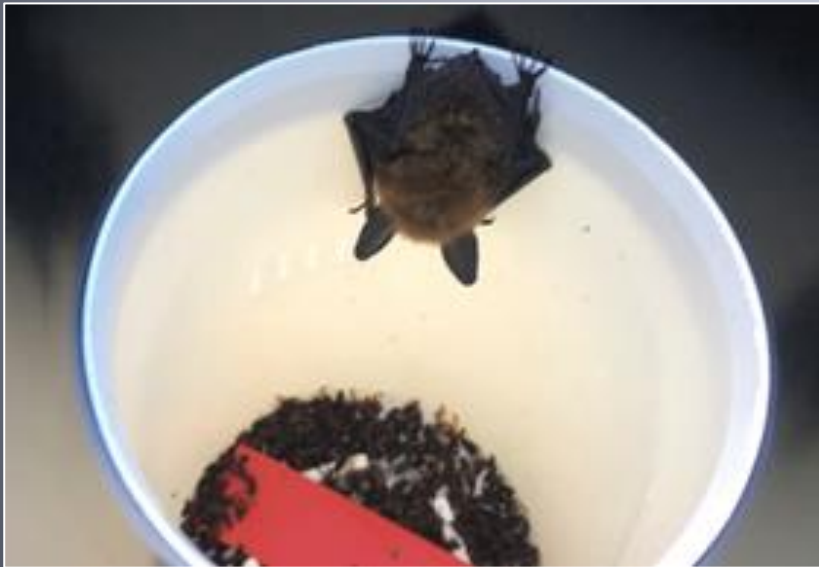


A simple solution to the incidental capture of bats in funnel traps used to monitor Douglas-Fir Beetle



<https://batsc.files.wordpress.com/2011/06/western-long-eared-myotis.jpg>

, Darcie Quamme¹, Erin McLeod^{2,3,4}, Cori Lausen⁵, & Frances Swan^{1,2}

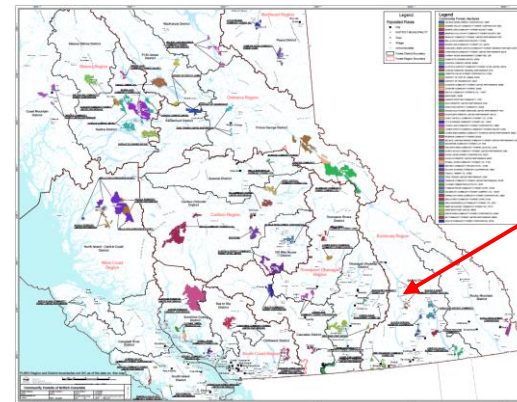
¹Integrated Ecological Research¹, True North Forestry Consulting Ltd., ³Nakusp and Area Community Forest (NACFOR), ⁴Narrows Timber Co. Ltd., ⁵Wildlife Conservation Society

Outline

- Goals
- Results of 2018-19 trapping
- Initial results
- Future work & solutions



Douglas Fir Beetle, *Dendroctonus pseudotsugae*
www.nelsonstar.com/news/douglas-fir-beetle-infestation-is-a-provincial-crisis-expert/

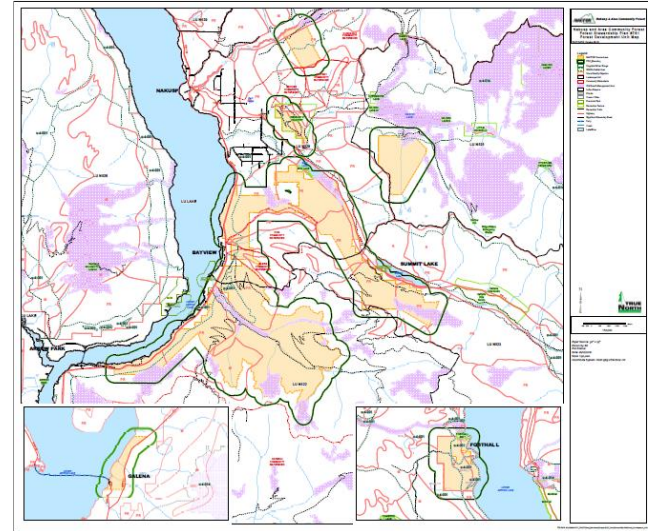


**Nakusp and
Area
Community
Forest**

Community Forests in BC

Project Goals:

- Encourage stewardship and education on the ecological services provided by bats to the forest industry.
- Collect data on incidental bat captures which would provide valuable information on bats and their prey
- Provide solutions to prevent incidental bat captures



https://nakuspcommunityforest.com/wp-content/uploads/2019/06/NACFOR_FSP_FDU_Map.pdf

Nakusp and Area Community Forest in the Selkirk Natural Resource District

Douglas Fir Beetle: BC distribution

Distribution of Douglas-fir beetle in British Columbia



- DFB attacks:
 - Large, old, standing Douglas-fir
 - Freshly downed trees
 - Trees stressed by a variety of factors, including drought and fire

Photos from MacLauchlan and Buxton 2018



DFB: An important local forest pest



An infestation of Douglas-fir bark beetles, like the one seen here, has been stopped near Nelson. But a local forest expert says the provincial infestation is growing out of control. File photo

Douglas-fir beetle infestation is a provincial crisis: Gerald Cordeiro says a local infestation near Nelson is only the start

<https://www.nelsonstar.com/news/douglas-fir-beetle-infestation-is-a-provincial-crisis-expert>

“The southern interior is currently experiencing a significant outbreak of Douglas-fir beetle (DFB)”

“Douglas-fir beetle infestations continued to expand, from 2,825 hectares in 2017, to 3,670 hectares in 2018. The number of small spot infestations also increased, from 351 to 728. Most of the expanded attack was in the Fruitvale, Edgewood, Fauquier, Whatshan Lake, Burton, Slocan Valley, WestArm, Creston, and Greenwood areas.” **MacLauchlan and Buxton 2018**

Funnel traps used to monitor DFB population by NACFOR



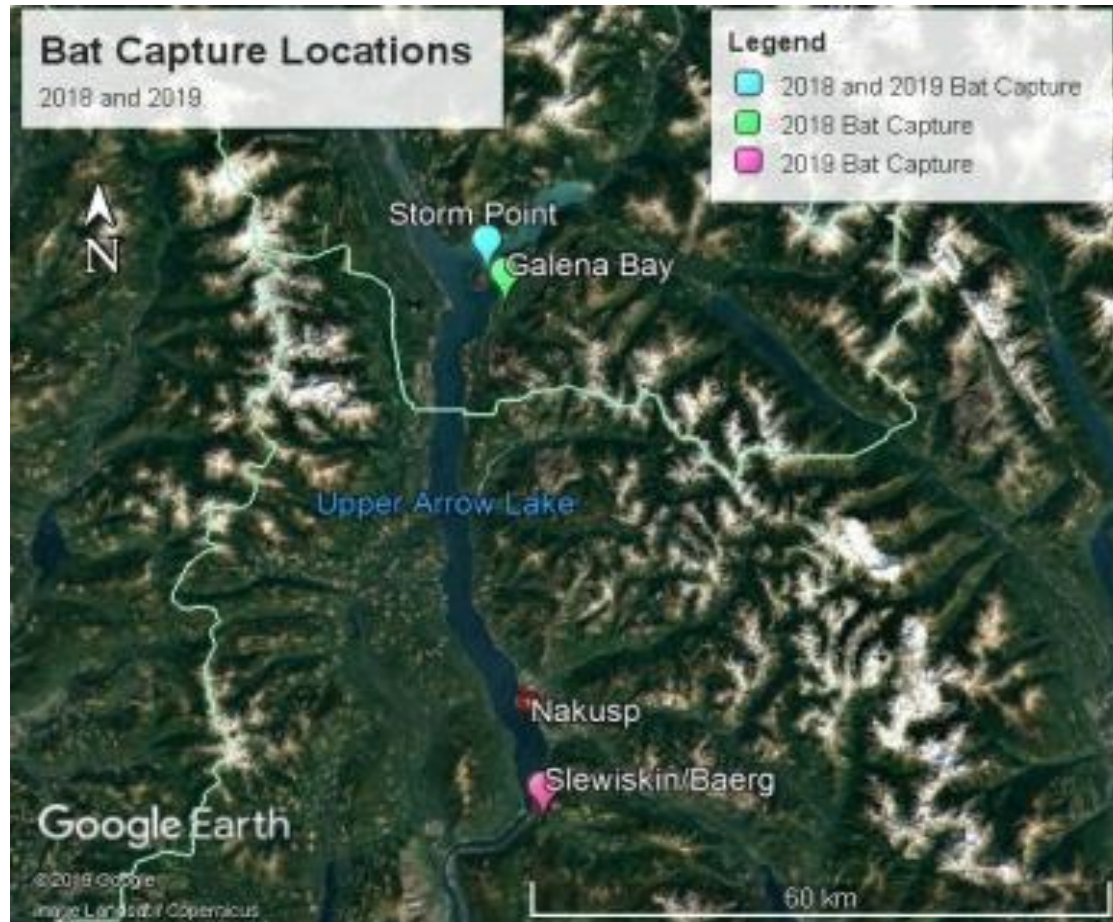
Erin McLeod of True North Consulting observed phenomenon and reported captures in funnel traps in outreach event with D. Quamme and C. Lausen under HCTF seed funding. [See poster on NACFOR website.](#)

- Used to monitor and control DFB populations and epidemics in the Selkirk Resource District.
- Baited with host volatiles and DFB pheromone¹
- Beetles are collected in cup with insecticidal strip weekly from May-Aug.
- Traps are removed at the end of the beetle flight period
- Combined effort by licensees and BC FLNRO

¹Synergy Semiochemicals, Standard lure, enhanced, Douglas Fir Kairomone, Frontalin, Ethanol, Seudenol

NACFOR= Nakusp and area Community Forest

DFB trapping in 2018 & 2019



- Western Long-eared bats (*M. evotis*) were found in beetle traps during monitoring for DFB in 2018 and 2019

Incidental capture of Western long-eared bats in funnel traps



Western Long-eared Myotis, *Myotis evotis*
Photo credit: Brock Fenton
<http://cwf-fcf.org/en/explore/bats/bats-101.html>

- Western long-eared bats (*M. evotis*) were collected from traps in recently harvested cutblocks, 50-100 m from edge from late May to mid August.
- Bats are unable to escape the trap because of the smooth surfaces and shape of the trap.
- Possibly attracted by the sound of live beetles in the trap or swarm of DFB around trap (pers. com. Mandy Kellner)
- *M. evotis* hunt using prey generated sounds (Faure, P.A. and R. Barclay. 1992).

Pest services provided by Western Long-eared bat to forest industry

- Bark beetles (Curculionidae, true weevils) as prey for bats:
 - Recent documentation of Curculionidae as prey for bat, using genomic methods in Ontario¹ and BC².
 - A 2019 study of bats and agricultural pests in BC detected Curculionidae as prey for bats. For example, *Dendroctonus ponderosae* (mountain pine beetle) was detected at all sites ²
 - Beetles are an important prey item for *M. evotis* ³
 - Increasing evidence that bats provide significant ecological services to the forest industry

¹Clare et. al. 2013 & 2014, Morningside, 2017

²Email report from F. Martinez to BC Bat team, March 2020.

³Ober and Hayes 2008

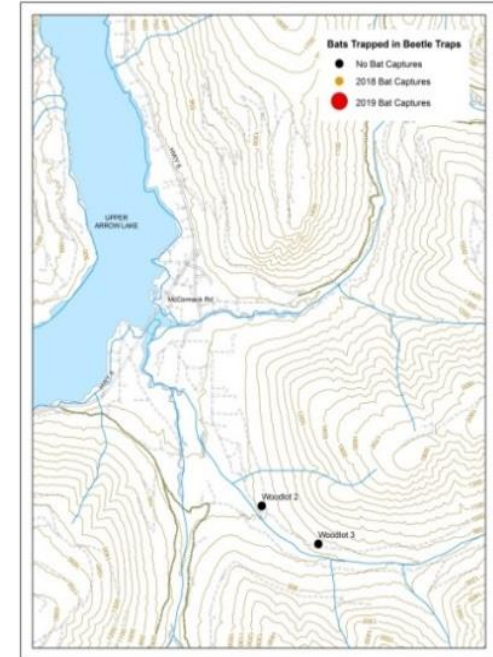
Eight trapping locations over two years



SlewBaerg Area



Galena Area



Woodlot 2-3

- In 2018, 4 bats were trapped from 9 traps in place over 15 weeks
- In 2019, 3 bats were captured over 13 weeks from same locations
- Four out of nine traps captured at least one bat over two years

Proposed solution: exclusion



Plastic, flexible,
easy to cut



Galvanized mesh, stiffer

- 12 mm mesh¹ placed over the bottom funnel of the beetle trap to exclude bats
- The mesh size may prevent other by-catch:
 - Mice, predaceous clerid “checkered” beetles, Cucujidae “flat bark beetles” and Douglas-fir pole beetles²
- Eliminates precautions required to handle bats and other small mammals.
- Current bat research in BC involving direct contact with bats has been temporarily suspended until there is a review of COVID19.

¹Mesh size and photos from Marnie Duthie-Holt, Forest Entomologist, FLNRO, Cranbrook, BC

²Predaceous clerid and flat bark beetles are natural enemies of DFB and also key in on DFB pheromone traps, while Douglas-fir pole beetles, *Pseudohylesinus nebulosus*, can be active under similar environmental conditions. (MacLaughlan and Buxton 2018)

Prevention is key



- *M. Evotis* unlikely to survive a week in trap due to exposure
- DFB killing agent may be detrimental over the short term



- Testing of exclusion methods will occur in 2020¹

¹Also see Martin et al (2012) for best modified pheromone trap designs to exclude natural enemies of bark beetles in Spain

Reporting: Species Inventory Database

- Reporting of live or dead bats in pheromone traps from past or present work is valuable information for bats even if proposed solutions are not yet implemented.¹
 - Provides:
 - Locational and species information
 - Capture timing and insect abundance
 - New records of DFB as possible prey for *M. evotis*.
 - Corroborates findings
 - Demonstrates willingness to implement solutions
 - Testing of solutions is encouraged

¹For example, in 2020, Lorraine MacLauchlan, provincial entomologist, is supporting outreach to First Nations and licensees that are trapping forest pests across the province to track and report the extent of incidental bat capture

Please see the BCBat web site for information and research on COVID19 and bats. <https://www.bcbats.ca/index.php/get-involved/community-bat-program-news-updates/91-information-bulletin-on-bats-in-bc-covid-19-and-wns-capture>.

Reporting: Single captures

- Single bat records can be uploaded through the Wildlife Incidental Observations Form (WIOF) at <https://a100.gov.bc.ca/pub/wiof/locationForm.do>

Reporting: Multiple bat captures

- Multiple bat captures within trapping grid collected over time can be uploaded to the BC Species Inventory Database (SPI)
- An Excel template can be obtained from SPI_Mail@gov.bc.ca
- The Conservation Data Center (CDC) mines and uploads the data from the SPI

Additional meta-data

- Additional project fields within the WIOF form should include if possible:
 - Number of pheromone traps
 - Type of trap, pheromone lures and killing agent used
 - Time period monitored
 - Insect trapping data
 - Location of traps with non-captures
- This would allow quantification of capture effort (% capture) and inspection of the timing of bat trapping and insect peaks

Thank you

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