR $_{23}$*				*BOTLWOSR $_{23}$*			
					TOSLROGR $_{23}$			
Hatched Elsewhere		*GOTLROSR $_{23}$*		*BOTLWOSR $_{23}$*				
				WOGLYOSR $_{23}$				
				BOSLGOLR $_{23}$[4]				

2023	GreatBigView		Blueberry Hill		Trailhead[2]		TreeBeard[2]	
	June	Fall	June	Fall	June	Fall	June	Fall
"ADULTS"	ROSLPOYR$_{m19-}$	ROSLPOYR$_{m19-}$	ROSLLOBR$_{m19-}$	ROSLLOBR$_{m19-}$	PLBOSR$_{m15-}$	PLBOSR$_{m15-}$	WLKOSR$_{m17}$	WLKOSR$_{m17}$
	GOSLRORR$_{fe16-}$	GOSLRORR$_{fe16-}$	ROLLKOSR$_{fe20}$	ROLLKOSR$_{fe20}$	LOSLBR$_{fe15-}$	LOSLBR$_{fe15-}$	YOSLWOBR$_{fe18-}$	YOSLWOBR$_{fe18-}$
	YOBLOOSR$_{fe21}$	YOBLOOSR$_{fe21}$	OOGLWOSR$_{m20}$	OOGLWOSR$_{m20}$	LOSLYOPR$_{m19}$	LOSLYOPR$_{m19}$	BOWLROSR$_{m19}$	BOWLROSR$_{m19}$
					TOSLROWR$_{fe19}$	TOSLROWR$_{fe19}$	BOSLWORR$_{fe19-}$	BOSLWORR$_{fe19-}$
					PORLPOSR$_{fe21}$	PORLPOSR$_{fe21}$	POWLTOSR$_{m21}$	POWLTOSR$_{m21}$
					TOPLSOYR$_{22}$	TOPLSOYR$_{22}$		
					KOBLGOSR$_{22}$	KOBLGOSR$_{22}$		
YOUNG Hatched Locally in 2023	*OOYLTOSR $_{23}$*	*OOYLTOSR $_{23}$*	*TOOLLOSR $_{23}$*	*TOOLLOSR $_{23}$*				
	LOSLGOWR $_{23}$	*LOSLGOWR $_{23}$*	*BOSLYOGR $_{23}$*	*BOSLYOGR $_{23}$*				
	YOSLBOLR $_{23}$							
	BORLOOSR $_{23}$	*BORLOOSR $_{23}$*						
Hatched Elsewhere	*GOSLLOOR $_{23}$*	*GOSLLOOR $_{23}$*		*YOSLGOTR $_{23}$*	*WOSLROGR $_{23}$*[7]	*WOSLROGR $_{23}$*[7]		
				BOYLOOSR $_{23}$				
					TOLLOOSR $_{23}$[7]	*TOLLOOSR $_{23}$*[7]		

2023	HelenMackenzie		FalseMack		BackBait[2]		TenEleven	
	June	Fall	June	Fall	June	Fall	June	Fall
"ADULTS"	ROSLPR$_{m15-}$	ROSLPR$_{m15-}$	RLROSR$_{m15-}$	RLROSR$_{m15-}$	GOSLTR$_{m15-}$	GOSLTR$_{m15-}$	TLOOSR$_{m15-}$	TLOOSR$_{m15-}$
	WOSLGOLR$_{22-}$	WOSLGOLR$_{22-}$	LOSLKR$_{fe17}$	LOSLKR$_{fe17}$	TOSLYOBR$_{fe18}$	TOSLYOBR$_{fe18}$	ROLLLOSR$_{fe21}$	ROLLLOSR$_{fe21}$
	TOBLGOSR$_{21-}$	TOBLGOSR$_{21-}$			LOSLYOGR$_{m19}$	LOSLYOGR$_{m19}$		
	YOOLTOSR$_{22-}$	YOOLTOSR$_{22-}$			BOOLWOSR$_{fe21}$	BOOLWOSR$_{fe21}$		
					WOSLOOGR$_{22}$	WOSLOOGR$_{22}$		
YOUNG Hatched Locally in 2023			*YORLBOSR $_{23}$*				*YOSLTOGR $_{23}$*	
			GOSLTOLR $_{23}$	*GOSLTOLR $_{23}$*			*ROBLGOSR $_{23}$*	
							BOSLTOBR $_{23}$	*BOSLTOBR $_{23}$*
							WOSLGOOR $_{23}$	
Hatched Elsewhere	*YOSLBORR $_{23}$*	*LORLYOSR $_{23}$*		*YOSLBOLR $_{23}$*				
		LOGLOOSR $_{23}$						

2023	Halfway		LakeApproach		Rossiter's Rise[2]		RossRise Bud-off[2]	
	June	Fall	June	Fall	June	Fall	June	Fall
"ADULTS"	ROSLOOTR$_{m21}$	ROSLOOTR$_{m21}$	GLROSR$_{m15-}$	GLROSR$_{m15-}$	LOPOSL$_{m09-}$		WLLOSR$_{m15-}$	WLLOSR$_{m15-}$
	WOSLPOOR$_{fe20}$	WOSLPOOR$_{fe20}$	KLWOSR$_{fe17}$	KLWOSR$_{fe17}$	KLGOSR$_{fe16}$	KLGOSR$_{fe16}$	KOSLROLR$_{fe19}$	KOSLROLR$_{fe19}$
					BOSLYOTR$_{m19}$	BOSLYOTR$_{m19}$	ROSLLOYR$_{m19}$	ROSLLOYR$_{m19}$
					ROBLPOSR$_{fe19}$	ROBLPOSR$_{fe19}$	KOOLGOSR$_{fe19}$	KOOLGOSR$_{fe19}$
YOUNG Hatched Locally in 2023							*YOBLGOSR $_{23}$*	*YOBLGOSR $_{23}$*
							GORLWOSR $_{23}$	
							TOSLBOOR $_{23}$	*TOSLBOOR $_{23}$*
Hatched Elsewhere		*YOSLWOLR $_{23}$*				*OOSLGOYR $_{23}$*		

2023	CampgroundBudoff		Campground[2,4]		LakeBottom		JackRabbit[2,5]	
	June	Fall	June	Fall	June	Fall	June	Fall
"ADULTS"	BOSLPR$_{m15-}$	BOSLPR$_{m15-}$	(disappeared)		POSLGOLR$_{m16-}$	POSLGOLR$_{m16-}$	ROLLWOSR$_{m18-}$	ROLLWOSR$_{m18-}$
	ROSLTOPR$_{fe20}$	ROSLTOPR$_{fe20}$	POSLBOKR$_{fe18}$	POSLBOKR$_{fe18}$	OOSLPOTR$_{fe19-}$	OOSLPOTR$_{fe19-}$	TOSLGR$_{fe16-}$	TOSLGR$_{fe16-}$
			TOSLLOBR$_{m18}$	TOSLLOBR$_{m18}$	ROTLLOSR$_{fe21}$	ROTLLOSR$_{fe21}$	LOGLROSR$_{m19}$	LOGLROSR$_{m19}$
			GOOLROSR$_{fe22-}$		WOSLTOKR$_{fe21}$	WOSLTOKR$_{fe21}$	YOBLTOSR$_{fe18-}$	YOBLTOSR$_{fe18-}$
			BOSLWOGR$_{m22}$	BOSLWOGR$_{m22}$			KOGLYOSR$_{m20}$	
			YOSLBOTR$_{fe19}$	YOSLBOTR$_{fe19}$			POSLLOYR$_{fe21-}$	POSLLOYR$_{fe21-}$
							YOSLOOBR$_{22}$	YOSLOOBR$_{22}$
YOUNG Hatched Locally in 2023	*LOSLGOYR $_{23}$*	*LOSLGOYR $_{23}$*	*TORLOOSR $_{23}$*			*YOSLLOBR $_{23}$*	*WORLBOSR $_{23}$*	
	YOWLOOSR $_{23}$	*YOWLOOSR $_{23}$*	*WOOLLOSR $_{23}$*	*WOOLLOSR $_{23}$*		*BOSLOOBR $_{23}$*	*GOSLTORR $_{23}$*	*GOSLTORR $_{23}$*
						ROSLGOWR $_{23}$	*GOYLOOSR $_{23}$*	*GOYLOOSR $_{23}$*
							OOGLLOSR $_{23}$	
							BOOLGOSR $_{23}$	*BOOLGOSR $_{23}$*
							YOSLRORR $_{23}$	
Hatched Elsewhere								*TOSLGOYR $_{23}$*

2023	RealRabbit		Battleship		Midway		Bridge	
	June	Fall	June	Fall	June	Fall	June	Fall
"ADULTS"	LOSLBORR$_{m19}$	LOSLBORR$_{m19}$	POYLWOSR$_{m21}$	POYLWOSR$_{m21}$	ROSLLR$_{m17}$	ROSLLR$_{m17}$	WOSLKR$_{m16}$[6]	WOSLKR$_{m16}$[6]
	POPLPOSR$_{fe19-}$	POPLPOSR$_{fe19-}$	LOSLWOBR$_{fe18}$	LOSLWOBR$_{fe18}$	SORLGR$_{fe16}$	SORLGR$_{fe16}$	GLWOSR$_{fe15-}$	GLWOSR$_{fe15-}$
					BOSLTOYR$_{22}$	BOSLTOYR$_{22}$	ROSLPOKR$_{m19}$	ROSLPOKR$_{m19}$
							LOPLBOSR$_{22}$	
YOUNG Hatched Locally in 2023	*LOYLTOSR $_{23}$*						*OOSLBOLR $_{23}$*	
	WOGLOOSR $_{23}$	*WOGLOOSR $_{23}$*					*TOSLGOYR $_{23}$*	
	BOSLTOGR $_{23}$						*WOSLTORR $_{23}$*	*WOSLTORR $_{23}$*
							LOGLLOSR $_{23}$	
Hatched Elsewhere								

[1]Sex (if known) and year of birth indicated by subscript after name. A minus sign following the year indicates that indicated year is latest possible year of birth.

[2]Two or more pairs known to have attempted nesting on this teritory in 2022

[3]LOSLRR rebanded as "SOLLRR" in fall 2022

[4]Affiliation of BOSLGOLR not yet known. Was banded with Biathlon birds Oct. 1, 2023 but not seen since then

[4]Three breeding pairs on this territory but male of Alpha pair disappeared in nesting period (before June). Two young produced by Beta pair. Horizontal lines delineate separate pairs.

[5]Four young produced by Alpha pair, two by Beta pair, and none by Gamma pair. Horizontal lines delineate separate pairs and corresponding young produced by Alpha and Beta pairs

[6]After rebanding in fall 2022, WOSLKR now appears as "SOWLKR"

Canada Jay Naming System

(brackets indicate a lost band; subscript is year hatched)

O = Over (when 2nd letter or 3rd last) or Orange

L = Left (when 2nd or 4th letter) or Light green

R = Right (when last letter) or Red

Y = **Y**ellow	T = ligh**T** blue	P = **P**urple	K = pin**K**
S = **S**tandard	B = dark **B**lue	G = dk **G**reen	W = **W**hite

Example: ROSLTOGR$_{19}$ = ***R****ed* ***O****ver* ***S****tandard* ***L****eft, ligh****T*** *blue* ***O****ver dark* ***G****reen* ***R****ight (hatched in 2019)*

Figure 5. Occupants of 24 territories in the Paradise Meadows Canada Jay study area as of July 3, 2023 and again in October 2023 (including adults plus 39 fledglings banded in June, and another 13 immigrants banded in October).

Figure 6. Nest of the NewGroup alpha pair, April 18, 2023

Figure 7. NewGroup alpha female (only her tail visible) incubating her 3 eggs (of which 2 hatched and fledged), April 19, 2023

Figure 8, NewGroup Beta female covering her two nestlings 3 days before their demise, May 26, 2023

Figure 9. The two 2-day old NewGroup Beta nestlings, May 24, 2023. (Photo by Donna Talluto)

Figure 10. Male and female of the NewGroup alpha pair feeding their two 10/11-day olds, May 17, 2023, Photo by Donna Talluto

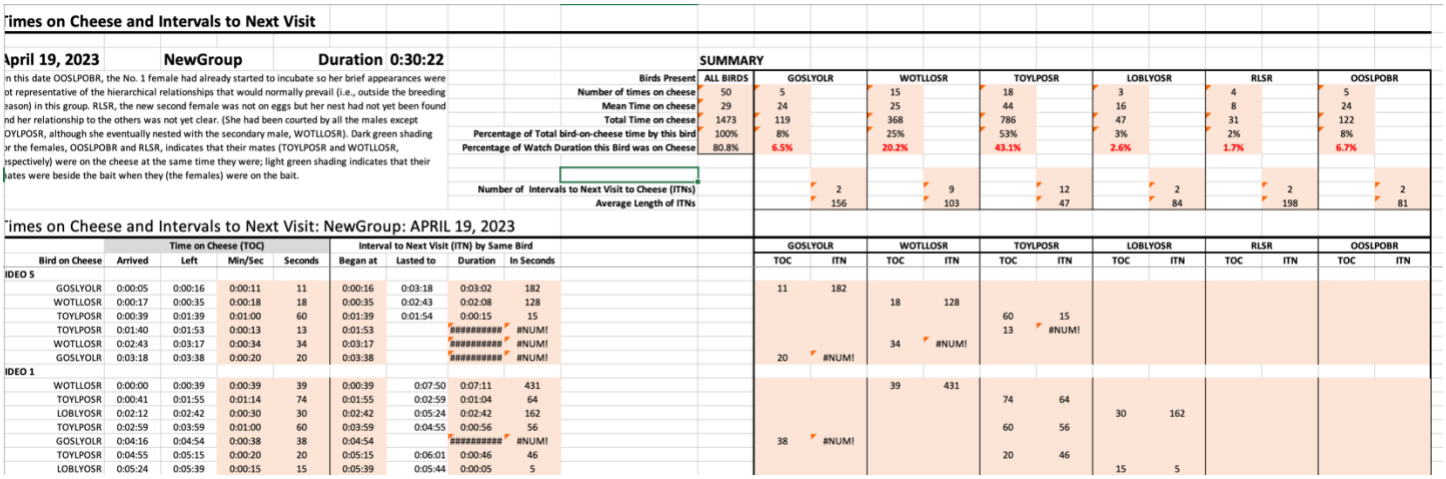
Figure 11. The two 20/21 day-old nestlings of the NewGroup alpha pair, 2 days before fledging, May 27, 2023. Photo by Donna Talluto.

Figure 12. Still from video showing the final attack and violent struggle leading to the eviction of the NewGroup beta female from her nest by the NewGroup alpha female, May 29, 2023. Original 23-second video available on request.

Figure 13. From the same video, showing the NewGroup alpha male killing the second of two beta nestlings and removing it from the beta nest, May 29, 2023. Original 23-second video available on request.

Figure 14. A photograph, June 17, 2021, of an alpha male that, for several weeks, showed evidence of having possibly been struck on the back by another jay late in the nesting season. One of several observations since 2017 suggesting that serious fights may be more common than we previously suspected at nests on territories where plural nesting is occurring.

Figure 15. The alpha male of the Biathlon group as he appeared on June 1, 2023, photo by Donna Talluto. When Donna found this bird, she wondered if it was at death's door. It appears to have been "beaten up" and along with several other late May, early June examples since 2016, it is possible that it had been in a serious fight with lower ranked birds in its social group.



Times on Cheese and Intervals to Next Visit

April 19, 2023 NewGroup Duration 0:30:22

n this date OOSLPOBR, the No. 1 female had already started to incubate so her brief appearances were ot representative of the hierarchical relationships that would normally prevail (i.e., outside the breeding eason) in this group. RLSR, the new second female was not on eggs but her nest had not yet been found nd her relationship to the others was not yet clear. (She had been courted by all the males except OYLPOSR, although she eventually nested with the secondary male, WOTLLOSR). Dark green shading r the females, OOSLPOBR and RLSR, indicates that their mates (TOYLPOSR and WOTLLOSR, spectively) were on the cheese at the same time they were; light green shading indicates that their ates were beside the bait when they (the females) were on the bait.

SUMMARY	ALL BIRDS	GOSLYOLR		WOTLLOSR		TOYLPOSR		LOBLYOSR		RLSR		OOSLPOBR	
Birds Present													
Number of times on cheese	50	5		15		18		3		4		5	
Mean Time on cheese	29	24		25		44		16		8		24	
Total Time on cheese	1473	119		368		786		47		31		122	
Percentage of Total bird-on-cheese time by this bird	100%	8%		25%		53%		3%		2%		8%	
Percentage of Watch Duration this Bird was on Cheese	80.8%	6.5%		20.2%		43.1%		2.6%		1.7%		6.7%	
Number of Intervals to Next Visit to Cheese (ITNs)			2		9		12		2		2		2
Average Length of ITNs			156		103		47		84		198		81

Times on Cheese and Intervals to Next Visit: NewGroup: APRIL 19, 2023

		Time on Cheese (TOC)				Interval to Next Visit (ITN) by Same Bird				GOSLYOLR		WOTLLOSR		TOYLPOSR		LOBLYOSR		RLSR		OOSLPOBR	
Bird on Cheese	Arrived	Left	Min/Sec	Seconds	Began at	Lasted to	Duration	In Seconds		TOC	ITN	TOC	ITN	TOC	ITN	TOC	ITN	TOC	ITN	TOC	ITN
IDEO 5																					
GOSLYOLR	0:00:05	0:00:16	0:00:11	11	0:00:16	0:03:18	0:03:02	182		11	182										
WOTLLOSR	0:00:17	0:00:35	0:00:18	18	0:00:35	0:02:43	0:02:08	128				18	128								
TOYLPOSR	0:00:39	0:01:39	0:01:00	60	0:01:39	0:01:54	0:00:15	15						60	15						
TOYLPOSR	0:01:40	0:01:53	0:00:13	13	0:01:53		##########	#NUM!						13	#NUM!						
WOTLLOSR	0:02:43	0:03:17	0:00:34	34	0:03:17		##########	#NUM!				34	#NUM!								
GOSLYOLR	0:03:18	0:03:38	0:00:20	20	0:03:38		##########	#NUM!		20	#NUM!										
IDEO 1																					
WOTLLOSR	0:00:00	0:00:39	0:00:39	39	0:00:39	0:07:50	0:07:11	431				39	431								
TOYLPOSR	0:00:41	0:01:55	0:01:14	74	0:01:55	0:02:59	0:01:04	64						74	64						
LOBLYOSR	0:02:12	0:02:42	0:00:30	30	0:02:42	0:05:24	0:02:42	162								30	162				
TOYLPOSR	0:02:59	0:03:59	0:01:00	60	0:03:59	0:04:55	0:00:56	56						60	56						
GOSLYOLR	0:04:16	0:04:54	0:00:38	38	0:04:54		##########	#NUM!		38	#NUM!										
TOYLPOSR	0:04:55	0:05:15	0:00:20	20	0:05:15	0:06:01	0:00:46	46						20	46						
LOBLYOSR	0:05:24	0:05:39	0:00:15	15	0:05:39	0:05:44	0:00:05	5								15	5				

Figure 16. Partial screen grab of results of modified protocol for assessing the benefits of dominance in a social group of Canada Jays. In this case, the dominance rankings were found independently and show that the relative time each bird spent on the cheese (figures in red) corresponds to its dominance ranking. That is, TOYLPOSR, the alpha male exploited the cheese 43% of the total time the bait was available, WOTLLOSR, the beta male had access only 20% of the time, GOSLYOLR, the gamma male (and gamma breeder in 2022) had access only 6.5% of the time and LOBLYOSR, a two-year-old male immigrant had access only 2.6% of the time. See note in document (above) regarding access by the two females.

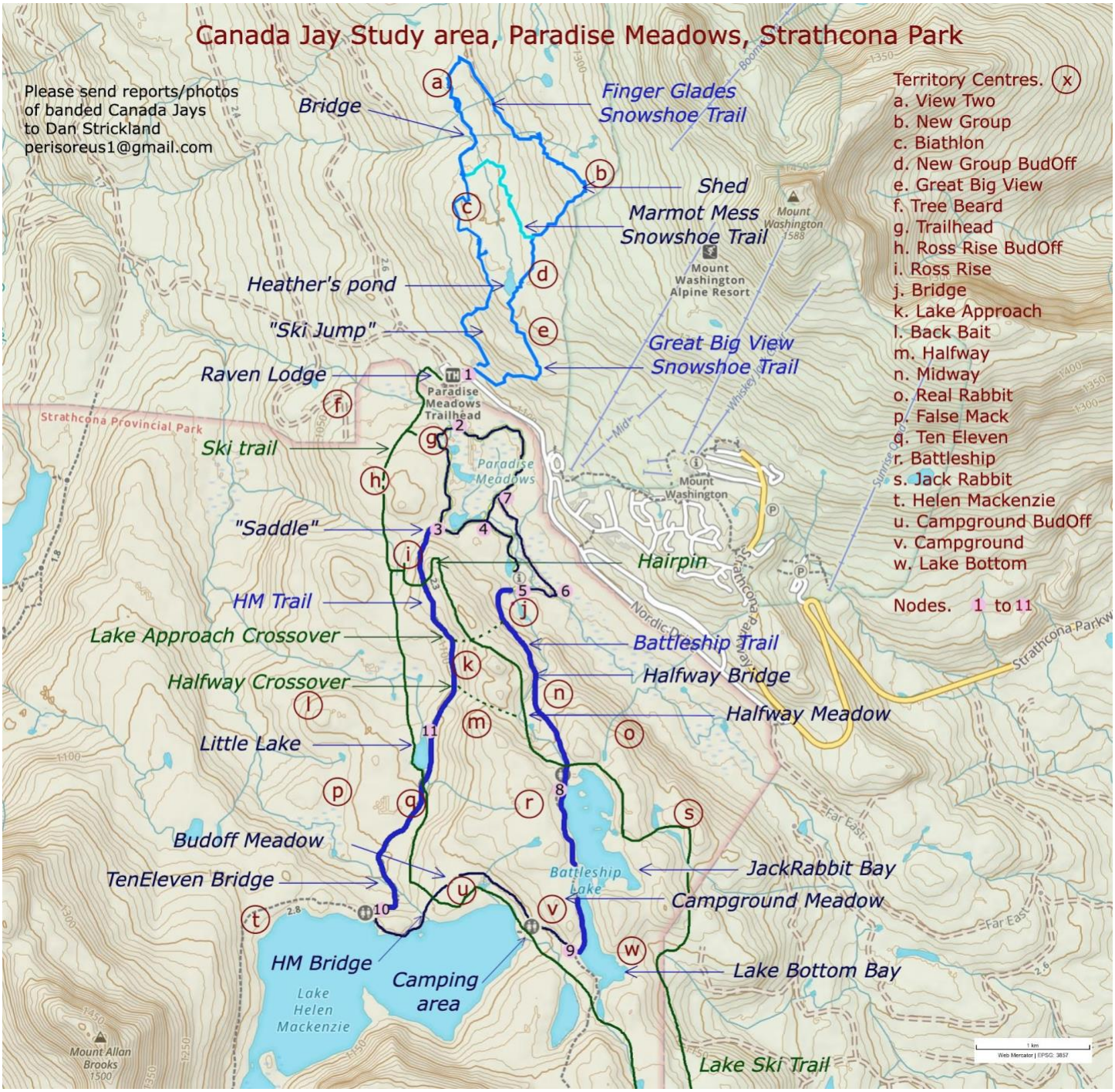


Figure 17. Digital map of the study area prepared by Donna Talluto showing the locations of main territory nesting areas as well as our names of the territories and certain geographical features.

Figure 18. Temporary cheese bait station with explanatory card for members of the public who might happen to find the station and understandably wonder if it was authorized by BC Parks. Photo by Donna Talluto.