

The Canadian Field-Naturalist

SUPPLEMENTARY MATERIALS:

Barred Owl (*Strix varia*) activity and diet recorded with a camera trap at a natural cavity nest in Manitoba, Canada (2016–2017)

JAMES R. DUNCAN, RIKI KERBRAT, and TODD M. WHIKLO



FIGURE S1. Barred Owl (*Strix varia*) nest cavity with mounted camera trap, southeastern Manitoba, Canada. Photo: James Duncan.

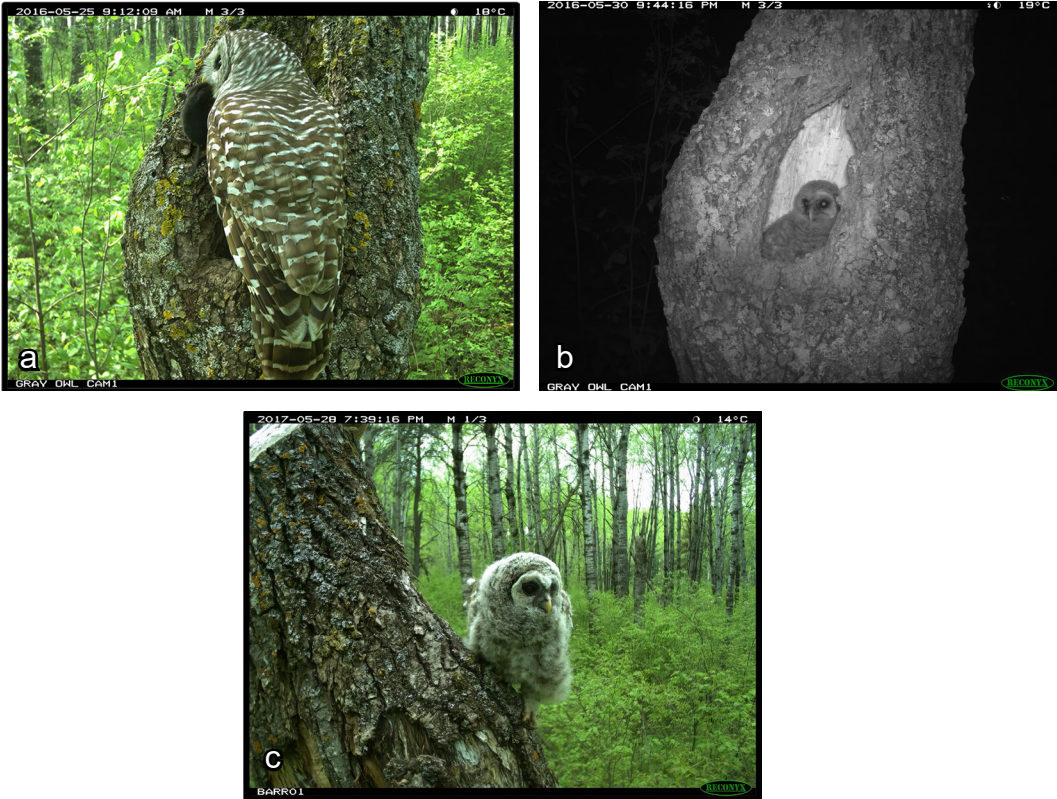


FIGURE S2. Camera trap images of a. adult Barred Owl (*Strix varia*) delivering a Star-nosed Mole (*Condylura cristata*) to its nest cavity, b. nestling peering out of the nest cavity, and c. nestling Barred Owl (*Strix varia*) at the nest cavity entrance before fledging, in southeastern Manitoba, Canada. Photos: James Duncan.

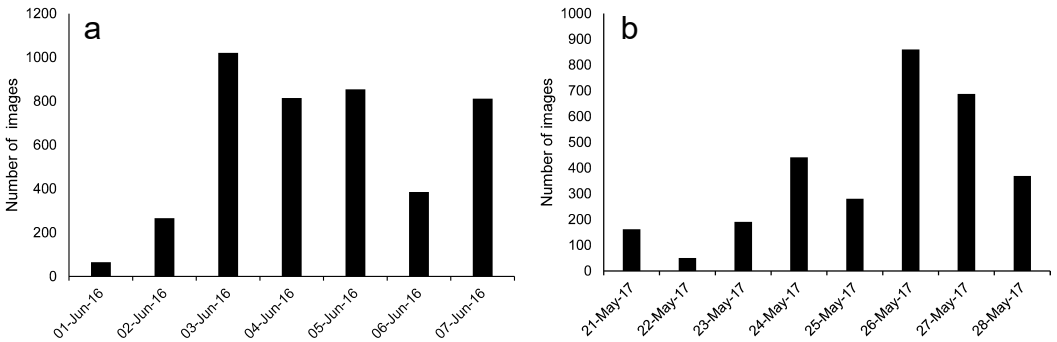


FIGURE S3. Number of nestling Barred Owl (*Strix varia*) images recorded at the nest entrance in a. 2016 with two nestlings present 1–7 June and b. in 2017 with three nestlings present 21–28 May in southeastern Manitoba, Canada.



FIGURE S4. Camera trap images of a. American Black Bear (*Ursus americanus*), b. Red Squirrel (*Sciurus vulgaris*), c. American Marten (*Martes americana*) visiting a Barred Owl (*Strix varia*) nest cavity in southeastern Manitoba, Canada. Photos: James Duncan.

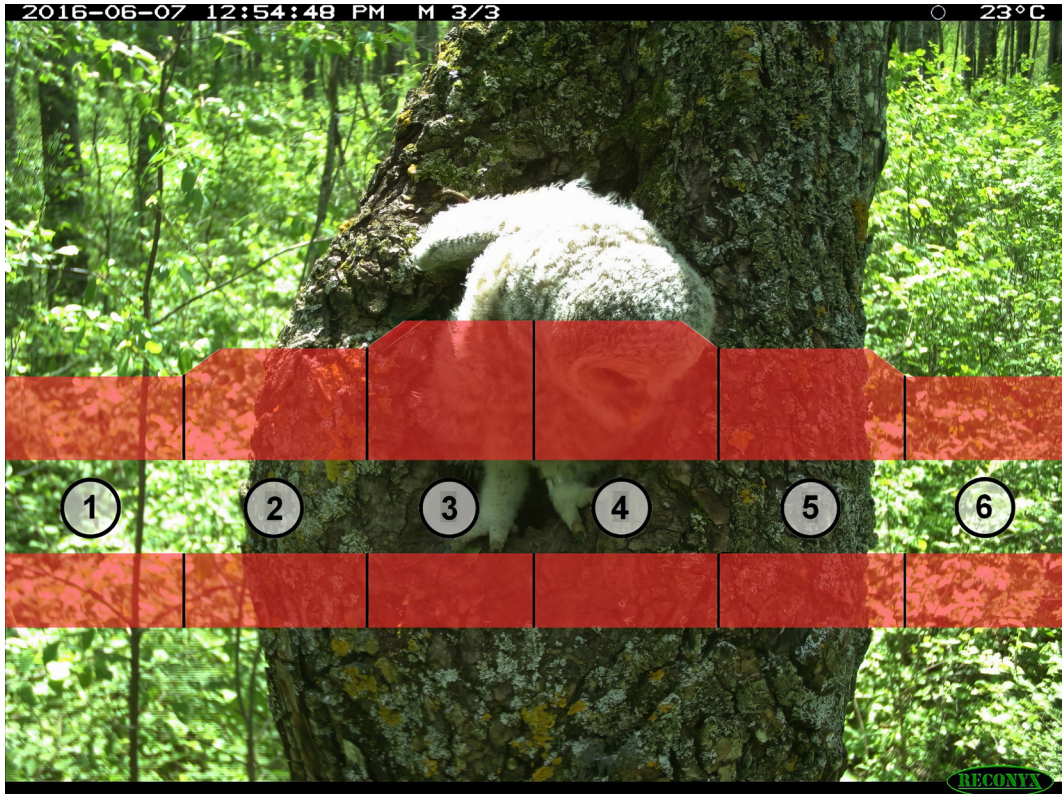


FIGURE S5. Camera trap image of Barred Owl (*Strix varia*) nestling at nest cavity entrance in southern Manitoba superimposed with 12 camera motion and relative temperature detection zones (individual red areas bordered by vertical black lines) arranged in upper and lower bands. Photo: James Duncan.

TABLE S1. Forest resource inventory habitat cutting class areas (ha) associated with estimated Barred Owl (*Strix varia*) breeding home ranges in southeastern Manitoba, Canada.

Cutting class*	Our study area	Southeastern Manitoba† area (mean [95% CI])
0 Grass/forb	57.1	14.1 (6.5)
1 Shrub/seedling (<3 m)	40.6	35.8 (17.6)
2 Pole/sapling (>3 m)	29.5	44.4 (22.6)
3 Intermediate (>10 m)	106.8	170.5 (50.8)
4 Mature	79.9	59.5 (24.9)
5 Overmature	0.2	42.1 (27.4)
Unproductive forest	0.2	115.8 (29.9)

*Gill (1955), Natural Resources Manitoba (1996).

†*n* = 28, Duncan and Kearns (1997).

TABLE S2. Forest resource inventory habitat crown closure areas (ha) associated with estimated Barred Owl (*Strix varia*) breeding home ranges in southeastern Manitoba, Canada.

Crown closure*	Our study area	Southeastern Manitoba [†] area (mean [95% CI])
0–20%	57.1	14.1 (6.5)
21–50%	5.1	40.7 (16.5)
51–70%	44.1	84.4 (30.1)
71–100%	201.4	226.7 (53.9)
Unproductive forest	6.4	115.8 (29.9)

*Gill (1955), Natural Resources Manitoba (1996).

[†]*n* = 28, Duncan and Kearns (1997).

TABLE S3. Forest resource inventory habitat species composition areas (ha) associated with estimated Barred Owl (*Strix varia*) breeding home ranges in southeastern Manitoba, Canada.

Species composition*	Our study area	Southeastern Manitoba [†] area (mean [95% CI])
0% conifer	24.2	80.4 (27.4)
<51% conifer	111.8	172.8 (45.5)
>50% conifer	178.0	35.8 (17.2)
100% conifer	0.0	71.8 (36.4)

*Conifer = all conifer species except Tamarack (*Larix laricina* (Du Roi) K. Koch); Gill (1955), Natural Resources Manitoba (1996).

[†]*n* = 28, Duncan and Kearns (1997).

TABLE S4. Forest cover type associated with a circular 314 ha estimated Barred Owl (*Strix varia*) breeding home range in southeastern Manitoba, Canada.

Cover type*	Area (ha)	% area
Softwood	178.0	57%
Hardwood	111.8	43%

*Softwood species excluding Tamarack (*Larix laricina* (Du Roi) K. Koch) and hardwood species include Tamarack; Gill (1955), Natural Resources Manitoba (1996).

TABLE S5. Summary of camera trap recorded image files at a Barred Owl (*Strix varia*) nest cavity in southeastern Manitoba, Canada, 2016 to 2019*.

Date/time range of recorded images		Number of days	Number of images
Start	End		
14-Mar-2016 13:19	26-Mar-2016 15:38	12.1	675
26-Mar-2016 15:48	24-Apr-2016 17:47	29.1	1421
24-Apr-2016 17:52	29-May-2016 15:11	34.9	3982
29-May-2016 15:19	03-Sep-2016 15:31 [†]	19.4 [†]	9528
22-Mar-2017 16:26	05-Apr-2017 12:22	13.8	705
05-Apr-2017 12:28	26-Apr-2017 15:38	21.1	838
26-Apr-2017 15:39	12-May-2017 16:56	16.1	1298
12-May-2017 17:00	20-May-2017 14:36	7.9	765
20-May-2017 14:39	09-Mar-2018 16:31	293.1	7040
09-Mar-2018 16:43	20-May-2018 12:53	71.8	393
20-May-2018 13:12	20-Jul-2018 12:10	61.0	181
20-Jul-2018 12:14	28-Feb-2019 18:15	223.3	199
28-Feb-2019 17:33	18-May-2019 11:43	78.8	36
18-May-2019 12:51	25-May-2019 18:36	7.2	31
Totals		967.1	27 092

*Nesting occurred in 2016 and 2017.

[†]Gap in coverage due to Forest Tent Caterpillar (*Malacosoma disstria* Hubner) triggering pictures and then obscuring the lens with cocoons for 57.43 days (17-Jun-2016 22:12 to 14-Aug-2016 08:36) until the secure digital card ran out of storage space and parts of the nest tree and mounted camera fell rendering the camera inoperable for 20.29 days (14-Aug-2016 08:36 to 03-Sep-2016 15:31). Nest repaired and camera remounted on 22-Mar-2017.

TABLE S6. Chronology of observed and estimated* breeding and other select events at a Barred Owl (*Strix varia*) nest cavity in southeastern Manitoba, Canada, 2015 to 2021.

Date	Event or observation
13 April 2015	Estimated date egg laid
25 April 2015	Nest cavity located
8 May 2015	Nest contained one egg
14 May 2015	Estimated hatch
25 May 2015	Nest contained one nestling
6 June 2015	Nestling banded at ~1.5 weeks old
14 March 2016	Set up nest camera pointed directly at cavity entrance
7–12 April 2016	Estimated dates eggs laid
7–12 May 2016	Estimated dates eggs hatched
29 May 2016	Two nestlings banded at ~2.5 and 3 weeks old
1 June 2016	First nestling recorded at nest cavity entrance; oldest nestling ~26 d
7 June 2016	Last nestling recorded at nest cavity entrance; youngest nestling ~27 d
17 September 2016	Repair fallen nest cavity and snag slab; remove camera and support arm
22 March 2017	One egg in nest; set up camera facing west at 90° to cavity entrance
24 March 2017	Estimated date second egg laid
27 March 2017	Estimated date last egg laid
5 April 2017	Three eggs in nest
21 April 2017	Estimated date first egg hatched
26 April 2017	Two nestlings and one egg in nest
27 April 2017	Estimated date last egg hatched
12 May 2017	Three nestlings in nest
20 May 2017	Three nestlings banded at ~3.5 to 4.3 weeks old
21 May 2017	First nestling recorded at nest cavity entrance; oldest nestling ~31 d
28 May 2017	Last nestling recorded at nest cavity entrance; youngest nestling ~32 d
9 March 2018	No Barred Owls detected in or near cavity
14 May 2018	Black bear recorded visiting the nest cavity and bends support arm
20 May 2018	No Barred Owls detected in or near cavity
20 July 2018	No Barred Owls detected in or near cavity
18 May 2019	No Barred Owls detected in or near cavity
25 May 2019	No Barred Owls detected in or near cavity; camera and arm removed
12 May 2020	No Barred Owls detected in or near cavity
8 & 12 May 2021	No Barred Owls detected in or near cavity; female on stick nest ~100 m east of the nest cavity
7 June 2021	No owls detected at or near stick nest
17 May 2022	No owls detected at or near nest cavity; Common Ravens in stick nest

*Estimated based on observations and 1–3 d and 2–4 d egg laying intervals between the 1st and 2nd eggs, and 2nd and 3rd eggs, respectively, and a 28–33 d incubation period (Mazur and James 2020).

TABLE S7. Barred Owl (*Strix varia*) prey identified from images taken by a trail camera at a nest cavity in southeastern Manitoba, Canada (2016–2017) in chronological order. Times are Central Daylight Time.

Date	Time	Prey item—common name	Scientific name
26 March 2016	19:34	Meadow Vole	<i>Microtus pennsylvanicus</i>
3 April 2016	05:13	Unidentified vertebrate	Subphylum: Vertebrata
7 April 2016	20:50	Unidentified vole	Subfamily: Arvicolinae
13 April 2016	05:37	Unidentified mammal	Class: Mammalia
14 April 2016	22:36	Unidentified animal	Kingdom: Animalia
24 April 2016	23:52	Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>
25 April 2016	18:57	Meadow Vole	<i>Microtus pennsylvanicus</i>
28 April 2016	07:19	American Robin	<i>Turdus migratorius</i>
9 May 2016	04:11	Unidentified rodent	Order: Rodentia
11 May 2016	21:07	Unidentified bird	Class: Aves
14 May 2016	04:33	Unidentified mammal	Class: Mammalia
15 May 2016	02:42	Unidentified mammal	Class: Mammalia
20 May 2016	02:31	Jumping Mouse	Genus: <i>Zapus</i>
22 May 2016	15:30	Unidentified bird	Class: Aves
24 May 2016	13:40	Snowshoe Hare	<i>Lepus americanus</i>
25 May 2016	09:12	Star-nosed Mole	<i>Condylura cristata</i>
26 May 2016	21:55	Jumping Mouse	Genus: <i>Zapus</i>
27 May 2016	17:54	Star-nosed Mole	<i>Condylura cristata</i>
28 May 2016	21:19	Star-nosed Mole	<i>Condylura cristata</i>
29 May 2016	19:00	Star-nosed Mole	<i>Condylura cristata</i>
3 June 2016	04:20	Unidentified predaceous diving beetle	Genus: <i>Dytiscus</i>
5 June 2016	04:30	Star-nosed Mole	<i>Condylura cristata</i>
5 June 2016	20:59	Star-nosed Mole	<i>Condylura cristata</i>
7 June 2016	02:13	Jumping Mouse	Genus: <i>Zapus</i>
23 March 2017	00:12	Meadow Vole	<i>Microtus pennsylvanicus</i>
29 March 2017	20:42	Unidentified rodent	Family: Cricetidae or Muridae
11 April 2017	04:05	Downy Woodpecker	<i>Picoides pubescens</i>
14 April 2017	21:02	Deer Mouse	<i>Peromyscus maniculatus</i>
19 April 2017	10:37	Star-nosed Mole	<i>Condylura cristata</i>
27 April 2017	04:49	Unidentified mammal	Class: Mammalia
29 April 2017	07:15	Ruffed Grouse	<i>Bonasa umbellus</i>
30 April 2017	21:22	Unidentified vertebrate	Subphylum: Vertebrata (mammal or bird)
5 May 2017	22:47	Common Earthworm	<i>Lumbricus terrestris</i>
7 May 2017	04:24	Unidentified frog (Wood or Leopard Frog)	Genus: <i>Lithobates</i>
7 May 2017	22:19	Wood Frog	<i>Lithobates sylvaticus</i>
10 May 2017	05:56	Northern Flying Squirrel	<i>Glaucomys sabrinus</i>
11 May 2017	01:48	Unidentified squirrel	Family: Sciuridae
11 May 2017	14:34	Snowshoe Hare	<i>Lepus americanus</i>
11 May 2017	20:47	Unidentified garter snake	Genus: <i>Thamnophis</i>
12 May 2017	22:08	Northern Flying Squirrel	<i>Glaucomys sabrinus</i>
13 May 2017	01:58	Star-nosed Mole	<i>Condylura cristata</i>
13 May 2017	04:39	Snowshoe Hare	<i>Lepus americanus</i>
13 May 2017	08:47	Sora	<i>Porzana carolina</i>
13 May 2017	14:17	Unidentified mammal	Class: Mammalia

TABLE S7. *Continued.*

Date	Time	Prey item—common name	Scientific name
14 May 2017	03:25	Unidentified weasel - likely Short-tailed Weasel	Genus: <i>Mustela</i> —likely <i>Mustela erminea</i>
14 May 2017	04:03	Star-nosed Mole	<i>Condylura cristata</i>
16 May 2017	02:45	Unidentified animal	Kingdom: Animalia
17 May 2017	01:29	Unidentified mammal - likely American Marten	Class: Mammalia - likely <i>Martes americana</i>
17 May 2017	17:08	Star-nosed Mole	<i>Condylura cristata</i>
18 May 2017	00:33	Star-nosed Mole	<i>Condylura cristata</i>
19 May 2017	21:26	Unidentified vertebrate	Subphylum: Vertebrata
19 May 2017	22:05	Giant Water Bug	<i>Lethocerus americanus</i>
20 May 2017	01:16	Unidentified vertebrate	Subphylum: Vertebrata
20 May 2017	09:51	Unidentified mammal - likely Snowshoe Hare	Class: Mammalia—likely <i>Lepus americanus</i>
23 May 2017	21:52	Unidentified sphinx moth	Family: Sphingidae
23 May 2017	21:59	Giant Water Bug	<i>Lethocerus americanus</i>
23 May 2017	22:06	Unidentified animal	Kingdom: Animalia
24 May 2017	21:29	Unidentified vole	Subfamily: Arvicolinae
24 May 2017	22:50	Unidentified animal	Kingdom: Animalia
26 May 2017	04:34	Unidentified animal	Kingdom: Animalia
26 May 2017	04:37	Unidentified animal	Kingdom: Animalia
26 May 2017	04:39	Unidentified animal	Kingdom: Animalia
26 May 2017	21:18	Unidentified animal	Kingdom: Animalia
27 May 2017	02:47	Star-nosed Mole	<i>Condylura cristata</i>
27 May 2017	05:03	Star-nosed Mole	<i>Condylura cristata</i>

TABLE S8. Barred Owl (*Strix varia*) non-breeding season* visits to a nest cavity in southeastern Manitoba, Canada (2017–2019). Times are Central Daylight Time.

Date and time at start of visit	Duration (m)	No. of images	Comment
28-Sep-2017 23:28	0.7	12	At nest entrance
29-Sep-2017 01:01	4.1	28	At nest entrance, enters then exits to nest entrance; second owl arrives while first remains
09-Oct-2017 22:45	5.93	63	At nest entrance, enters then exits to nest entrance
13-Oct-2017 22:59	1.08	12	At nest entrance
15-Oct-2017 21:18	2.93	27	At nest entrance
20-Feb-2018 05:59	0.4	9	At nest entrance, enters then exits nest cavity
16-Mar-2018 20:30	2.03	39	At nest entrance, enters then exits to nest entrance
20-Mar-2018 21:57	22.73	89	At nest entrance, enters then exits to nest entrance twice
25-Mar-2018 23:41	0.8	36	At nest entrance
27-Mar-2018 06:48	0.97	10	At nest entrance
03-Apr-2018 22:34	2.6	7	At nest entrance, enters then exits nest cavity
04-Apr-2018 06:33	0.18	9	At nest entrance, enters then exits nest cavity
19-Apr-2018 00:21	4.32	60	At nest entrance
19-Apr-2018 03:26	0.95	21	At nest entrance
14-May-2018 00:19	1.3	6	At nest entrance (black bear visits later this day)
28-Oct-2018 22:48	0.02	3	At nest entrance
10-Apr-2019 20:19	0.03	3	At nest entrance
16-Apr-2019 01:34	0.03	3	At nest entrance
27-Apr-2019 04:45	0.03	3	At nest entrance
01-May-2019 04:07	0.03	3	At nest entrance

* Last young fledged on 28 May 2017, then no owls recorded on camera until 28 Sept 2017; all images recorded in night (black and white) mode

TABLE S9. Birds and mammals visiting a Barred Owl (*Strix varia*) nest cavity in southeastern Manitoba, Canada, 2016 to 2019.

Birds	Mammals
Yellow-bellied Sapsucker (<i>Sphyrapicus varius</i>)	Northern Flying Squirrel (<i>Glaucomys sabrinus</i>)
Northern Flicker (<i>Colaptes auratus</i>)	Eastern Chipmunk (<i>Tamias striatus</i>)
Pileated Woodpecker (<i>Dryocopus pileatus</i>)	American Red Squirrel (<i>Tamiasciurus hudsonicus</i>)
Canada Jay (<i>Perisoreus canadensis</i>)	Deer Mouse (<i>Peromyscus maniculatus</i>)
Blue Jay (<i>Cyanocitta cristata</i>)	American Black Bear (<i>Ursus americanus</i>)
Black-capped Chickadee (<i>Poecile atricapillus</i>)	American Marten (<i>Martes americana</i>)
White-breasted Nuthatch (<i>Sitta carolinensis</i>)	
Brown Creeper (<i>Certhia americana</i>)	

Literature Cited

- Duncan, J.R., and A.E. Kearns.** 1997. Habitat associated with Barred Owl (*Strix varia*) locations in southeastern Manitoba: a review of a habitat model. Pages 138–147 in *Biology and Conservation of Owls of the Northern Hemisphere: 2nd International Symposium*, February 5–9, 1997, Winnipeg, Manitoba, Canada. Edited by J.R. Duncan, D.H. Johnson, and T.H. Nicholls. General Technical Report NC190. U.S. Department of Agriculture, Forest Service, North Central Forest Experiment Station, St. Paul, Minnesota, USA.
- Gill, C.B.** 1955. Forest Inventory of Manitoba. *Forestry Chronicle* 31: 272–273. Accessed 14 April 2023. <https://pubs.cif-ifc.org/doi/pdf/10.5558/tfc31272-3>.
- Hamer, T.E.** 1988. Home range size of the Northern Barred Owl and Northern Spotted Owl in western Washington. M.Sc. thesis, Western Washington University, Seattle, Washington, USA.
- Natural Resources Manitoba.** 1996. Forest Inventory Field Instruction Manual. Winnipeg, Manitoba. Forest Resource Management. Unpublished manuscript. Winnipeg, Manitoba, Canada.