Current and Future Management of Burned Forests to Protect Cavity-Using Birds and Other Boreal Wildlife

Report to Yukon Fish And Wildlife Enhancement Trust

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Dr. Hilary A. Cooke, Wildlife Conservation Society Canada

PROJECT ACTIVITIES

What activities did you complete during your project?

Our 'birds & burns' research continued for a second year in 2022, with field work at 2 new sites burned in 2021 (Wildland Fire numbers 2021MA003 - Clear Creek; 2021WL007 - Tuchitua) and 1 existing study site (2018WL005 - Poison Lake) first studied in 2021 (Figure 1). We were unable to visit 1 existing study site (2019DA010 - Pigue Creek) due to high river levels.

We conducted standardized searches for new active nest cavities and checked the 2021 nest cavities for reuse. This year we found 50 new active nest cavities of American Three-Toed Woodpecker and Black-backed Woodpecker (Figure 2). Five of 11 nest cavities active in Poison Lake fire in 2021 were reused in 2022: 4 by the same species as in 2021 (3 Three-toed Woodpecker and 1 Black-backed Woodpecker cavity), and 1 by a different species (Black-backed using a 2021 Three-toed cavity). As well, an older nest cavity used by Mountain Bluebirds in 2021 was reused by Tree Swallows in 2022. During field activities we also found active nests of Dark-eyed Junco, American Robin, Northern Hawk Owl, and Common Nighthawk.

In addition to searching for new active nest cavities and tracking reuse in old cavities, we deployed 22 Automated Recording Units (ARUs) and recorded 3,979 hours of audio recordings of bird communities in the 3 burns. Also, each day in 2021 and 2022, we completed a presence/not detected checklist at the end of the field day. We have recorded 88 avian species over 42 field days in 6 burns across the 2 years (Table 1).

In 2021 and 2022 we collected data on each new cavity tree, including species, diameter, and decay condition. We also collected information on burn severity using field plots and tested 2 new methods in 2022: using a drone to detect foraging activity (Figure 3) and using trail cameras to monitor activity at 4 nest cavities (Figure 4).

Finally, in 2022 our field team was joined for 3 days by Kaska Land Guardians from Dena Kayeh Institute, who contributed to data collection on cavity nests, cavity trees, and burn severity at the Poison Lake site.

How did your activities contribute to you goals and objectives?

The goals of this project are to: 1) Develop guidelines for what, where, and how much of standing

deadwood needs to be retained within harvest blocks to avoid impacts of salvage harvesting on cavity-nesters; and 2) Model and map areas with disturbance refugia potential as part of a broader effort to model all types of climate-change refugia and map networks of sites and linkages with high climate-change resilience across Yukon's boreal landscapes.

The objectives of this project support achieving the goals of this project:

1. Describe the structure and composition of the cavity-nesting community in recently burned forests, including identifying keystone excavators, and changes in community composition over time.
2. Describe nest and foraging tree selection and determine the influence of pre-fire forest condition and patterns of fire severity on the cavity-nesting community.
3. Determine the environmental drivers of fire severity, including unburned patches of forest (i.e. disturbance refugia).

In 2022, our cavity nest searching and cavity reuse field activities approximately doubled our existing database for burned forests to 98 active cavity nests for 8 species, which will be used to develop a cavity nest web (Objective 1). A cavity nest web outlines the structure and composition of the cavity-nesting community and allows us to identify keystone excavators. Keystone excavators are those woodpeckers whose cavities are disproportionately important to other cavity-nesting species, particularly species that are unable to excavate their own cavity.

With our combined 2021 and 2022 dataset, we are beginning to see patterns in the characteristics of trees used for nesting, which will support achieving Objective 2 and ultimately development of guidelines to protect important cavity trees in recent burns (Goal 1). For example, 89% of nest cavity trees (n=76) were in dead white or black spruce, with a medium diameter at breast height of 23 cm, and most (70 of 76) were in areas of high burn severity.

Our combined 2021 and 2022 dataset includes 518 burn severity plots in 6 burns. This data is being collected to field-validate a remotely-sensed index of burn severity and subsequently produce high-resolution maps of patches of unburned forest (Objective 3) that may function as climate-change refugia for spruce forest species (Goal 2). Preliminary analysis of the burn severity data suggests we need to: 1) increase sampling within each burned site; 2) add sampling in new burns; and 3) examine regional differences in burn severity mapping due to differences in forest structure and site conditions, e.g. between the central Yukon and southeast Yukon burns.

Note any variances to your goals, objectives or work plan and explain why they occurred.

There were no significant variances to our goals and objectives in 2022. As noted previously, we tested new field methods for documenting foraging activity and nesting activity, and also deployed ARUs to collect vocalization data. We were unable to visit one of our 2021 sites (Pigue Creek) due to high water levels on the Stewart River.

Explain how the results of your work contributed to the protection, enhancement or restoration of fish,

wildlife or their habitat.

As noted previously, this project will aid in developing guidelines for forest management – what, where, and how much deadwood to harvest in recent burns – to avoid impacts to potential nest sites for post-fire specialists, keystone cavity excavators, and the entire cavity-using community.

Our fire severity mapping and modelling of unburned forest patches will inform mapping, monitoring, and stewardship of potential climate-change refugia for species that depend on spruce forest, which is critical to support adaptation of Yukon's wildlife to changing conditions and associated loss of suitable habitat.

If you were to do the project again what would you do differently?

Generally our field activities have proceeded as planned and the project is on track to meet the goals and objectives. In 2022 we incorporated ARUs into our sampling design and will use the vocalization data to develop standardized indices of woodpecker activity (as a proxy for woodpecker abundance or density). We can then compare woodpecker activity indices between sites and over time at a given site. Ideally, ARUs would have been deployed in 2021, the first year of the study, particularly at the Poison Lake site where we now have 2 years of cavity nest data.

The field team appreciated the opportunity to share time in the field with the Kaska Land Guardians from Dena Kayeh Institute. While we explored similar opportunities for staff, citizens, or Land Guardians of the First Nation of Na-cho Nyak Dun, we were unable to make it work due to conflict between their and our field schedules, and also because the Clear Creek site is relatively remote with rough road access, so not conducive to day visits, which we did not realize until our crew visited it in early June. With a better understanding of field conditions and access, we will again try to identify opportunities for shared time in the field.

COMMUNICATIONS

What did you do to ensure your results were shared with the appropriate groups, people or governments?

We have just completed a report of 2021 and 2022 field activities that will be distributed to the relevant First Nations and other partners in the coming month.

Describe how you recognized the Enhancement Trust and/or its mandate.

All funders and partners are acknowledged in the field report that will be distributed. In addition, the YFWET is recognized in reports to other funders.

Identify any communication materials, strategies or techniques that you used to promote your project and its objectives.

Notes and pictures from the 2023 field season were shared on WCS Canada social media and in internal and external WCS Canada newsletter. In 2021 I did a CBC radio interview on a weekly summer spot on birds during the Yukon morning show. This is a multi-year project and we plan to increase communications and outreach activities as the project progresses, e.g. with presentation at the Yukon Biodiversity Forum, blog or story map, etc.

Include photos of the project in action or the finished product.

See Photos at end of report.

Figure 1. WCS Canada Birds & Burns Study Sites, 2022.

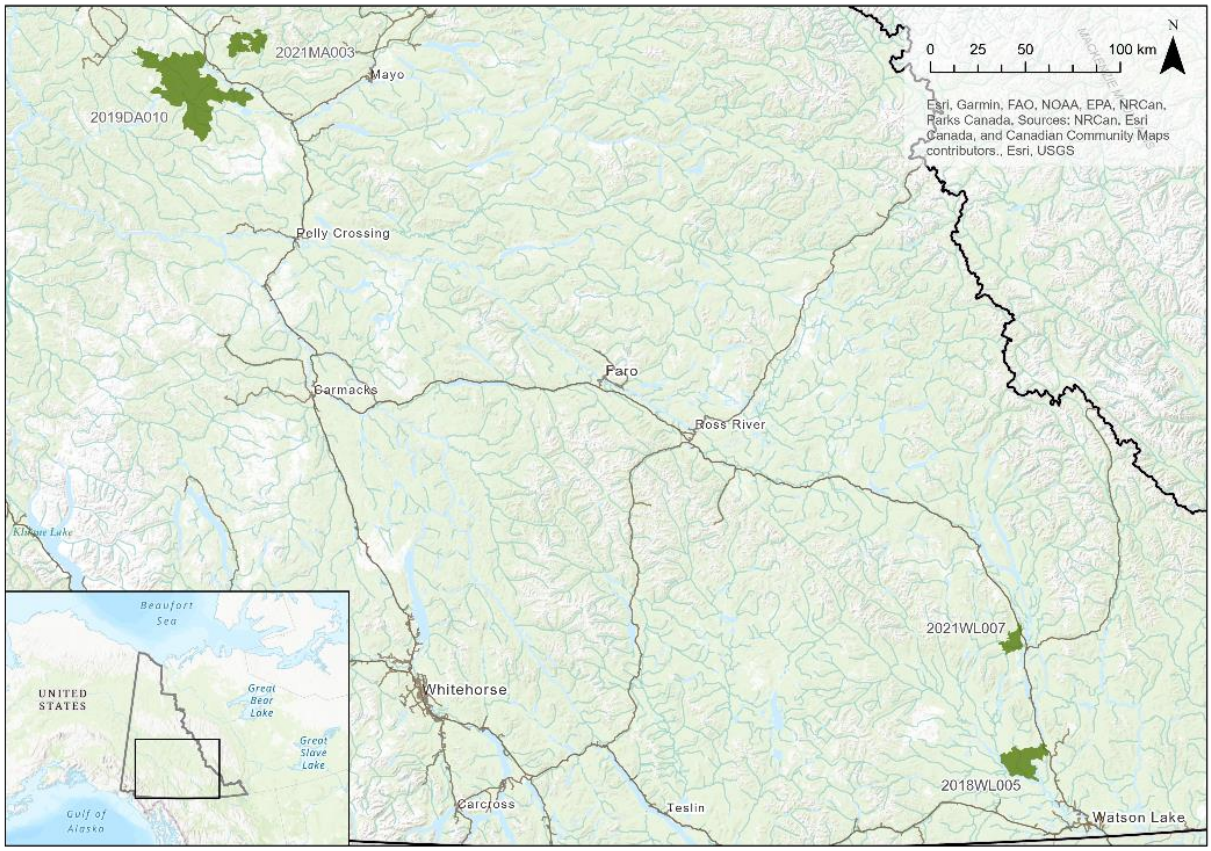

Figure 2: A Black-backed Woodpecker nest cavity in a dead standing spruce tree in the 2021 Clear Creek burn (Yukon Wildland Fire number 2021MA003). Credit: Patrice Mathieu, Wildlife Conservation Society Canada, 2022.

Figure 3. Aerial photo of the 2021 Tuchitua burn (Yukon Wildland Fire number 2021WL007) near the Robert Campbell Highway

Figure 4. Male Black-backed Woodpecker (right) and nestling in cavity (left) in the Tuchitua burn.

Table 1. A presence/not detected checklist was completed at the end of each field day in 2021 and 2022. Frequency recorded is the percentage of daily checklists (n=42) when a species was recorded as present.

Species	Frequency recorded (%)
Canada Goose	14
Trumpeter Swan	7
Tundra Swan	2
Blue-winged Teal	2
Mallard	5
Green-winged Teal	5
Canvasback	2
Lesser Scaup	2
Bufflehead	5
Common Goldeneye	2
Barrow's Goldeneye*	5
Red-breasted Merganser	5
Common Loon	5
Horned Grebe*	5
Mew Gull	5
Herring Gull	12
Wilson's Snipe	43
Spotted Sandpiper	55
Solitary Sandpiper	7
Lesser Yellowlegs	79
Ruffed Grouse	5
Spruce Grouse	26
Turkey Vulture	2
Osprey	2
Northern Harrier	21
Bald Eagle	10
Red-tailed Hawk	10
American Kestral	2
Merlin	5
Great Horned Owl	2
Northern Hawk Owl	17
Common Nighthawk*	29
Tree Swallow	55
Violet-green Swallow	5
Cliff Swallow	2
Belted Kingfisher	2
Yellow-bellied Sapsucker	14
American Three-toed Woodpecker	76
Black-backed Woodpecker	79
Downy Woodpecker	2
Hairy Woodpecker	14
Northern Flicker	69
Gray Jay	81
Common Raven	81

Olive-sided Flycatcher*	40
Western Wood Pewee	62
Alder Flycatcher	52
Least Flycatcher*	10
Hammond's Flycatcher	5
Say's Phoebe	21
Northern Shrike	5
Mountain Bluebird	26
Townsend's Solitaire	29
Varied Thrush	31
Gray-cheeked Thrush	17
Swainson's Thrush	74
Hermit Thrush	12
American Robin	100
Black-capped Chickadee	7
Boreal Chickadee	38
Red-breasted Nuthatch	14
Ruby-crowned Kinglet	76
Warbling Vireo	10
Northern Waterthrush	71
Black-and-white Warbler	2
Orange-crowned Warbler	5
Common Yellowthroat	21
Yellow Warbler	7
Blackpoll Warbler	10
Yellow-rumped Warbler	60
Townsend's Warbler	2
Wilson's Warbler	5
American Pipet	5
Chipping Sparrow	55
American Tree Sparrow*	10
Fox Sparrow	40
Dark-eyed Junco	100
White-crowned Sparrow	74
White-throated Sparrow	52
Savannah Sparrow	21
Lincoln's Sparrow	55
Pine Grosbeak	12
Common Redpoll	67
Red Crossbill	2
White-winged Crossbill	2
Pine Siskin*	2
Red-winged Blackbird	2
Rusty Blackbird	17