



Examining the Spatial Ecology of Blanding's Turtles (*Emydoidea blandingii*) to Inform Mitigation for Quarry Development

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+ Why should we care about turtles?



+ How are turtles doing?





Problems turtles are currently facing

■ ROAD MORTALITY





Problems turtles are currently facing

■ HABITAT DESTRUCTION





Problems turtles are currently facing

■ POACHING/ PET TRADE



+ How can we help?



Citizen Science

Citizens helping to increase our collective knowledge of wildlife across the province.

+ How can we help?



**IF YOU FIND AN INJURED TURTLE ON THE
ROAD CALL [\(705\) 741-5000](tel:7057415000)**

+ How can we help?





Blanding's Turtle

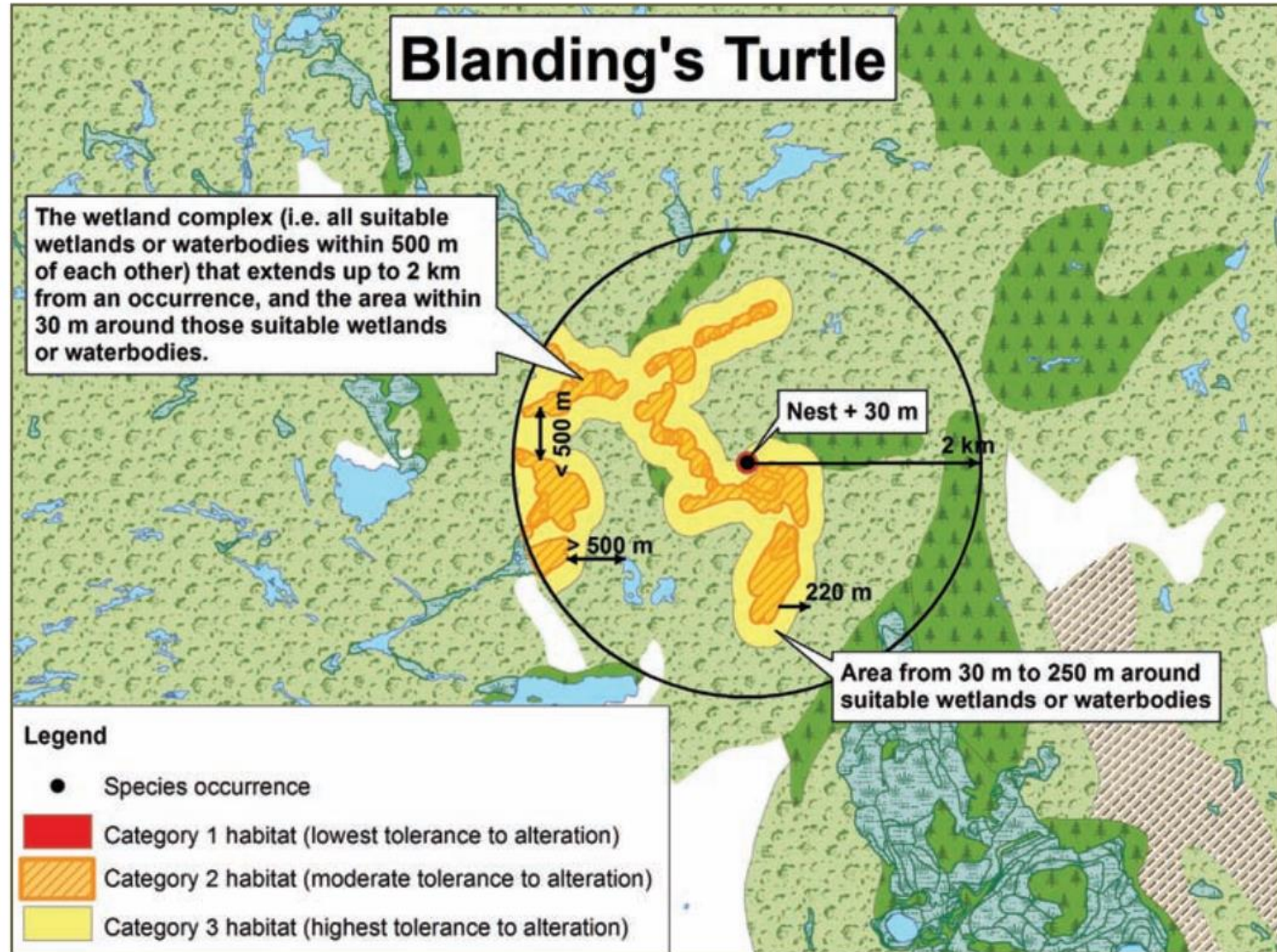
Endangered (IUCN, COSEWIC); Threatened (COSSARO)

- Mining (including quarrying) identified as a threat (COSEWIC 2016)
- **Only turtle species in Ontario with defined habitat protection under Endangered Species Act (MNRF, 2013)**



+ Habitat Protection

Sample application of the general habitat protection for Blanding's Turtle





Context and Objectives



- Trap rock quarry proposed in **Blanding's Turtle habitat**
- Collect spatial ecology data to **identify Category 1, 2 and 3 Blanding's turtle habitat**, to inform quarry footprint and mitigation
- Perform “before” data collection in **Before-After-Control-Impact (BACI) study** (“after” data collected when quarry in operation) to assess mitigation success



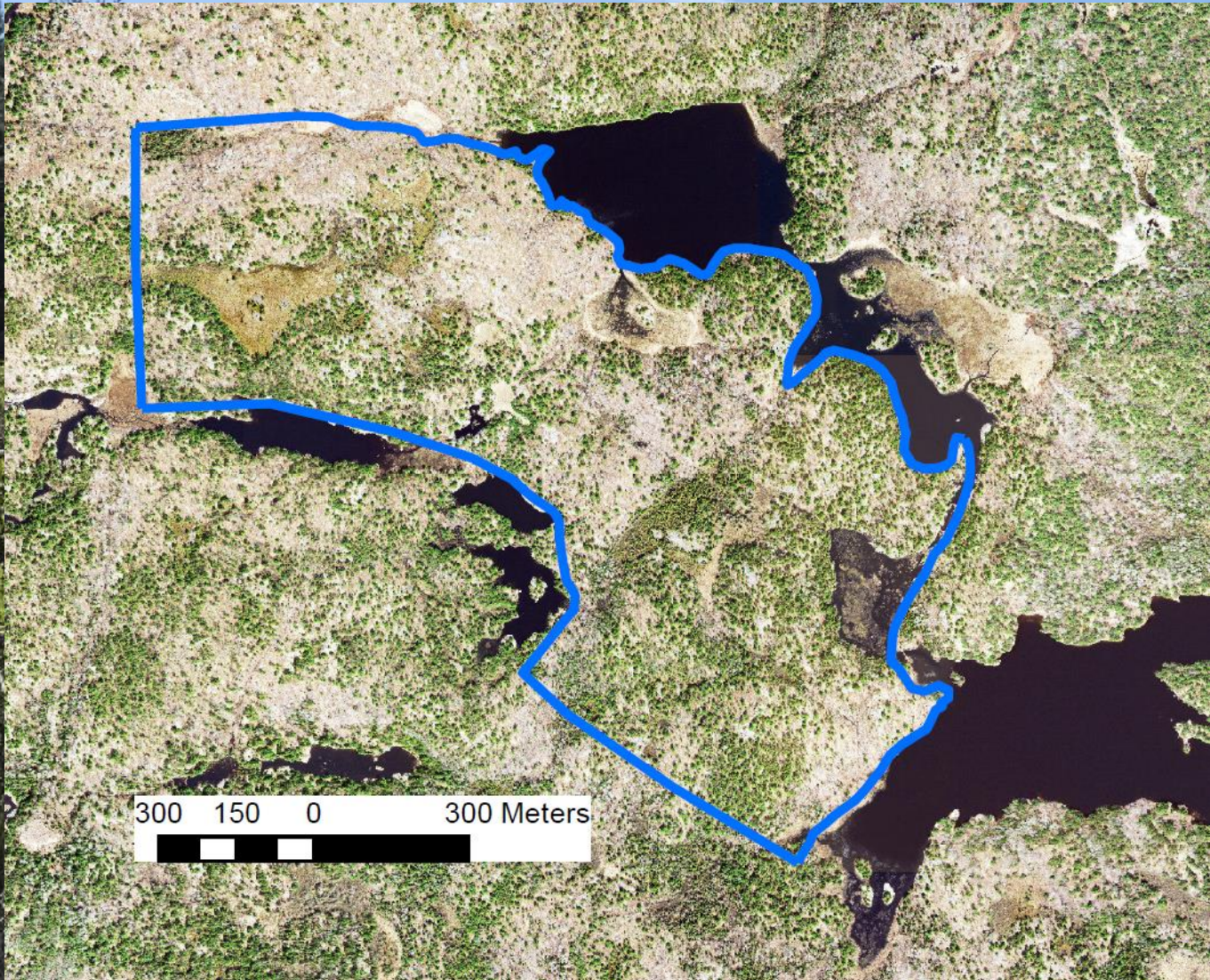
Methods



Impact (Quarry) Site

- **Central Ontario, Canada (46°N, 82°W)**
- **Provincial Crown (public) Land**
- **Licensed area = 115 ha**
- **Extraction area = 68.3 ha**
- **Rocky outcrops, mixed forest and wetlands**
 - **open marshes, wet meadows, vernal pools and treed swamps**

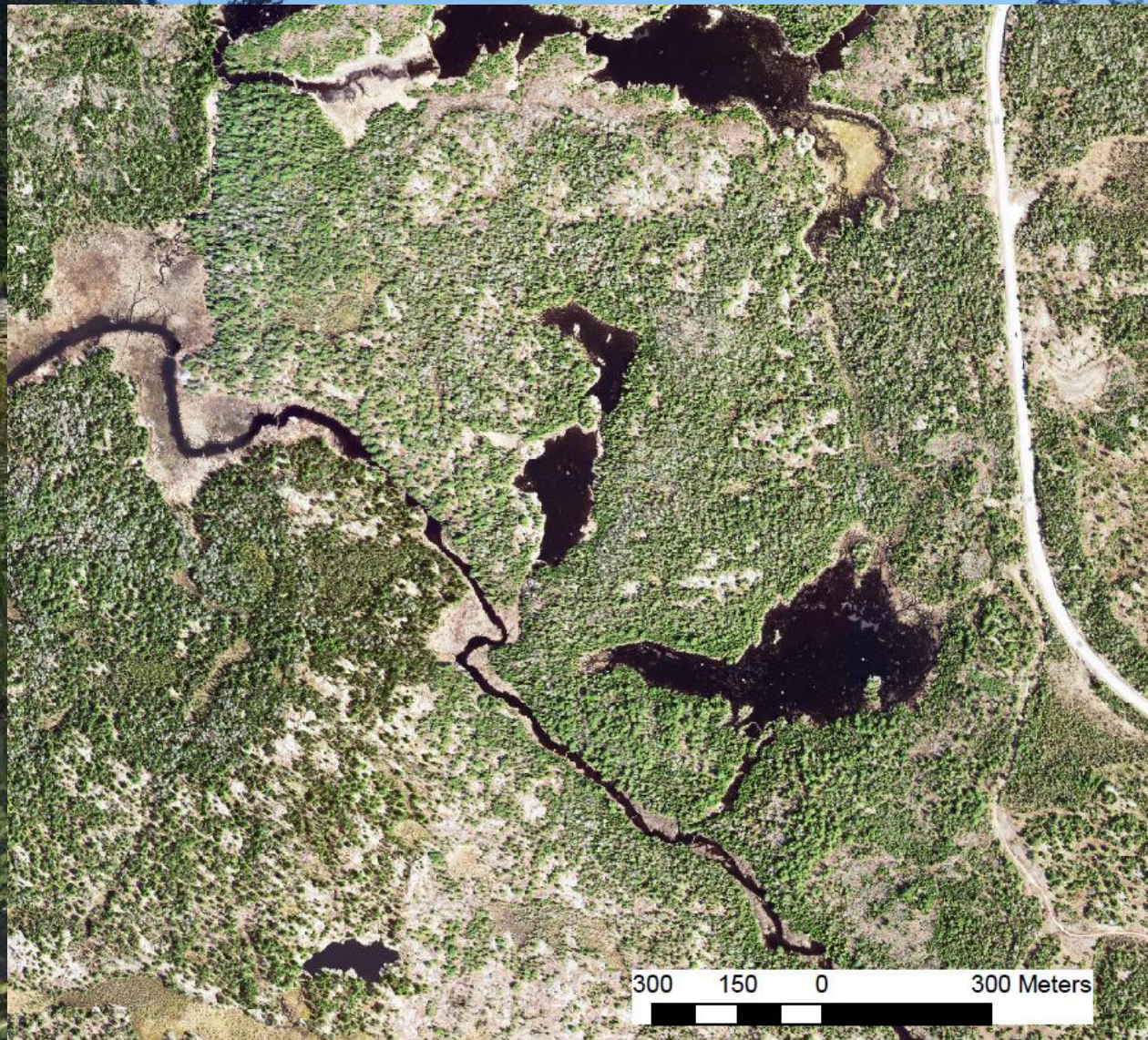
Impact Site



Control Site

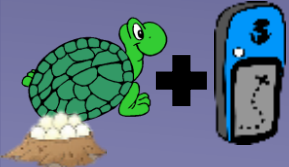
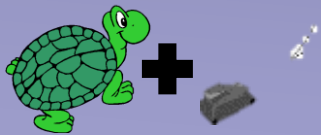
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Control Site



+ Spatial Ecology

- Collected using VHF radio telemetry and GPS data loggers

	Control Site 2017	Impact Site 2017	Control Site 2018	Impact Site 2018
GPS Transmitters 	1 (1F)	1 (1F)	2 (2F)	10 (10 F)
VHF Transmitters 	3 (1F, 2M)	19 (10F, 9M)	6 (3F, 3M)	17 (11F, 6M)

* GPS= Lotek PinPoint
Beacon Tag- 240

* VHF= ATS Model#
R1655 and R1650

+ Preliminary Results



+ Turtle Captures

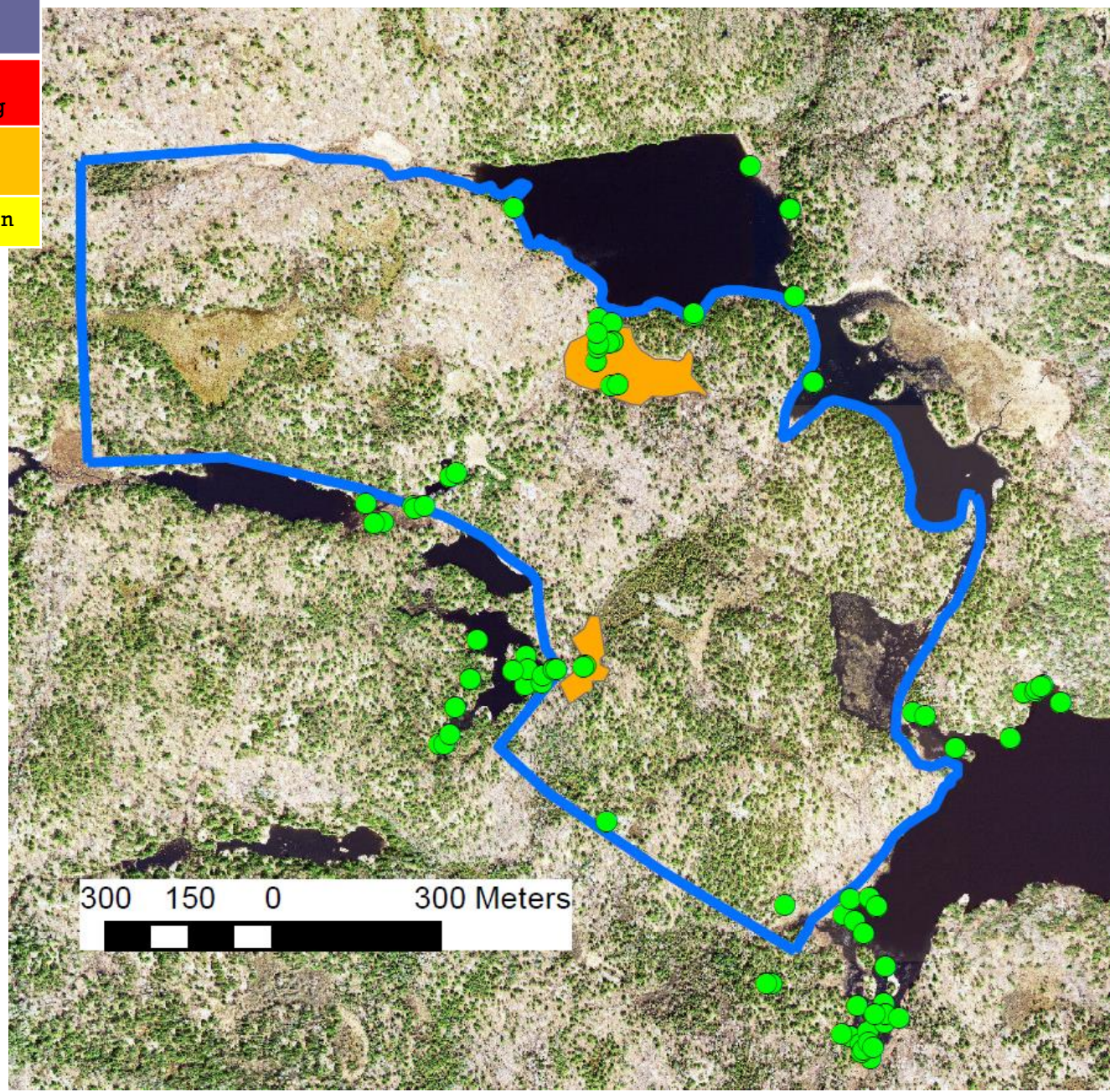
	Control Site	Impact Site
Captures	7	52
Recaptures	3	26

- Mark-Recapture data identified 2 new PSWs
- Allowed for application of VHF transmitters and GPS data loggers



Male BLTU captured during surveys being processed and photographed

Habitat Categorization	
1	Nest & Overwintering
2	Seasonal Habitat
3	Travel Between



Mark-recapture data identified 2 new PSW's at the impact (quarry) site

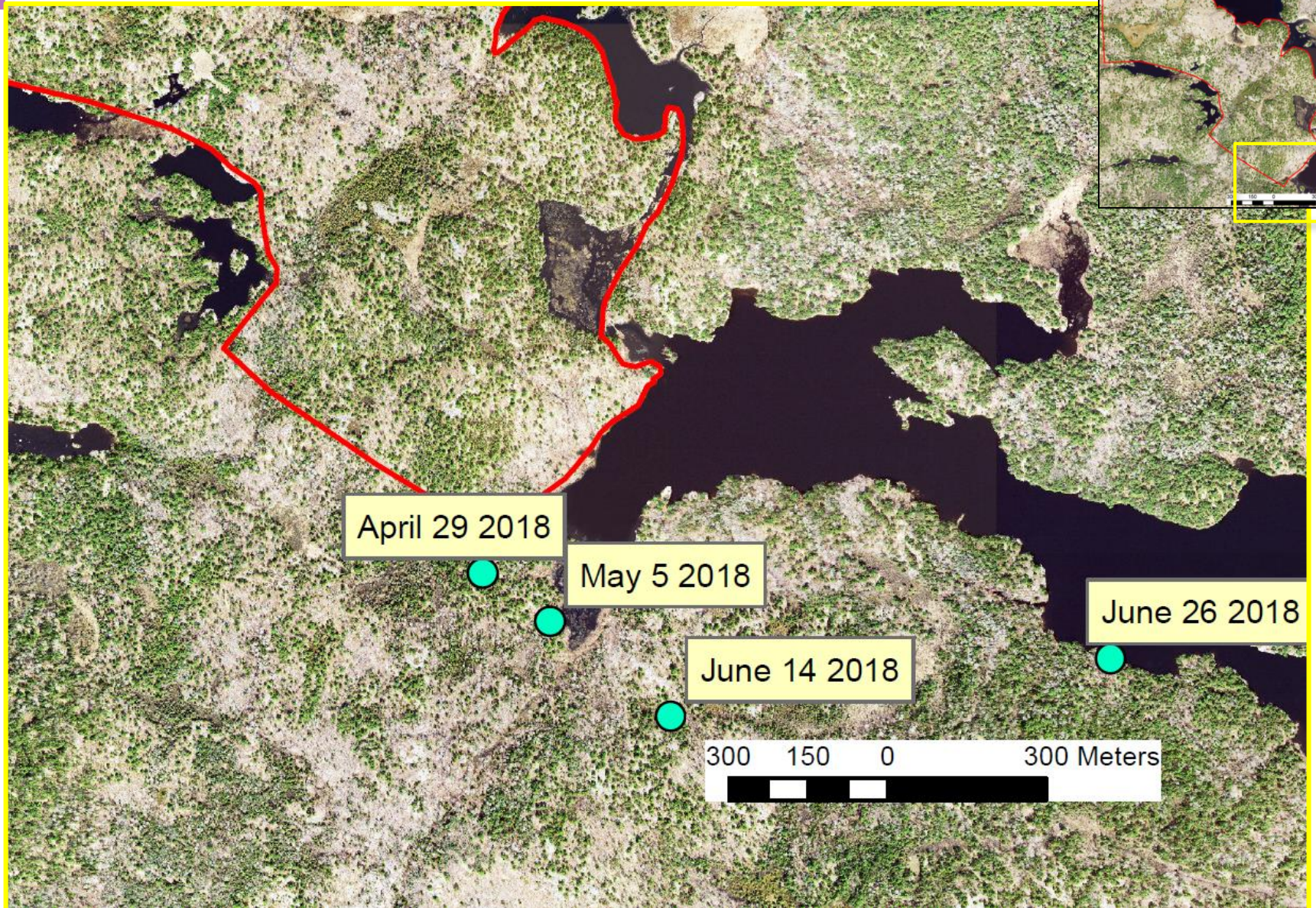
+ Turtle Movements

	Control Site 2017	Impact Site 2017	Control Site 2018	Impact Site 2018
VHF Transmitters Attached 	3	19	7	17

- Telemetry data allowed for category 1, 2 and 3 habitat to be identified
- It allowed us to find nesting and overwintering sites and monitor movements between wetlands

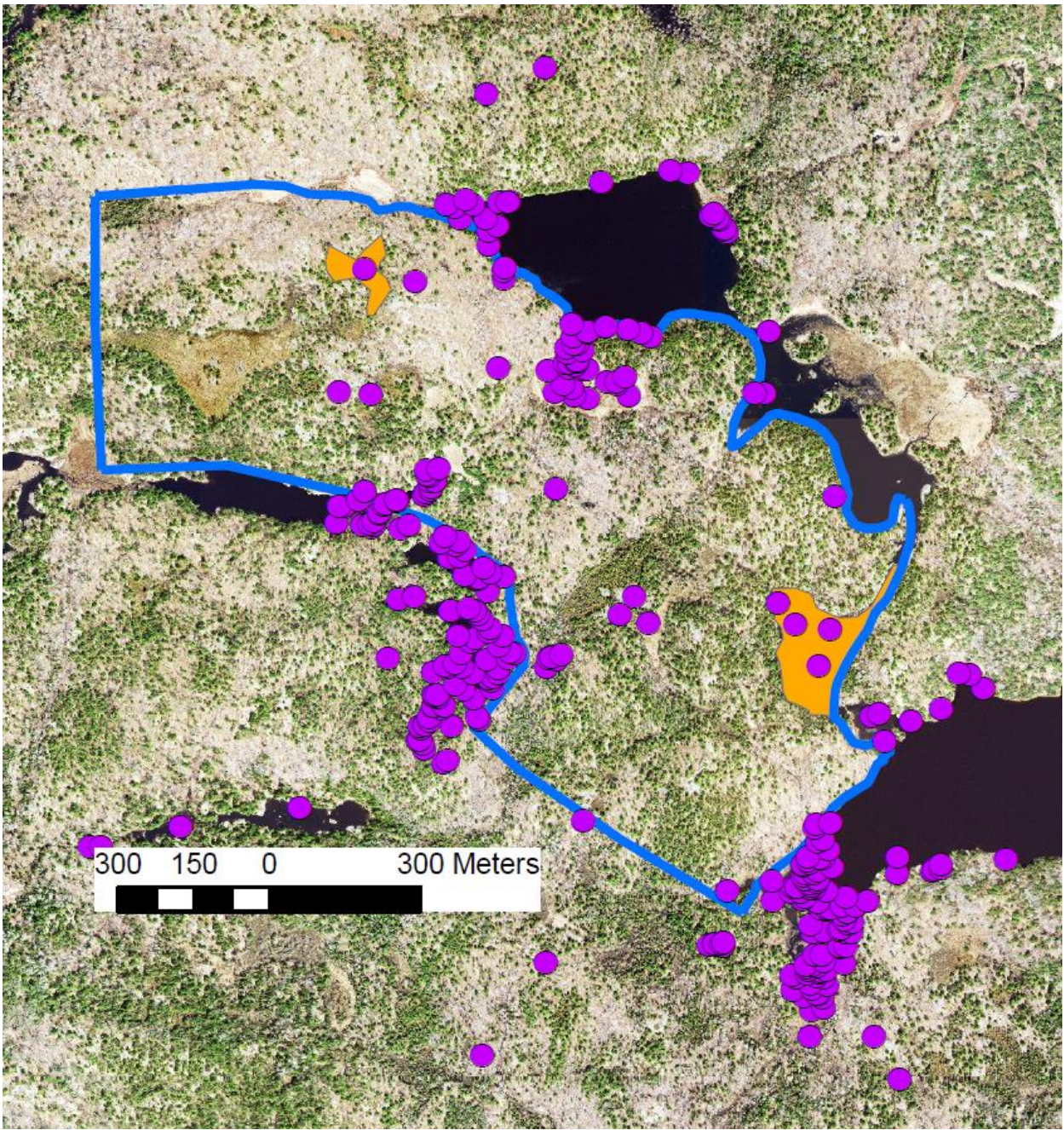


Female BLTU moving from overwintering site to seasonal wetland



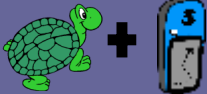

Category 1, 2 and 3 habitat identified from BLTU0044 telemetry data at impact (quarry) site

Habitat Categorization	
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2	Seasonal Habitat
3	Travel Between

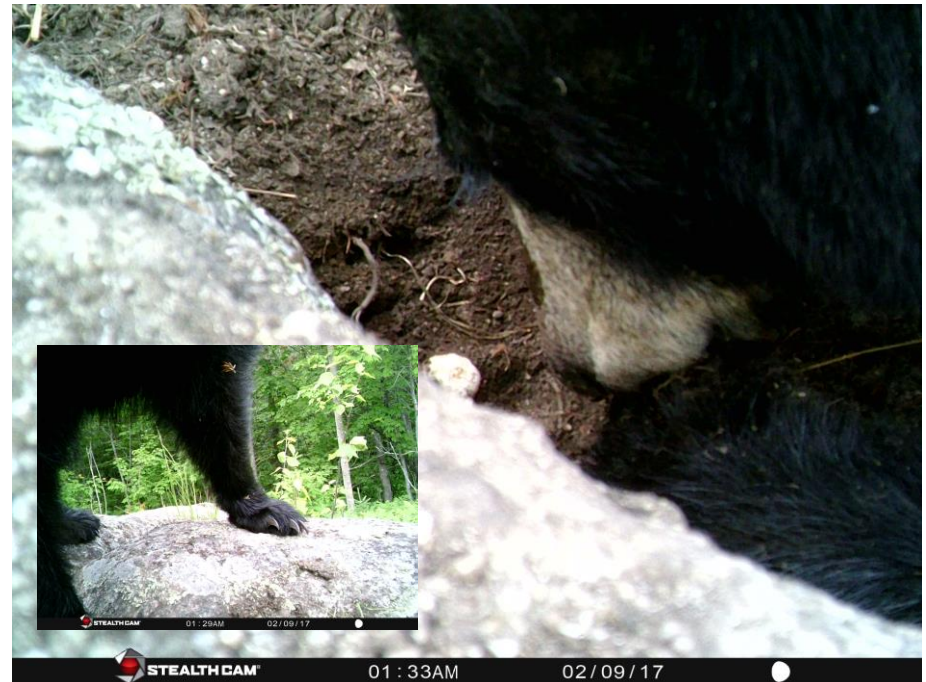


Telemetry data from 2017 and 2018 used to identify 2 new PSW's at the impact (quarry)

+ Nesting Sites

	Control Site 2017	Impact Site 2017	Control Site 2018	Impact Site 2018
GPS units attached	1	1	2	10
Nests identified 	0	1	0	4

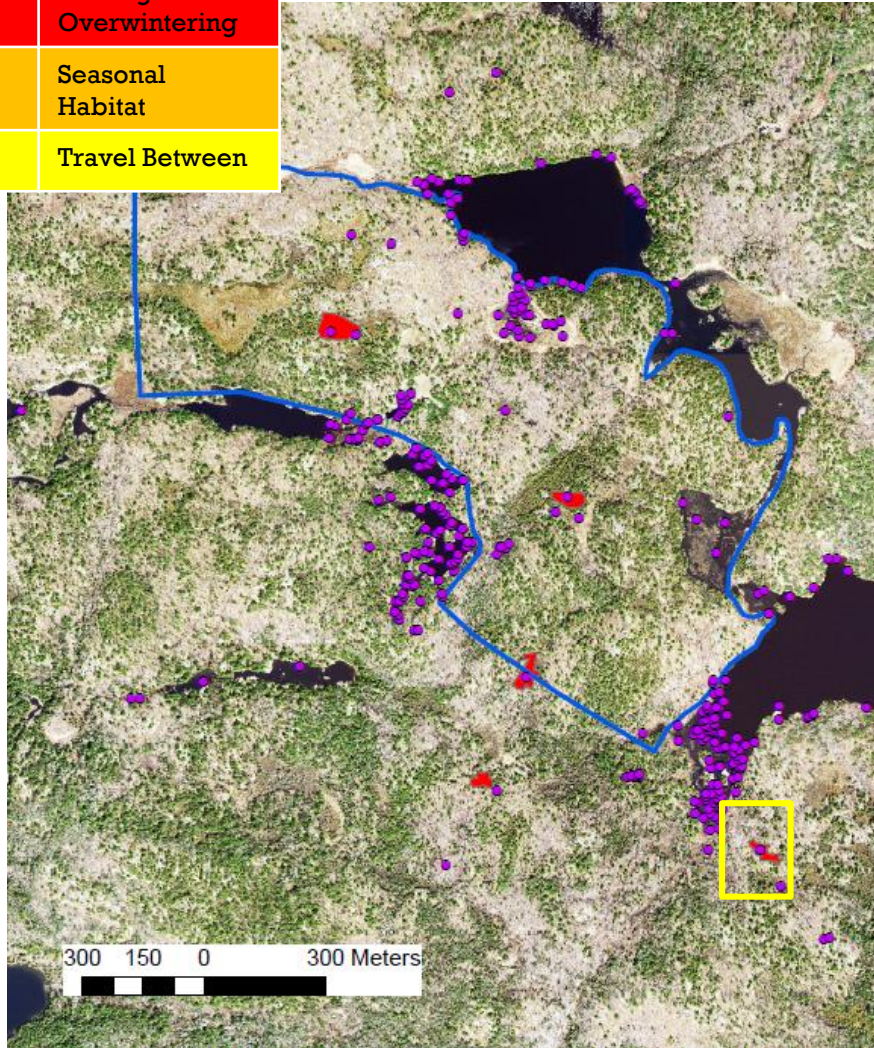
- Nesting sites are Category 1 habitat
- Under ESA, development should avoid destroying nesting sites



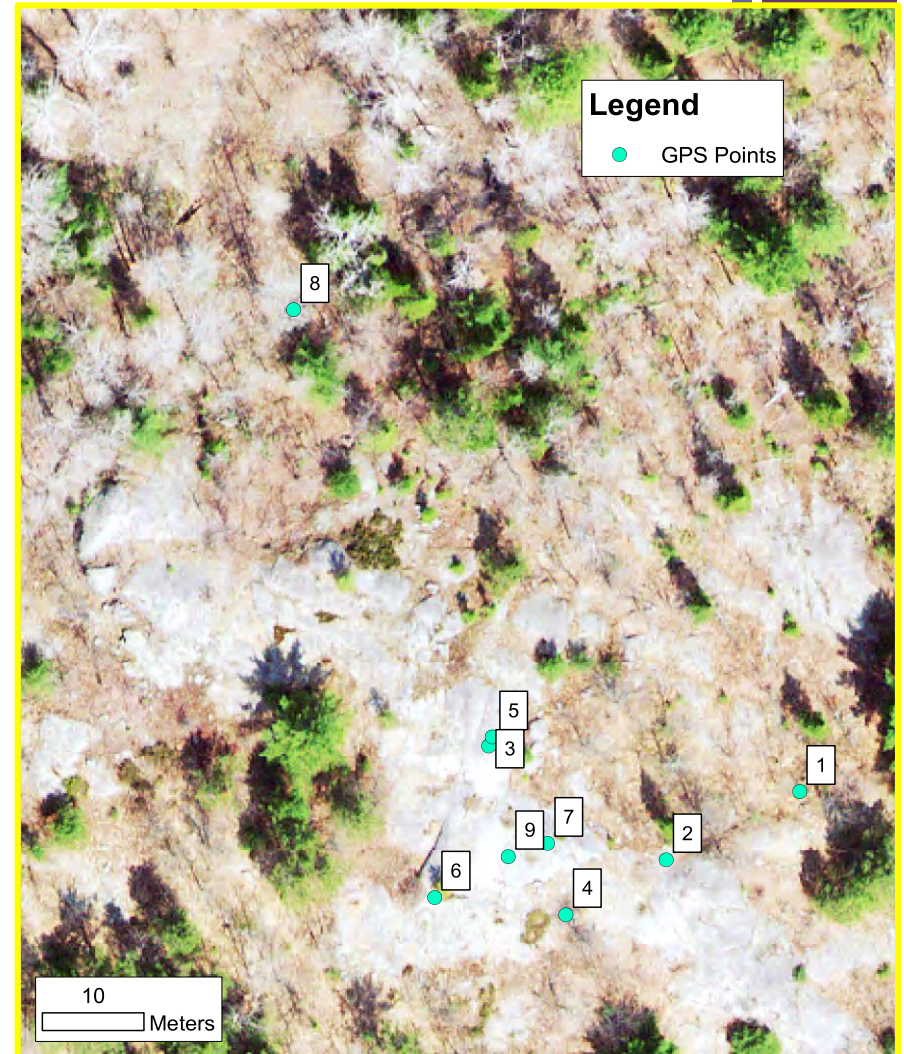
Unexpected visitor at BLTU0003's nest

Habitat Categorization

- | | |
|---|-------------------------|
| 1 | Nesting & Overwintering |
| 2 | Seasonal Habitat |
| 3 | Travel Between |



Nesting sites (category 1) identified using telemetry data in 2017 and 2018 at impact (quarry) site



BLTU0001 nest found using GPS transmitter on June 11, 2017 at impact (quarry) site

+ Overwintering 2017-18

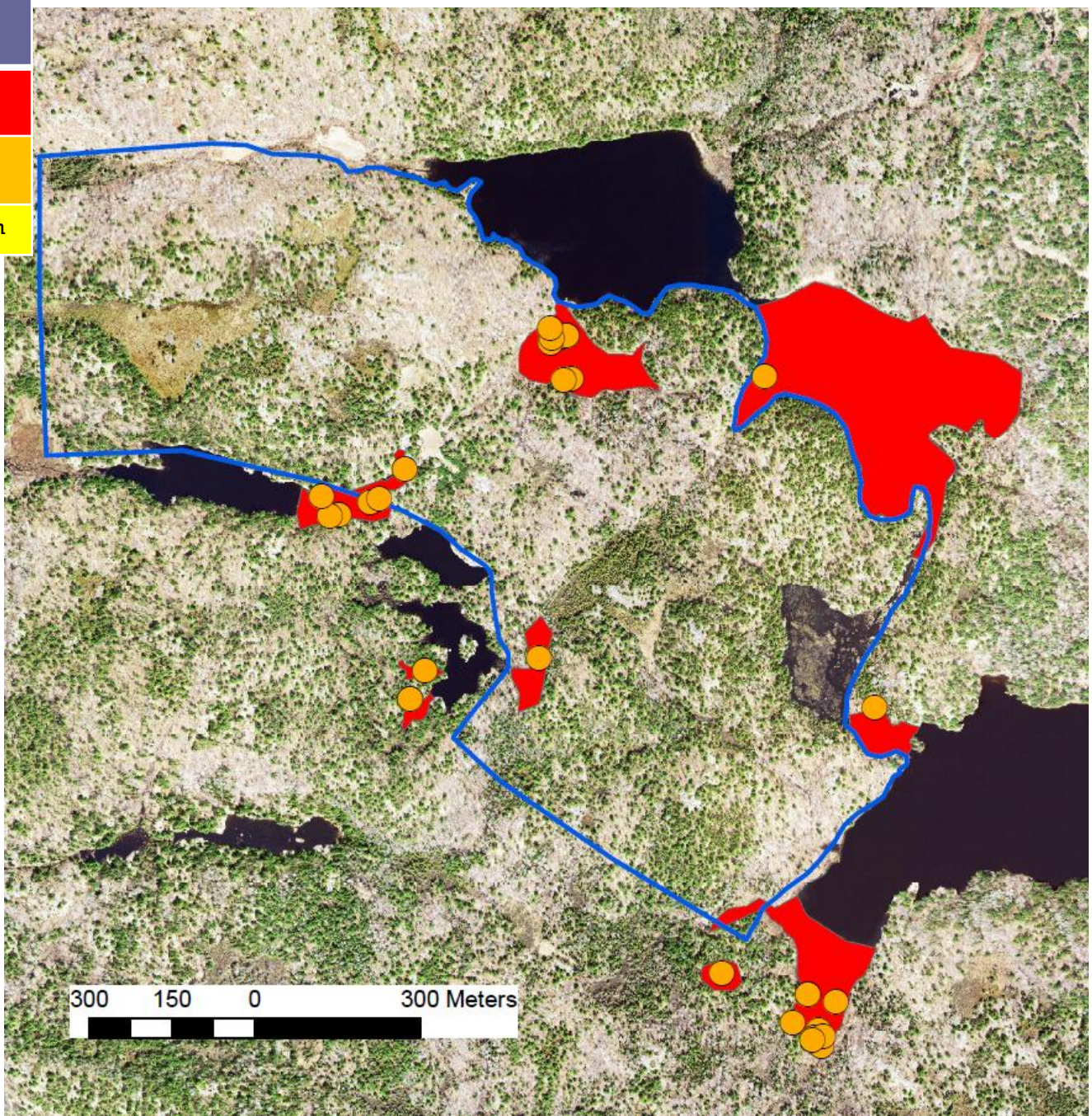
	Control Site	Impact Site
Confirmed Overwintering Turtles	3	35



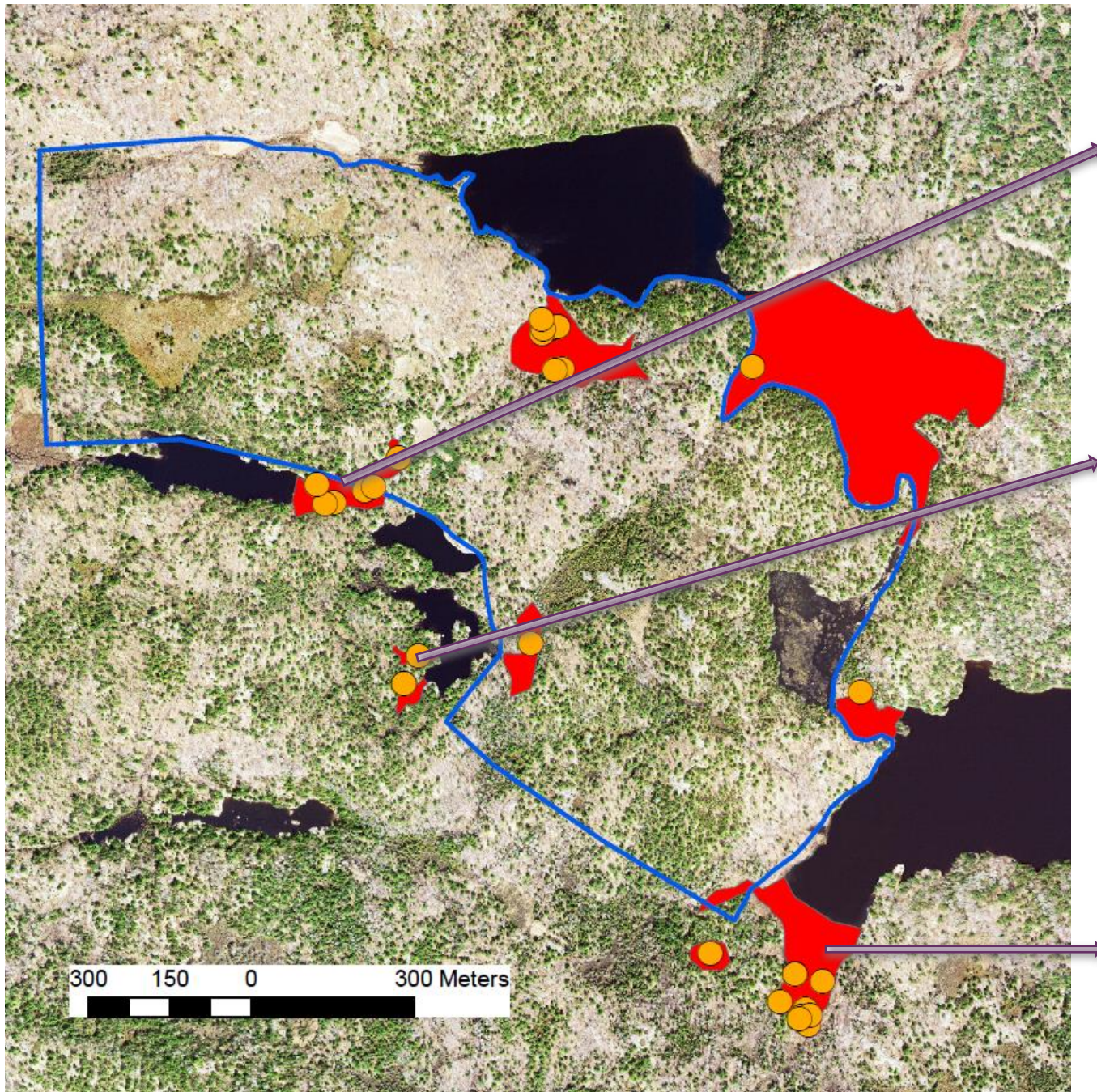
BLTU0044 under thin layer of ice on April 29, 2018 at impact site

- Overwintering sites are Category 1 habitat
- Informed alterations to quarry footprint

Habitat Categorization	
1	Nesting & Overwintering
2	Seasonal Habitat
3	Travel Between



Overwintering sites identified using telemetry data in 2017 and 2018

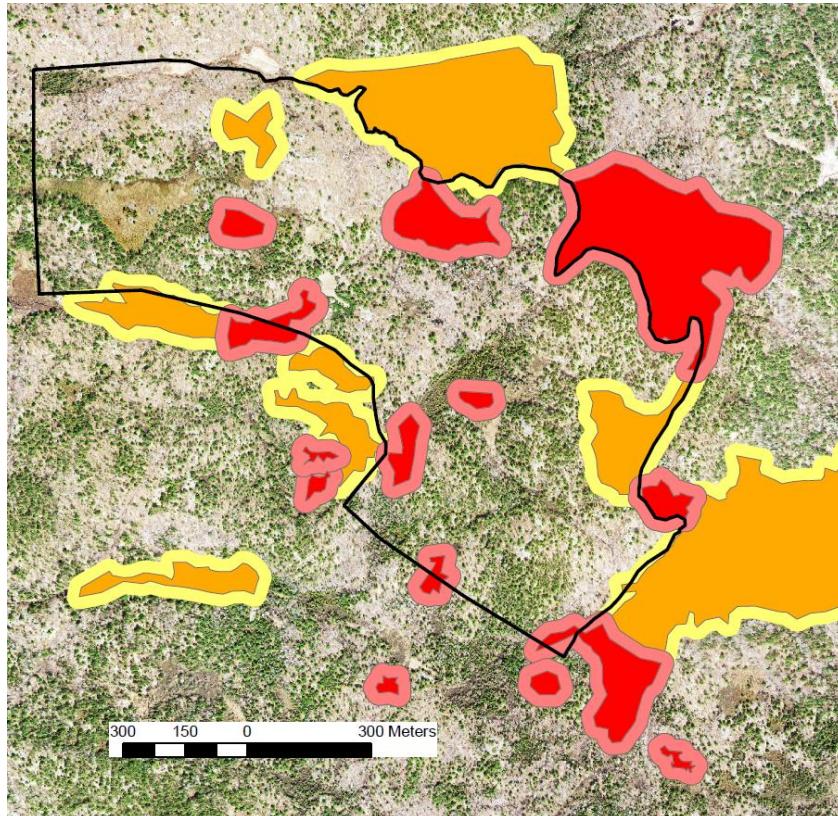


Habitat Categorization

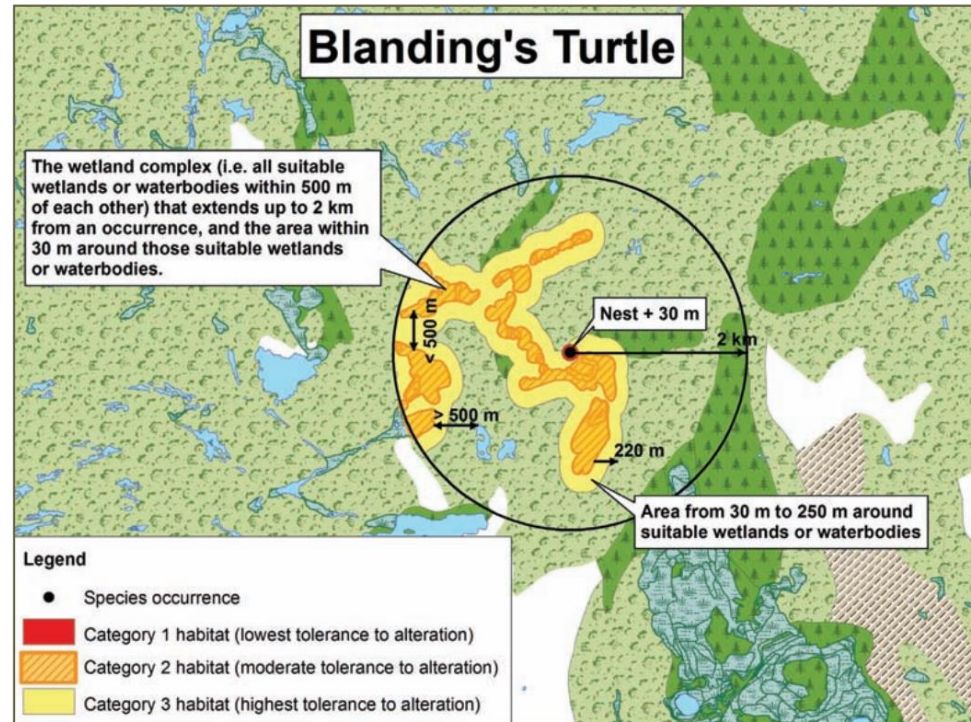
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What's Still to Come

- Final map of quarry with mitigation structure suggestions and habitat categorizations



Sample application of the general habitat protection for Blanding's Turtle



+ Significance of Study

- BACI studies are essential to test effectiveness of mitigation (Lesbarrères and Fahrig, 2012)
- Poor mitigation can increase mortality (Baxter-Gilbert et al. 2015, Markle et al., 2017)
- **Collaboration between industry and science is essential**





Thank you!

QUESTIONS?

