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WCS Canada is a national non-government organization with conservation science programs in the far north in Ontario since 2002. I (Dr. Matthew Scrafford) have led WCS Canada's wolverine research activities in the province since 2017 with the focus of that work including a wolverine collaring and tracking effort in Red lake that started in 2018. Data from this project are often cited in my comments below. Before joining WCS Canada, I assisted on wolverine research projects in Montana and led a project in northwestern Alberta where I studied wolverine response to industrial disturbance.

Red Lake Wolverine study (2018-2022)

The Ontario government listed wolverines as threatened under the Endangered Species Act, 2007. Scientists drafted a Wolverine Recovery Strategy (2013) in response to their listing and the Ministry of Natural Resources and Forestry (MNRF) created a Government Response Statement (2016) that prioritized research and conservation actions for wolverines. We designed our field project in Red Lake to address six action items in the Government Response Statement:

- Produce data that quantifies wolverine abundance in Red Lake and across the Ontario shield (Action #1).
- Determine wolverine habitat use and den-site selection in response to industrial disturbance (Actions #2 and #4).
- Develop best-management practices for human activities in wolverine habitats (Actions #7 and #13).
- Promote public awareness of wolverines through targeted communication products (Action #14).

The focus of our fieldwork in Red Lake has been deploying GPS collars on wolverines and tracking them to document den-site use, habitat use, foraging, and mortality sources. We used a grid of live traps (Fig. 1) and run poles to estimate wolverine abundance. For detail on our methods, please see our 2020-2021 report and the attached 2022 field report. Below we highlight our main accomplishments from five years of fieldwork in Red Lake:

- Deployed 30 live traps and 10 run poles across a 5,470 km^2 study area.
- Live trapped over 9,895 trap nights.
- Responded to over 520 triggered live traps, of which 253 were wolverines.
- Monitored 53 wolverines (18 females and 35 males) with GPS collars and confirmed an additional 14 individuals on camera (so far) that we were not able to live trap, bringing the total to 67 known wolverines in our study area.
- Collected over 65,000 GPS locations from 47 wolverines (16 females and 31 males) between March 2018 and May 2022. The median (minimum, maximum) number of GPS locations collected from males (n = 31) was 1,009 (60, 3,866) and from females (n = 16) was 1,455 (91, 4,860). About 2/3 of our GPS locations have been from the summer relative to the winter.
- Documented 11 wolverine mortalities: 9 human-caused and 2 from predation.
- Documented 7 male and 3 female dispersal or exploratory movements.

- Visited 108 "clusters" of GPS points to investigate wolverine activities. We found prey remains at 63 clusters, with moose and beaver as the primary wolverine food source.
- Located 12 reproductive dens in slash piles ($n = 4$), rocks or boulders ($n = 2$), and down trees or root balls ($n = 6$). The 12 dens were from 5 different females.
- Wrote and published a forestry management guide with recommendations for forestry activities around known wolverine denning sites.
- Collected 392 wolverine biological samples: 197 scat samples, 97 hair samples, 46 blood samples, and 52 tissue samples.
- Provided the Cascades Carnivore Project with 132 wildlife tracks to help understand the accuracy of wolverine track identification by citizen scientists and professionals.
- Deployed motion sensor cameras on all our traps and run poles to identify wolverines in our study area resulting in over 500,000 pictures over 5 years.
- Deployed 167 motion sensor cameras on current and retired forestry roads to determine the use of roads by wildlife, vehicles, and humans.
- Worked with local trappers to monitor live traps and run poles.
- Worked with grade 12 students at Red Lake District High School to develop and write scientific reports using field data we have collected.
- Contributed to a number of interviews and news articles on our research on wolverines in Ontario.
- Participated in the filming of the TVO documentary series *Great Lakes Untamed*, which features our wolverine research in Episode 2 *The Big Freeze*, and Episode 4 *Wolverine Walker of the Great Lakes*, both released September 27th, 2022.

Figure 1. Wolverine at a live trap in Red Lake, Ontario.

COMMENTS ON PROJECT DESCRIPTION

Terrestrial environment (Page 39): There are some limited non-forested upland habitats such as rock barrens, particularly in the northwestern portion of the Property.

Rocky areas are important to wolverines because they provide structure for denning or resting sites and they are relatively rare or unique habitats in the Red Lake area. The wolverine reproductive den (den

site) found in the 2003-2005 telemetry project was in an area in Red Lake with large boulders (Dawson et al. 2010). Wolverine F05 had a den site within a boulder area on a hilltop near Walsh Lake (Fig. 2). Wolverine F07 had a den site in a rocky area about ~4 km from the Dixie property (Fig. 3; Fig. 4).

Figure 2. Wolverine F05's den site in a rocky area near Walsh Lake.
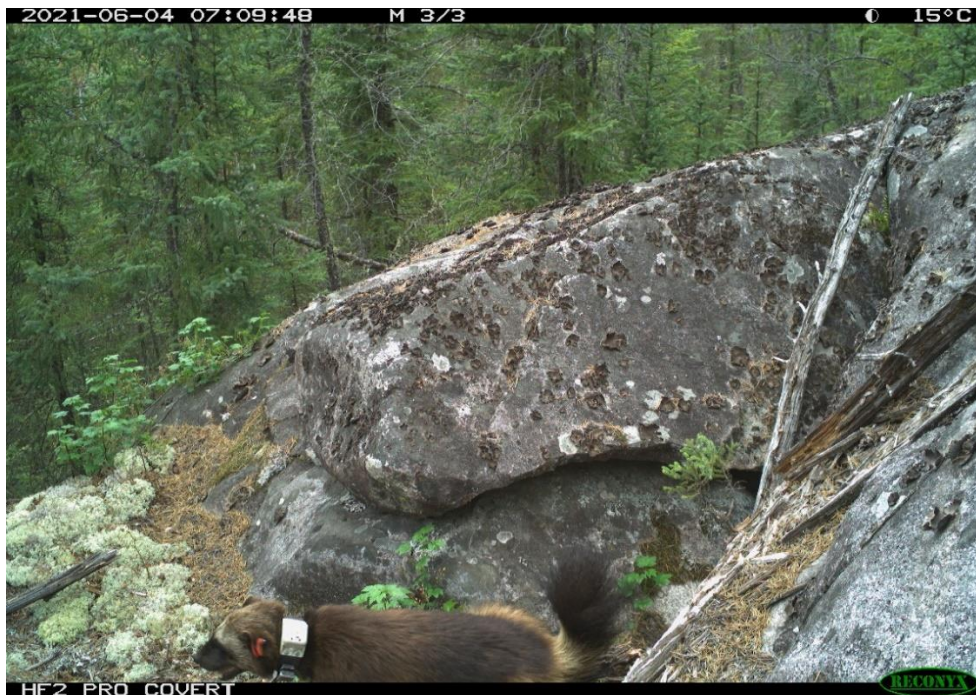

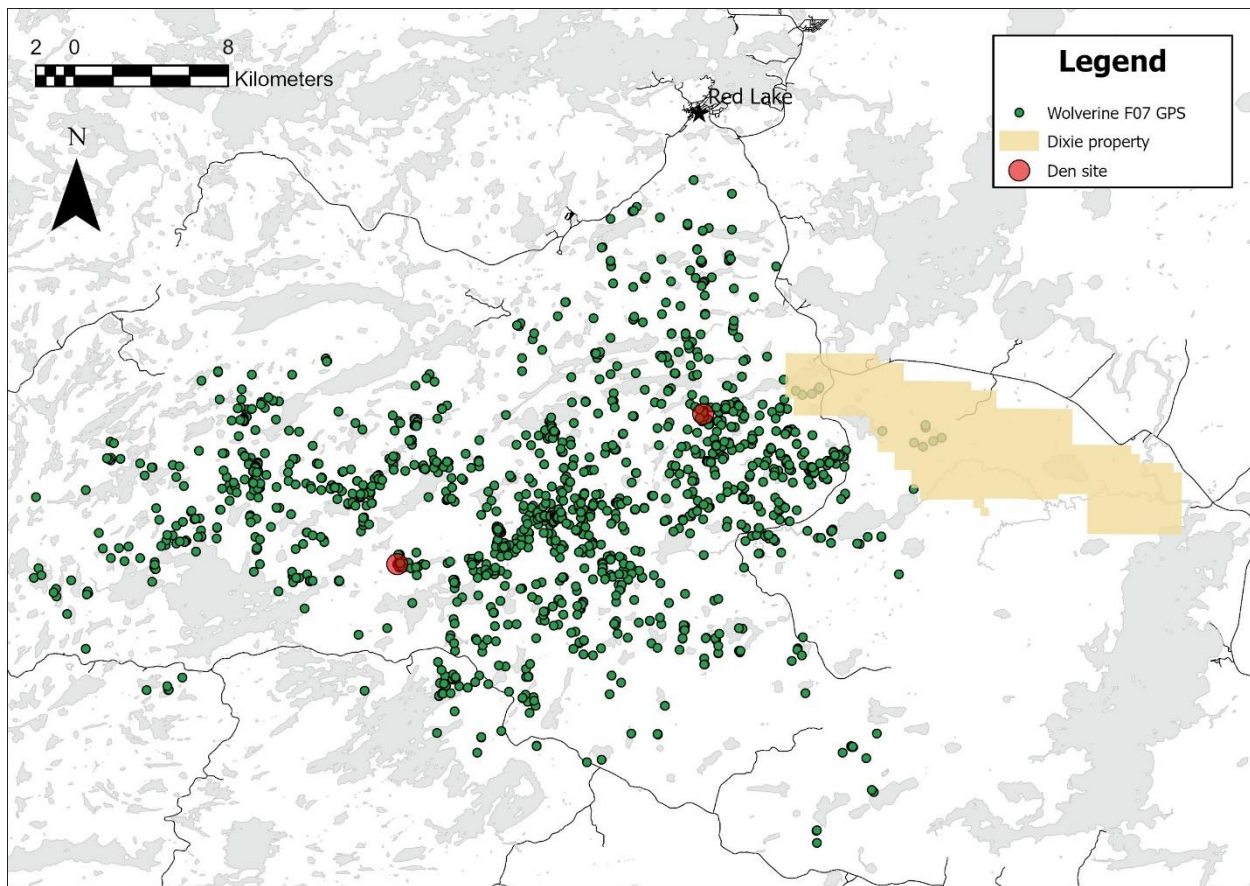Figure 3. Wolverine F07 returning to her den site in June.

Figure 4. Wolverine F07's GPS data from Red Lake.

Terrestrial environment (Page 40): Note that use of the Property by wolverine (a Species at Risk) was confirmed during 2021 to 2022 field investigations.

Eleven wolverines we monitored with GPS collars were within the Dixie property between 2018 and 2022. These included three females (F01, F07, and F13) and eight males (M03, M10, M12, M16, M17, M27, M28, and M28). Wolverines F01 and F07 are reproductive females with confirmed den sites outside of the Dixie property.

Table E.2 Preliminary Summary of Potential Environmental Effects (Page 63): Project development may overprint small creeks and beaver ponds, and have the potential to reduce downstream flow in the immediate vicinity.

Beavers are an important food source for Red Lake wolverines; approximately 18% of their diet is based on beaver (Table 1). Wolverines kill beavers by digging into lodges or ambushing them on land. Dewatering will have negative effects on beaver populations, and thus, wolverines in the area.

Table 1. Percent occurrence of prey items in the diet of Red Lake wolverines. A "cluster" is a foraging site we visited where we either collected scat or identified prey remains. Prey remains and scat were analyzed for species identification in a lab.

Species	77 unique clusters	
	Sum occurrence at clusters	% occurrence at clusters
Moose	47	42.73
Deer	1	0.91
Snowshoe Hare	27	24.55
Beaver	20	18.18
Caribou	2	1.82
Marten	5	4.55
Small rodent	0	0.00
Wolverine	1	0.91
Black bear	2	1.82
Wolf	2	1.82
Lynx	1	0.91
Ermine	1	0.91
Grouse	1	0.91

Table E.2 Preliminary Summary of Potential Environmental Effects (Page 65): (1) Wildlife (and including Moose and other furbearers) may be disturbed by site activities and disturbance, including noise; and (2) Mine site development may displace existing terrestrial habitat for Species at Risk.

The Dixie Road area is already heavily disturbed by exploratory mining and forestry activity. Adding this project to the area only increases cumulative disturbance within habits important to species at risk.

Wolverines avoid areas with human developments (Scrafford et al. 2017), particularly areas that have a greater magnitude of human activity in the form of industrial vehicle traffic (Scrafford et al. 2018) or recreationalist (Barrueto et al. 2022). Increased site activity is going to decrease the suitability of the Dixie property to wolverines and other wildlife species.

F07, a reproductive female, has a home range that includes the Dixie property and adjacent habitats to the west. F07's Area of Concern (AOC), created by the Red Lake MNRF to protect her denning area from forestry, adjoins the Dixie property. This mining project will degrade habitat quality within the AOC for her and her offspring that might use the area in the future (see Aronsson and Persson 2018 for a discussion of offspring fidelity to denning areas).

This project will likely make east to west movement in the Red Lake area difficult for larger wildlife such as wolverines, black bears, or caribou. To the north of the Dixie property is Trout Lake, to the south is Pakwash Lake, and connecting these lakes is Highway 105. The Dixie Property will provide an additional barrier for movement between these lakes. This barrier will likely be less in the winter when wildlife can cross frozen lakes, but it will nonetheless increase fragmentation in the larger area.

Table E.2 Preliminary Summary of Potential Environmental Effects (Page 65): Increase potential for wildlife collision primarily on local roads.

More industrial traffic will increase wolverine mortality risk from vehicle collisions. This risk will increase not only in the Dixie property but north and south on Highway 105, extending the footprint of this project far beyond the Dixie property. We had two wolverines in Red Lake get hit by vehicles, but we know of other non-tagged individuals that have been killed by logging trucks that were not able to maneuver to avoid hitting the wolverines. Increased mortality is particularly detrimental to wolverines because they have naturally low reproductive rates and densities.

RECCOMENDATIONS

- Reduce vehicle traffic to decrease wildlife collisions and keep a database of where collisions are taking place to provide additional future mitigation methods.
- Reduce the speeds that mining vehicles can drive within the project area, particularly in winter and at night, to reduce collisions with wildlife.
- Cease project activities in the northwest corner of the Dixie property during the denning period (Feb 15 – May 15).
- Reduce human activity in the northwest corner of the property during all times of the year.
- Coordinate with the government (MECP, MNRF) on habitat management within F07's AOC. AOCs should apply to all industrial activity rather than just forestry.

LITERATURE CITED

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