

Nova Scotia Habitat Conservation Fund

Population structure and distribution of Black Bears in Nova Scotia.

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This study of Black Bears (*Ursus americanus*) in Nova Scotia builds on previous research which accomplished the following: 1. A thorough collection of the most relevant publications on black bears in northeastern North America, 2. A summarization of all the data collected by DNR on black bears, and 3. Optimization of the molecular genetic techniques to identify individuals and determine genetic relationships among individuals using microsatellite markers.

Here we report on the data collected during the summer of 2015.

Project Objectives:

- determine the population structure of Black Bears in Nova Scotia based on molecular genetic analysis of hair collected from bears visiting bait sites in a study area in Kings Co.
- estimate black bear structure and distribution for Nova Scotia based on application of molecular genetic techniques based on skin samples collected by DNR personnel from bears trapped and shot throughout Nova Scotia.

Goals:

- Map the population size, structure and distribution of black bears in Nova Scotia.
- Map the spatial distribution of human black bear interactions in Nova Scotia.
- Design a management strategy for minimizing human black bear interactions in Nova Scotia.

Results:

Honours student, Noah Ueffing set out 40 bait sites surrounded by barbed wire to snatch hair samples from black bears visiting the sites. The bait sites were located in the area bounded by Gaspereau Lake, New Ross and Windsor (see Map 1). The bait stations were visited regularly seven times between 29 June and 8 September 2015. Table 1 summarizes the hair samples collected.

Noah did not complete his Honours degree. Microsatellites will now be isolated from DNA by Brittini Scott, an MSc student who is taking over the project. The data will be used to estimate the population size of black bears in the study area.

The second part of the study was to analyze microsatellites from skin samples of black bears submitted by hunters and trappers. In total 35 samples were submitted from around the province but only 21 samples had accompanying data. Table 2 lists the skin samples submitted. Microsatellite data are presented in Table 3.

Initial analysis of eight microsatellite length from skin samples from Cape Breton, NE and SW Nova Scotia indicates no difference (see Table 4). This however is a very preliminary result based on very few samples.

Not all skin samples had known locations unfortunately. The distribution by County of bear skin samples are listed in Table 5.

Planned research for the 2017 season.

1. Master of Science candidate Brittini Scott is taking a course in molecular techniques which will give her the expertise needed to isolate microsatellites from hair and skin samples from black bears.
2. Continue sampling hair from the bait stations in the study area in Kings Co.
3. Set up one to two more bait study sites.
4. Get to know bear hunters and trappers to ensure that samples will be submitted with complete information.
5. Analyse previous year's data
6. Work closely with DNR staff
7. Develop a management plan for black bears in Nova Scotia

Map 1. The Kings Co. study area showing the location of 40 bait sites.

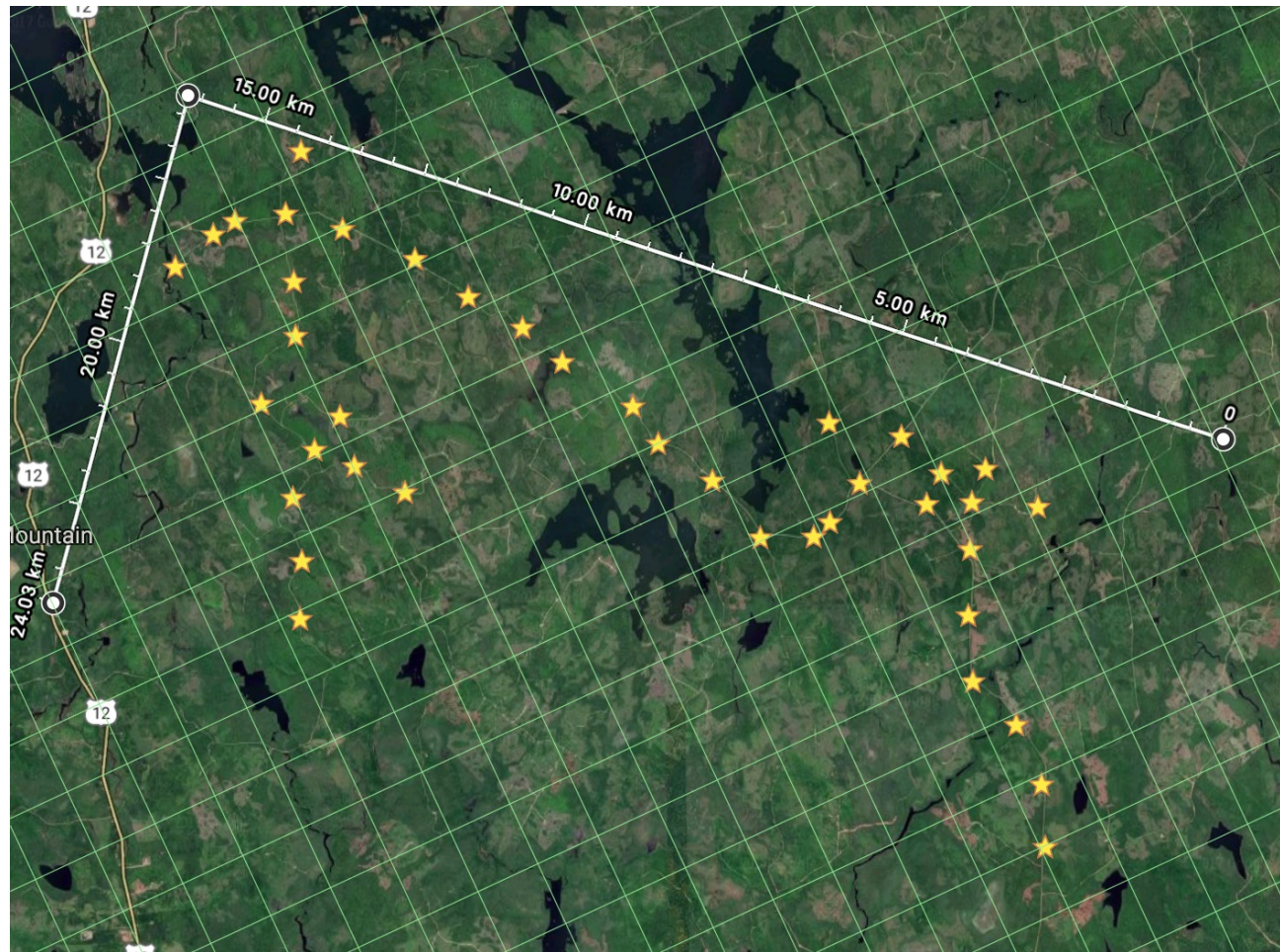


Table 1. Number of hair samples collected during the summer of 2015 from 40 bait sites in the Gaspereau Lake, New Ross and Winsor study area.

Count of site	Hair samples Collected							Grand Total
	Hair sample collected							
Bait station	2015-06-29	2015-07-07	2015-07-14	2015-07-27	2015-08-10	2015-08-26	2015-09-08	
2				1				1
3							1	1
4					2			2
5					1			1
7			1					1
11		1						1
16				1				1
17	1	1	1					3
19		1		3				4
21				1				1
22		1		1	2			4
23	1	1						2
26				1		2	1	4
27	2	2	2	4	2		1	13
28						1		1
29	1	1		1	3	1		7
30				1			2	3
33		1						1
34		2						2
37						1		1
38				1	1			2
39		1			1			2
40	1	2		4				7
Grand Total	6	14	4	19	12	5	5	65

Table 2. Skin samples submitted to DNR noting Tag #, Name of hunter/trapper, WRC, Date, County/map location, County, sex of bear, tag # and Acadia Bear Study number (ABS#) pink colour indicates individuals with Microsatellite extraction successful.

Tag #	Name	WRC	Date	County	CountyA	Sex	Tag	ABS #
146508	Nora Saulnier	391625632	08-09-2014	Digby	Digby	M		1
146504			09-12-2014	Digby	Digby			2
146505	Arnold Barr	296767564	29-09-2014	Digby	Digby	M		3
146506	Glendon Milbury	743819677	19-09-2014	Miller Lake, Annapolis	Annapolis	M	14-217317	4
		421316158	15-1-2015					5
		956156446	09-09-2014	55 Z2B4	Annapolis			6
	T. Comeau		01-11-2014	70 Z5F5	Digby	M		7
	Kayla		05-10-2015	White Rock 47 V5D2	Kings	F		8
	Al Worther		21-09-2015	64Z1F4	Annapolis	M		9
	Doreen Buffett	729611518	05-10-2015			M		10
	Jeremy Smith	848485418	06-11-2015	38 W2 H3	Colchester		15-272205	11
	David Matthews	691533320	24-10-2015			M		12
	Gerry Gibson	452324	15-10-2015	Pictou	Pictou	F		13
	Jessica Gibson							14
	Mark Potter		07-10-2015	63Z3A4	Annapolis	M		15
246449		830852278	14-10-2015	Annapolis	Annapolis	F		16
262533		624254339	10-10-2015	Annapolis	Annapolis	M		17
			10-10-2015	56Y3E1	Kings	M		18
	Daryl Boland	853587417	26-09-2015	65Y4A1	Lunenburg	M		19
	Paul Larada		02-10-2014	Inverness Co	Inverness			20
		522?11047		58Z3H4	East Hants			21
BIR#1004829			07-08-2015			M		22
		655880542	10-09-2015			F		23
		398370805	01-09-2015					24

146201	Bonnie Cleveland	727427345	02-11-2015	79Y1G2	Lunenburg	M		25
		944784189	08-10-2015					26
	Kyle Crawford	908652141	16-Sep-15	Lunenburg Co Kings Co. Blue Mtn Lake	Lunenburg	M	15-244227	27
		331586677	25-Sep-14		Kings	m		28
	Ricky Banks	735117544						29
		655880542	10-Feb-14	47W5C2	Kings	m		30
	Raymond Gilbert	962476099	04-Oct-15			m	15-272-041	31
	Reid Gilbert	871649265	08-Oct-15			f	15-277-054	32
		352754189	13-Nov-15	shimicas, Cumb Co.		m		33
		352754189	18-Oct-15	Oxford, Cumb Co		m		34
	352754189	11-Oct-15	Oxford, Cumb Co		m		35	

Table 3. Microsatellite data for eight microsatellite loci showing the number of base repeats (blanks are missing data).

ABS #	loc_G1A	loc_G1D	loc_G1B	loc_G10C	loc_G10L	loc_G10M	loc_G10P	loc_G10X
1		196	174	122	151	228		
1		200	180	131	154	236		
2		194	176	122	149	234		154
2		196	180	131	154	234		177
3	206	194	174		149	228	172	177
3	207	196	176		161	234	172	177
4	207	196	174	122	154	234	172	164
4	207	204	174	131	161	234	172	164
5	207	196	174	124	161	232	185	162
5	207	200	174	133	173	238	185	162
6	205	194	173	126		228	168	154
6	208	200	176	131		234	178	165
7				122		234		
7				131		238		
8	209	196	174		149	234	178	154
8	209	200	174		154	236	178	177
9	201	196	174		154	226	168	164
9	210	196	176		161	236	168	177
10	209	196	174	133	149	232	184	162
10	209	204	176	133	151	234	184	162
11	205	196	174	126	161	226	170	167
11	210	202	176	126	165	234	170	171
12		193	176		156	232		
12		204	176		156	236		
13		194	173	122	173	234	170	154

13		204	173	133	175	236	178	164
14	207	204	173	128	156	232		162
14	210	204	175	133	156	234		162
15								
15								
16	205	195	173	130	154	228	178	161
16	208	200	176	133	154	234	178	164
17	207	193	167	130	156	227	178	177
17	210	200	173	133	173	234	178	181
18	205	196	173	122	156	226	178	162
18	209	196	175	122	158	236	180	164
19	207	200	173	130	154	226	178	181
19	207	204	175	132	154	226	178	181
21								
21								
22	201	194	173	122	158	234	184	162
22	210	204	175	133	173	234	184	164
23		194	182	130	178	234	172	
23		204	182	132	178	236	172	
24		194	182	122	154	234		163
24		204	182	130	154	236		165
25		194	174	122	154	234	172	162
25		196	176	135	156	236	172	165
26		196	174	128	154	226	172	165
26		204	180	130	177	234	172	177
27		196	176	122	156	234	178	164
27		200	176	132	173	236	178	164
28		194	176		156	234	172	162
28		200	182		177	236	172	164

29	196	180	121	154	226	180	154
29	196	184	132	173	236	180	154
30	194	167	126	154	228	178	165
30	194	176	134	177	236	178	175
31	200	180	121	154	226	181	156
31	204	180	132	175	236	181	169
32	196	176	122	158		178	162
32	196	176	130	175		178	171

Table 4. Number of bear skin samples by county.

County	# analysed
Annapolis	6
Colchester	1
Digby	4
East Hants	1
Inverness	1
Kings	4
Lunenburg	3
Pictou	1
Grand Total	21

Table 5. Average plus Standard Deviation for eight microsatellite lengths for three regions of Nova Scotia (Cape Breton, NE and SW Nova Scotia) including p values.

Area		loc_G1A	loc_G1D	loc_G1B	loc_G10C	loc_G10L	loc_G10M	loc_G10P	loc_G10X
Cape Breton	Ave	207.7	199.7	174.5	129.8	158.9	233.7	184.5	162.5
	Stdev	2.8	4.6	1.1	4.5	8.1	2.1	0.1	0.7
NE Nova Scotia	Ave	207.6	198.8	177.2	126.4	164.4	232.7	175.7	164.1
	Stdev	2.9	4.3	3.5	4.6	9.3	4.4	4.9	5.7
SW Nova Scotia	Ave	207.5	197.1	175.6	128.9	161.3	232.0	175.7	167.3
	Stdev	2.1	3.3	3.7	4.6	9.6	4.1	3.9	8.7
		No dif	No dif	p 0.2	p 0.30	No dif	No dif	No dif	No dif