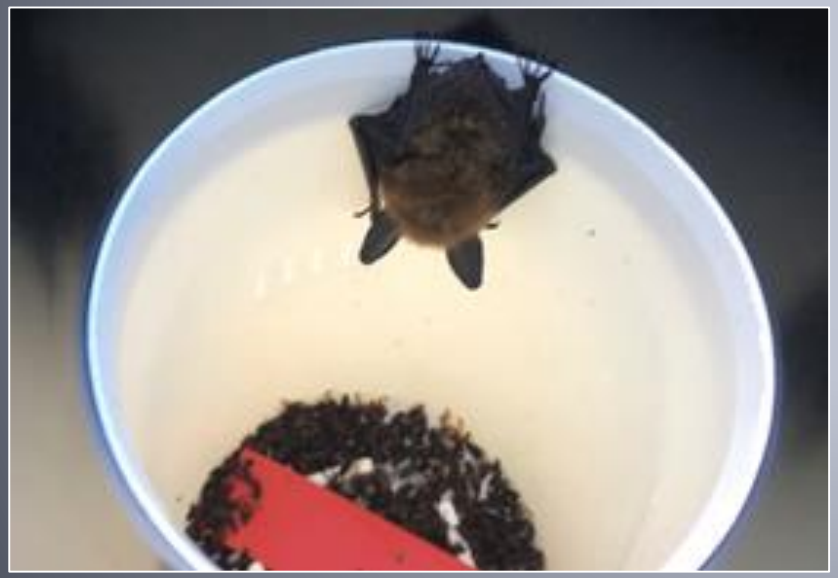
The incidental capture of bats in funnel traps for Douglas-Fir Beetle monitoring

Within the Selkirk Natural Resource District



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

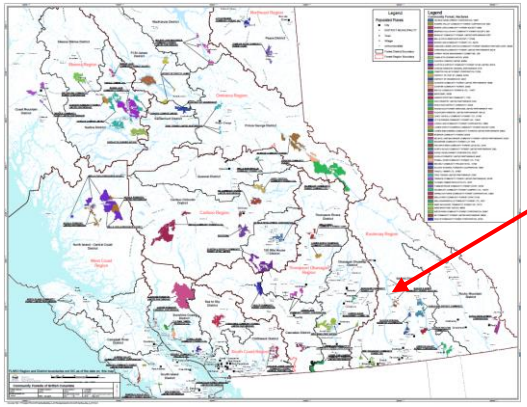
, Darcie Quamme[1], Erin McLeod[2,3,4], Cori Lausen[5], & Frances Swan[1,2]

[1]Integrated Ecological Research[1], True North Forestry Consulting Ltd., [3]Nakusp and Area Community Forest (NACFOR), [4]Narrows Timber Co. Ltd., [5]Wildlife 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/

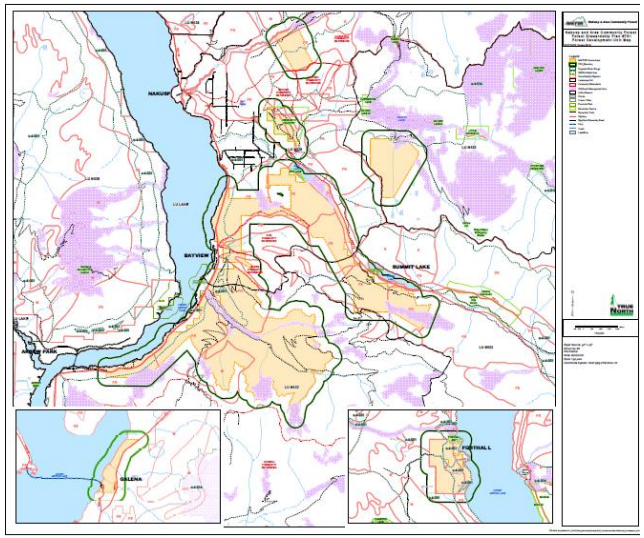


Nakusp and Area Community Forest

Community Forests in BC

Project Goals:

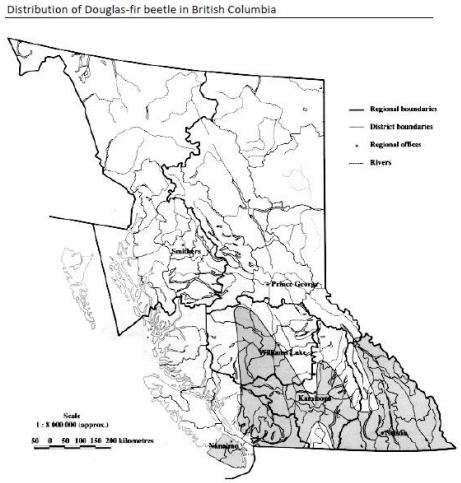
- Encourage stewardship and education on the ecological services provided by bats to the forest industry.
- Collect data on incidental bat captures which would provide valuable information on bats and their prey
- Provide solutions to prevent incidental bat captures



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



- 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

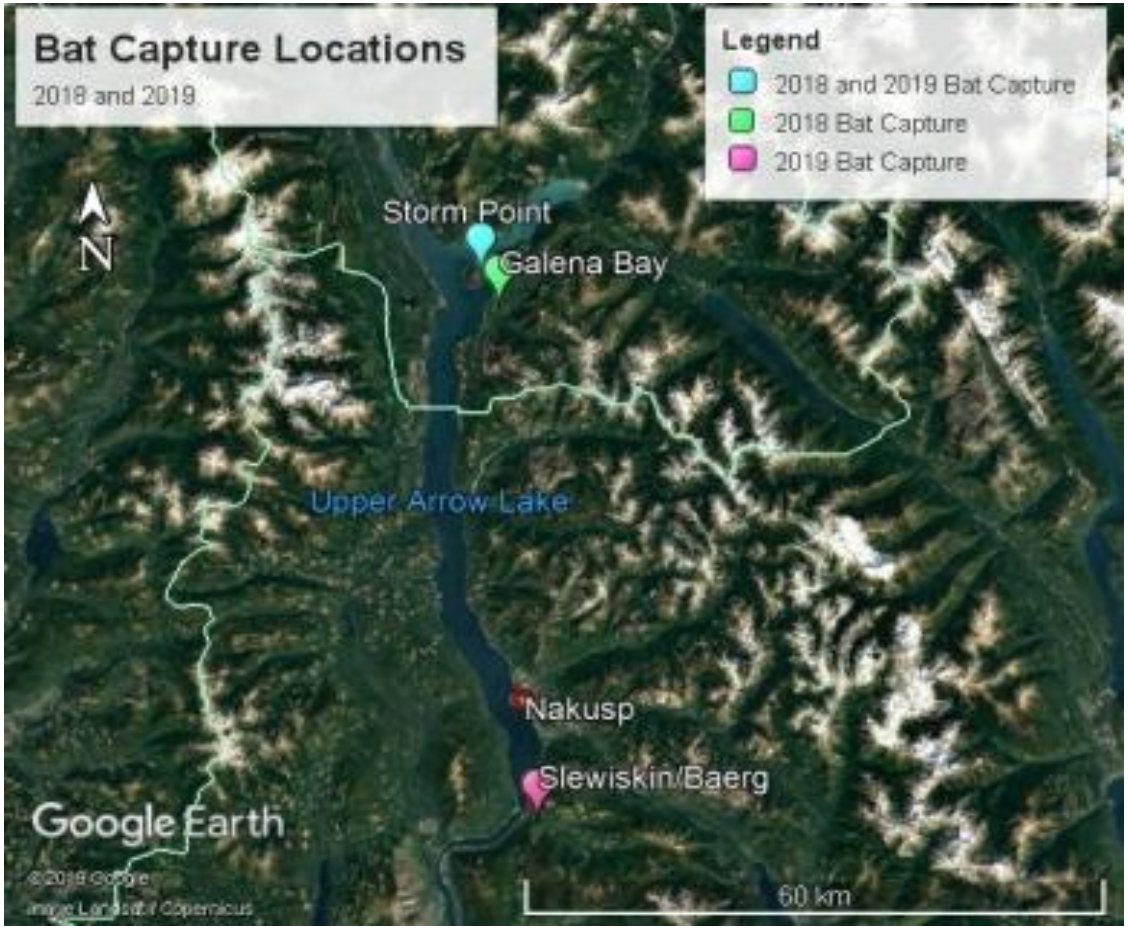
Erin McLeod of True North Consulting observed phenomenon and reported captures in funnel traps in outreach event with D. Quamme and C. Lausen under HCTF seed funding. See poster on NACFOR website.

- Used to monitor and control DFB populations and epidemics in the Selkirk Resource District.
- Baited with host volatiles and DFB pheromone[1]
- 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

[1]Synergy 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

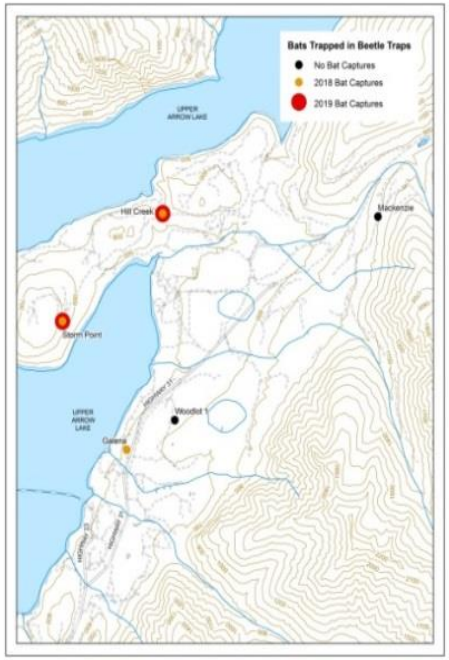
- Western long-eared bats (M. evotis) were collected from traps in recently harvested cutblocks, 50-100 m from edge from late May to mid August.
- Bats are unable to escape the trap because of the smooth surfaces and shape of the trap.
- Possibly attracted by the sound of live beetles in the trap or 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 to forest industry: Western Long-eared bat

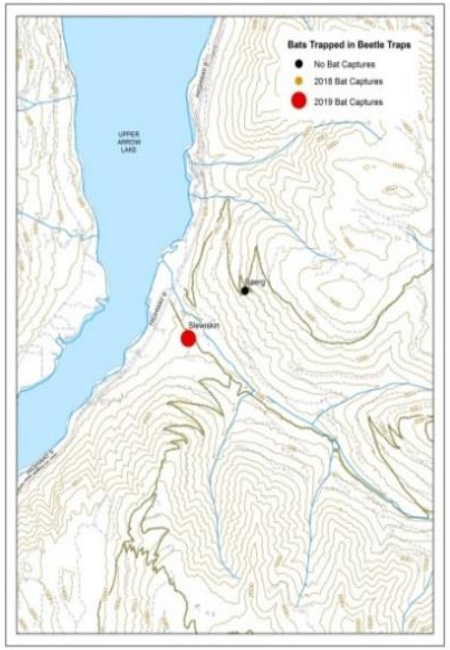
- Bark beetles (Curculionidae, true weevils) as prey:
  - Recent documentation of Curculionidae as prey[1] using genomic methods (Clare et. al. 2013 & 2014, Morningside, 2017,
  - Study of bats and agricultural pests found mountain pine beetle (Curculionidae) in guano using genomic methods, (email report from F. Martinez to BC Bat team, March 2020).
  - Beetles are an important prey item for *M. evotis* –Ober and Hayes 2008
  - Potential to provide ecological services to the forest industry

[1]LBB=Little Brown bat, *Myotis lucifugus* , BBB= Big brown bat, *Eptesicus fuscus*

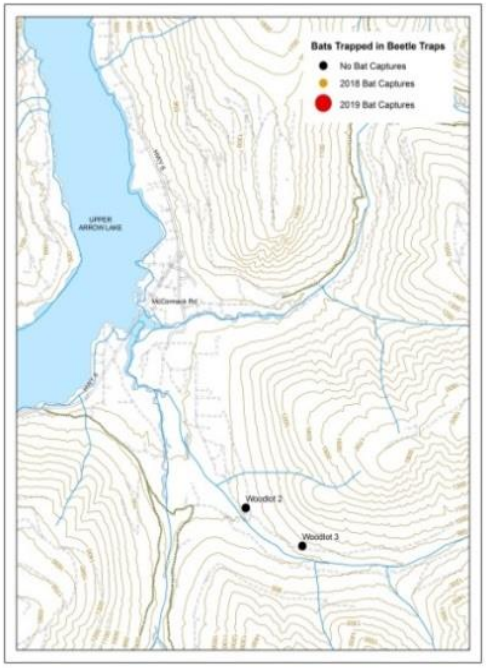
Eight trapping locations over two years



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

- Fine-gauge wire 12 mm mesh[1] placed over the bottom funnel of the beetle trap to exclude bats
- The mesh size may prevent other by-catch such as mice, predaceous clerid "checkered" beetles, Cucujidae "flat bark beetles" and Douglas-fir pole beetles [2]
- Testing of this solution will occur in 2020 by the Nakusp and Area Community Forest

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

[2]Predaceous 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)

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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

- Untested solution [1]

[1]Also 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

[1]For 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.

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

- Thank you to Habitat Conservation Fund, Wildlife Conservation Society, True North Consulting, Nakusp and Area Community Forest, Interfor, Forest, Lands and Natural Resource Operations and Rural Development (FLNRO), BC Bat Action Team, Community Bat Programs of BC, Kootenay Community Bat Project
- Special thank you to Frances Swan (True North Consulting), Orville Dyer (FLNRO), Cori Lausen (Wildlife Conservation Society),Mandy Kellner (Community Bat Programs of BC, Leigh-Anne Isaac (Kootenay Community Bat Project),
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