

Examining Shifting Seasonality at Spruce Hole Bog

University of New Hampshire CARPE Course

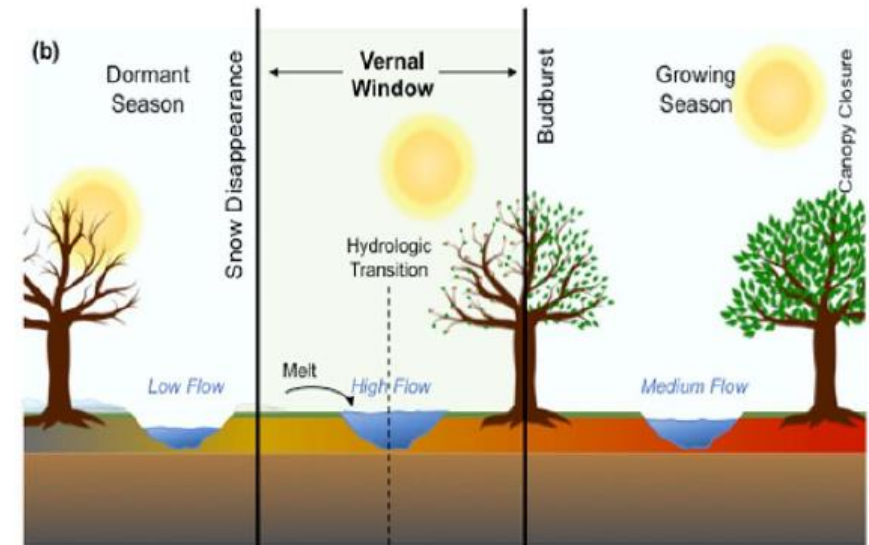
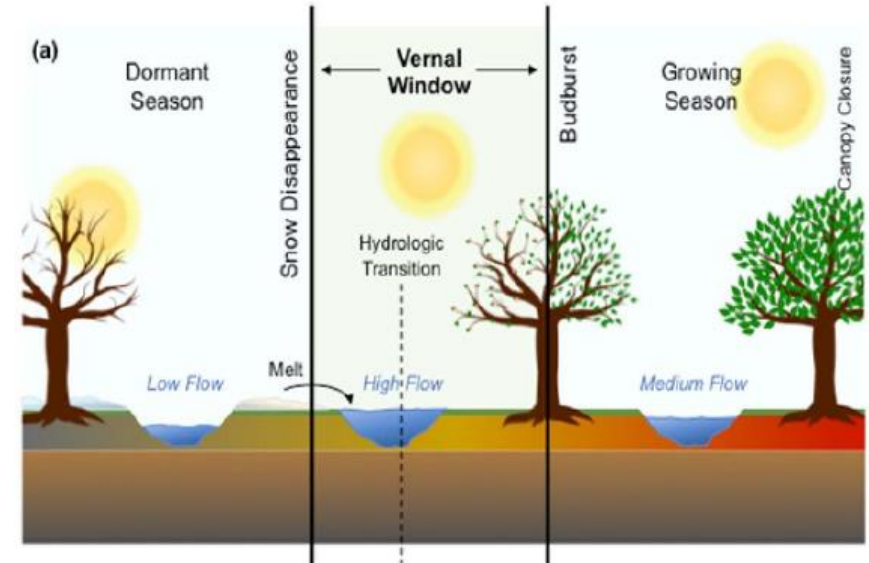
Convergent Arctic Research Perspectives & Education

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What is the vernal window?

Vernal Window: shoulder season between snowmelt and leaf-out, when water, nutrients, and carbon move rapidly through ecosystems.



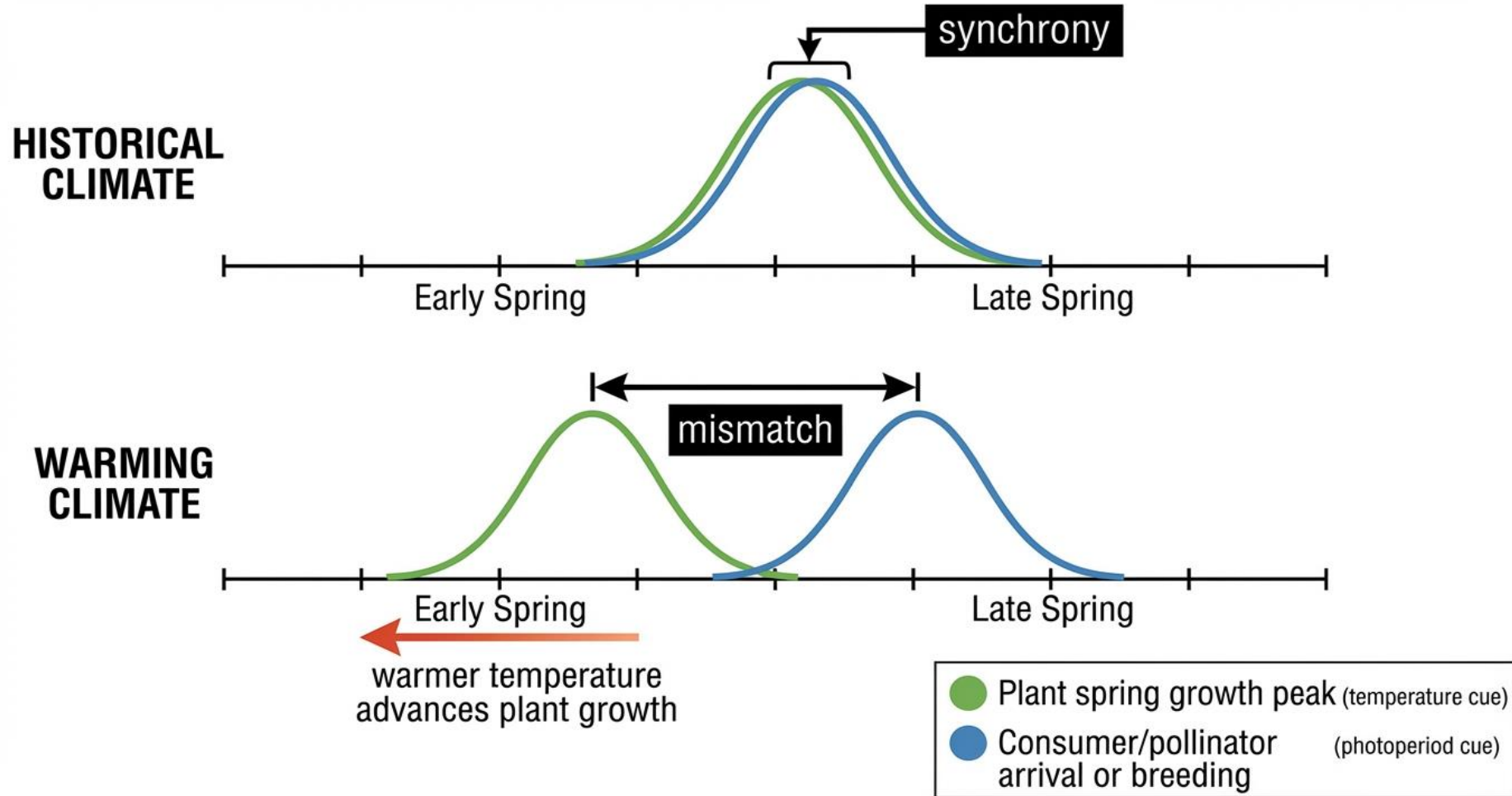


Snowmelt to Canopy Closure

Creed et al. 2015
Contosta et al.



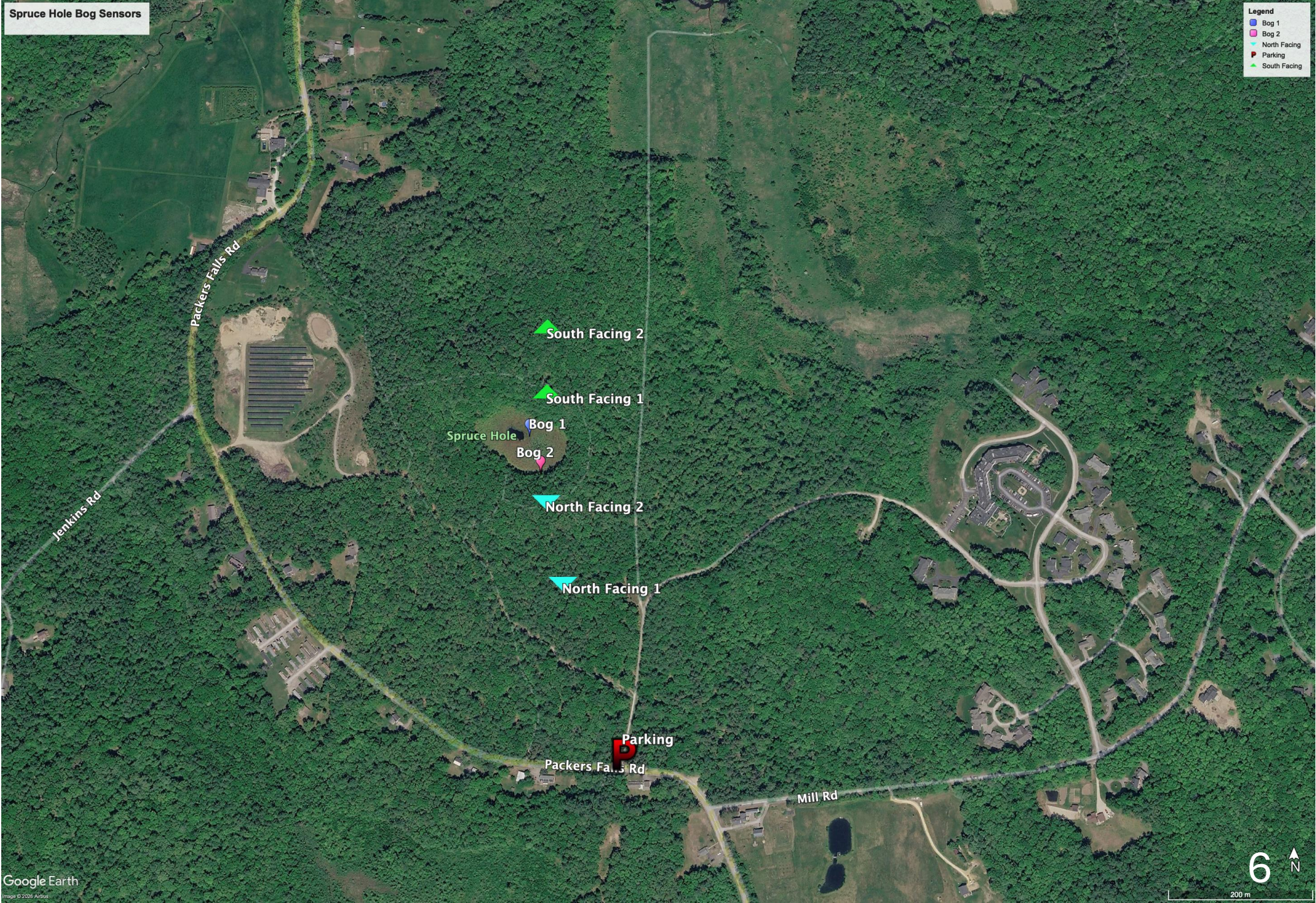
How does a shifting vernal window impact the bog?



Spruce Hole Bog Sensors

Legend

- Bog 1
- Bog 2
- North Facing
- Parking
- South Facing



Game Camera: wide angle photos

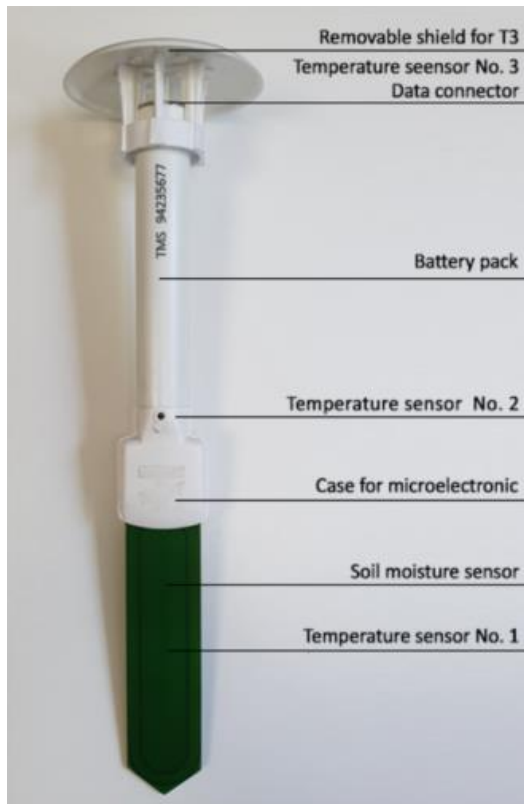
- plant phenology
 - green-up/green-down
 - Snow presence/absence
- Photo taken every 30min.



Soil Probe: soil moisture and temperature

- 15cm above ground
- 2cm above ground
- 6cm below ground

Measurements taken every 15 minutes.





Ibutton Air Sensor:

- Air temperature
 - Relative humidity
- Measurements taken every 15 minutes.



Recording Microphone:

Captures auditory data, ie. birds and frogs.

Range of up to 100 meters and frequency of up to 140 kHz.

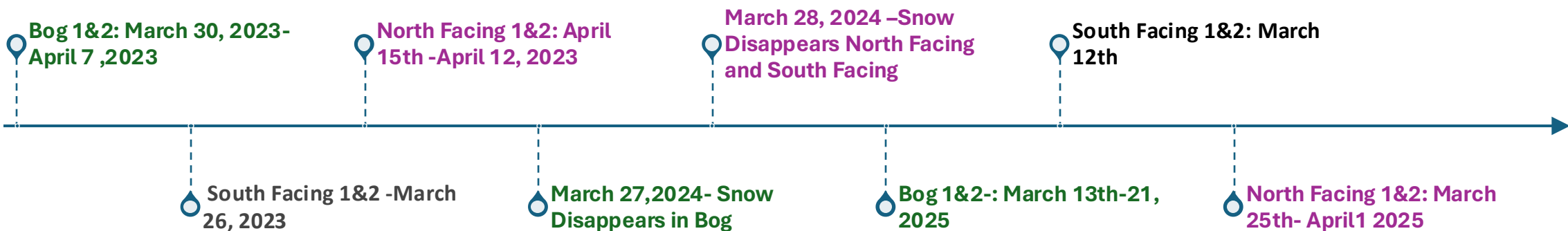


Captured on March 18, 2026 by Darlyn Chavez



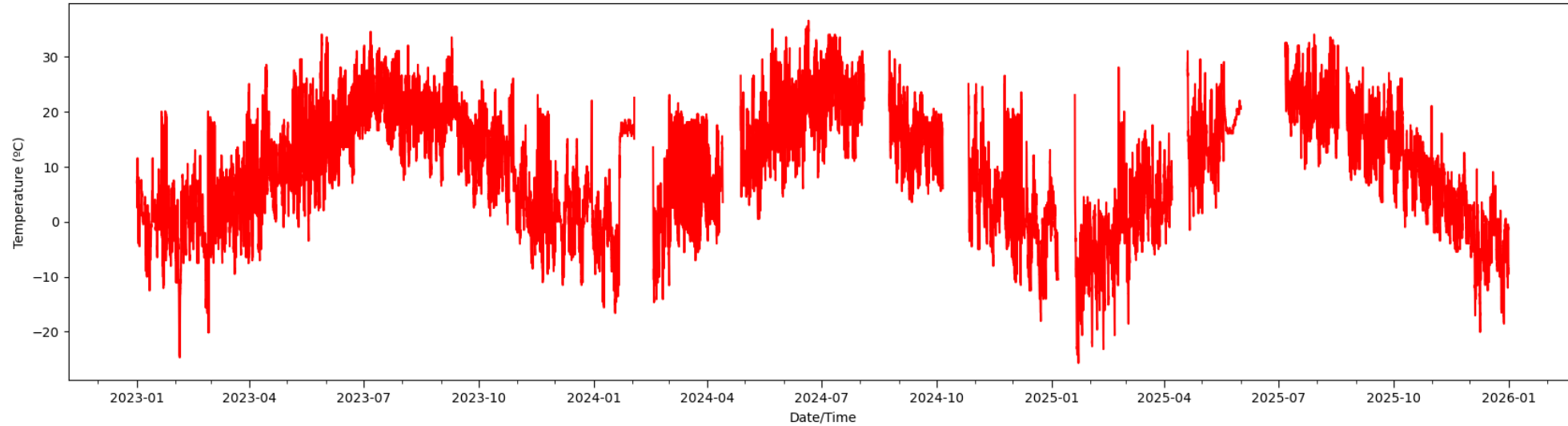
Snow Disappearance By Site

**Bog Cam 1 March
2024**

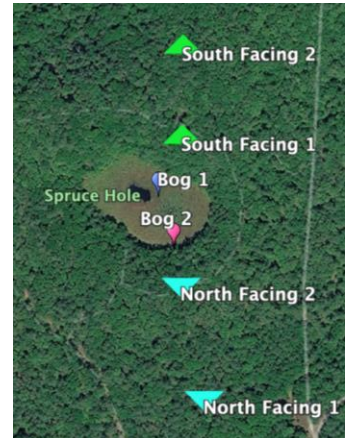
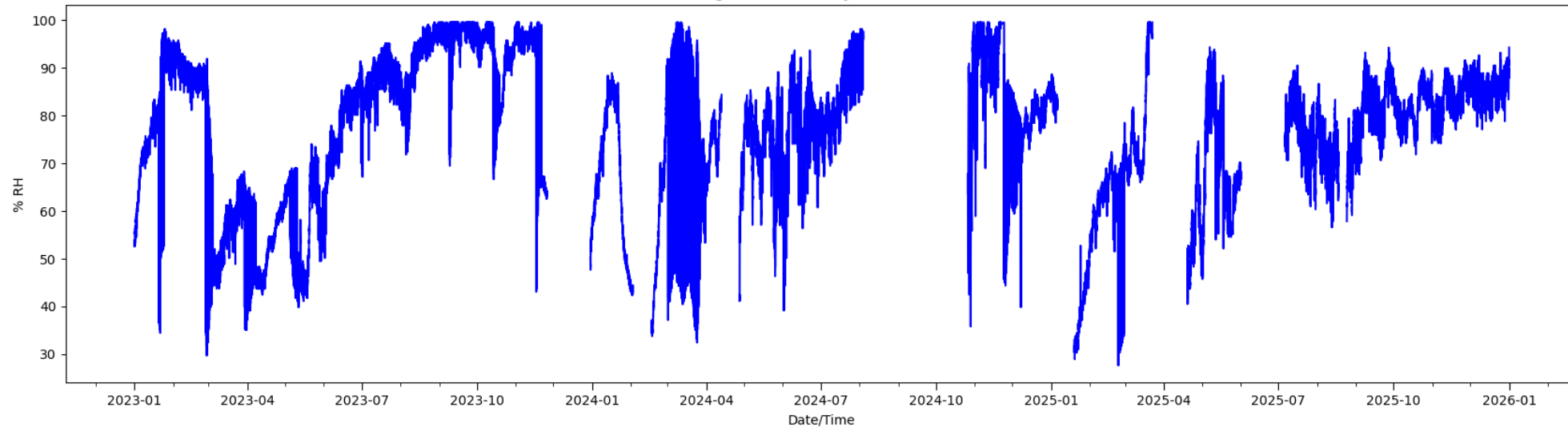


Bog 2 - Air Temperature & RH

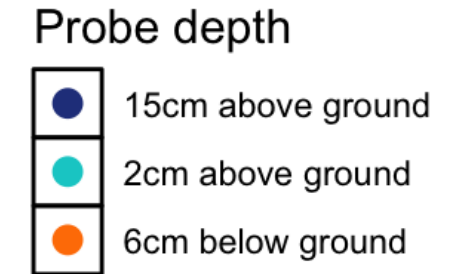
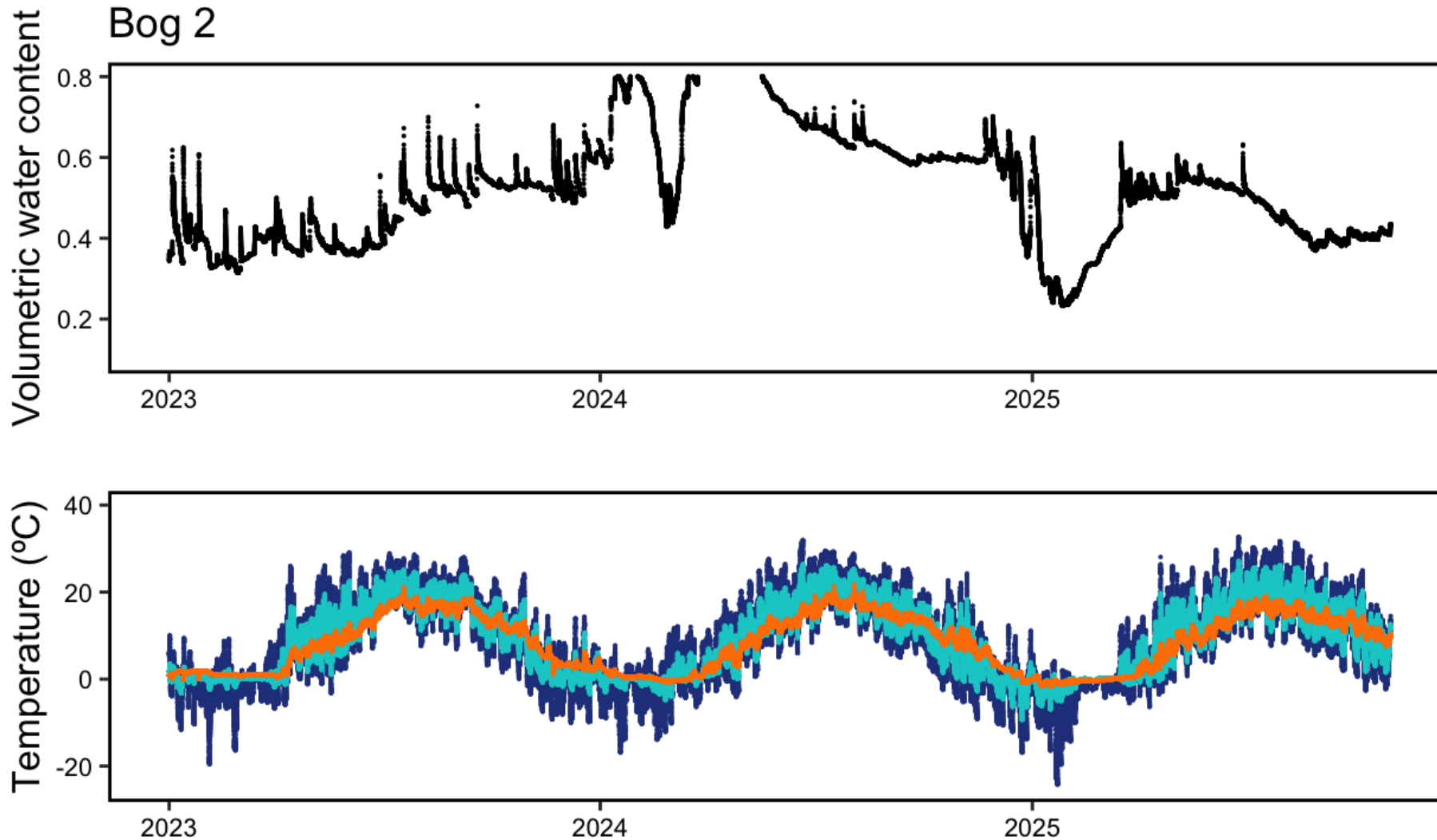
Bog 2 - Air Temperature Time Series



Bog 2 - Air Humidity Time Series

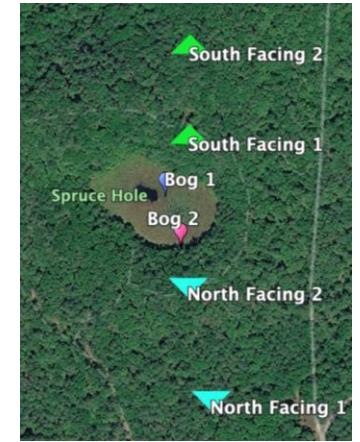
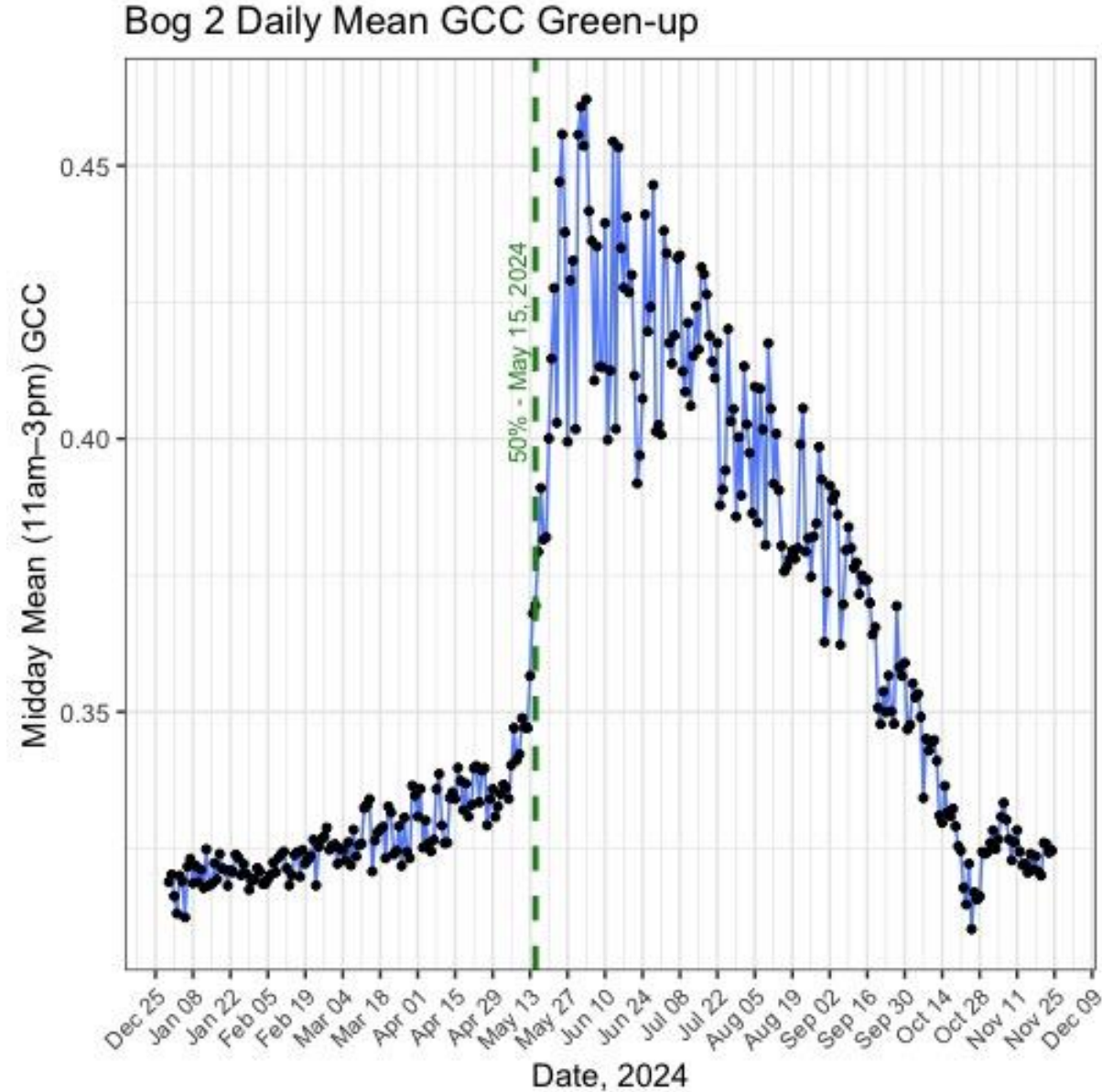


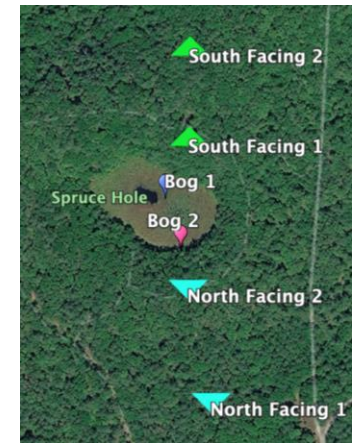
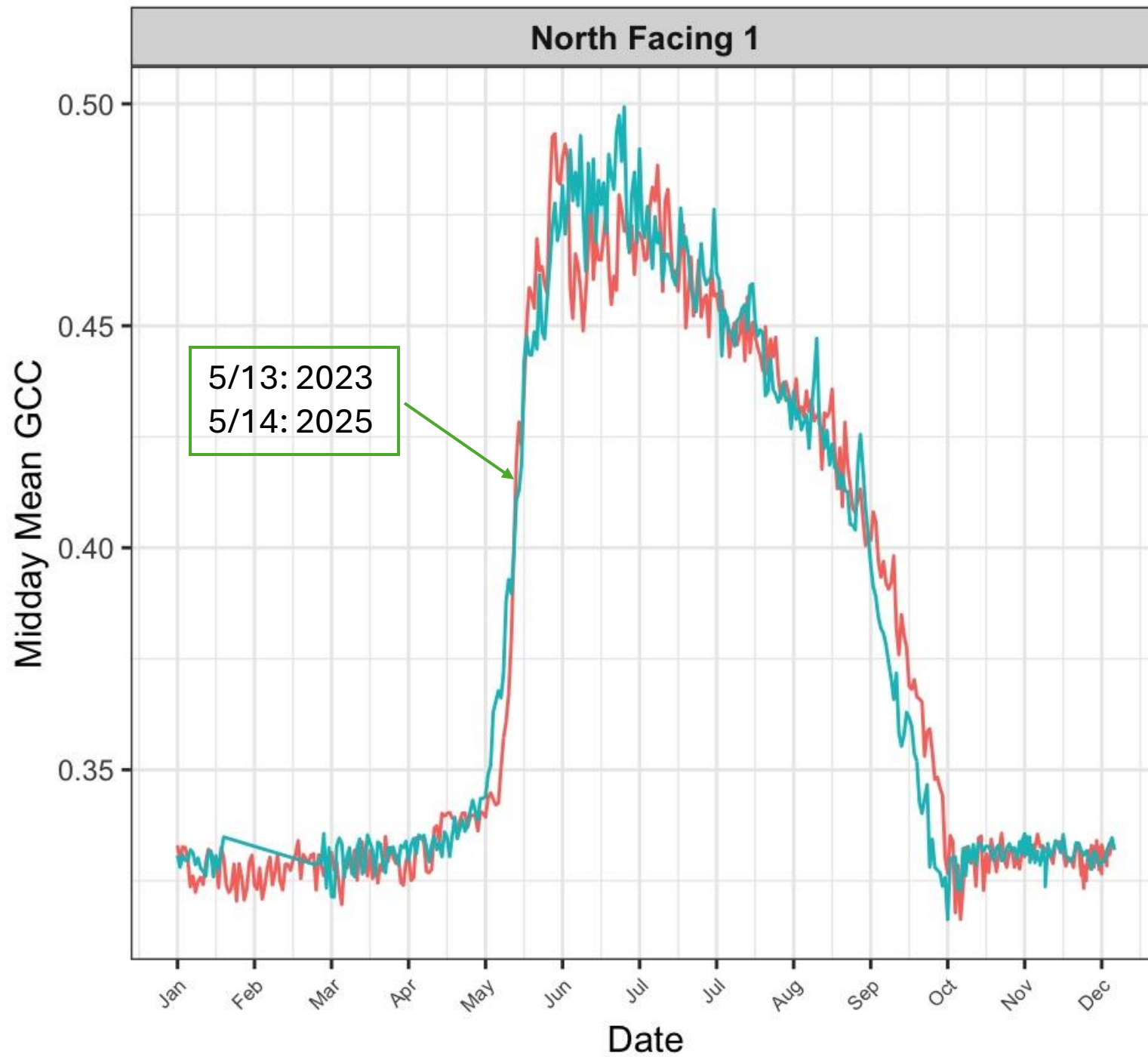
Volumetric Water Content and Temperature



Bog 2 Green-up 2024

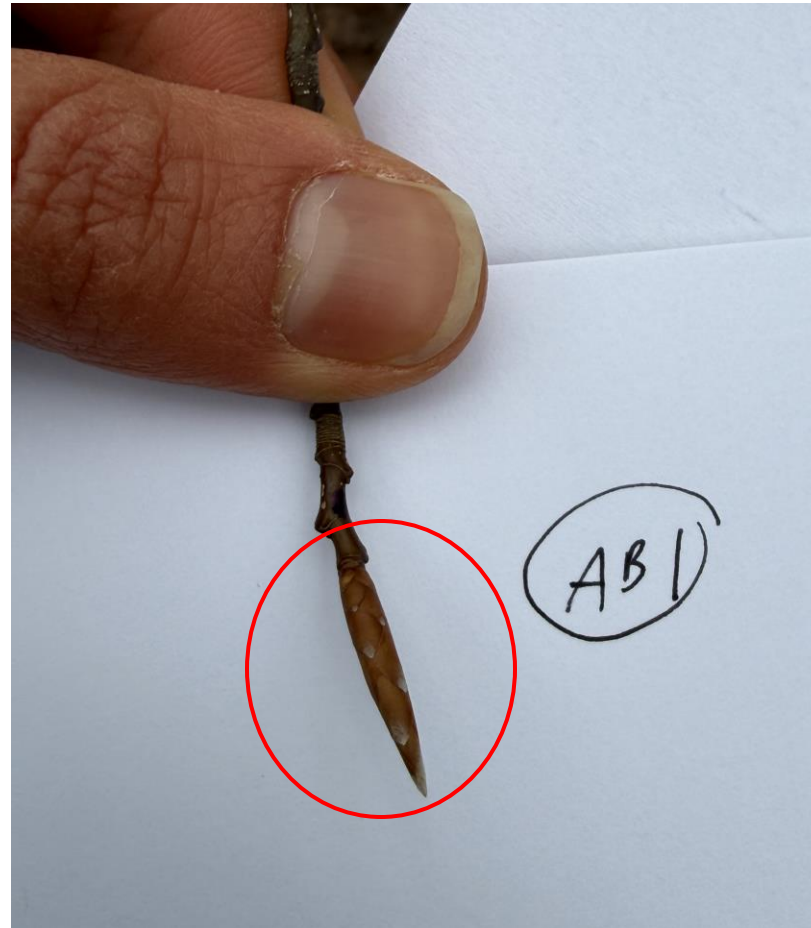
Green-Up Data





Globe Green-Up Measurements

Global Learning and Observations to Benefit the Environment



Notable SHB bird species

American Goldfinch



Eastern Wood-Pewee



Hermit Thrush



White-breasted Nuthatch



Barred Owl



Red-eyed Vireo



Ovenbird



Scarlet Tanager



Hairy Woodpecker



Tufted Titmouse



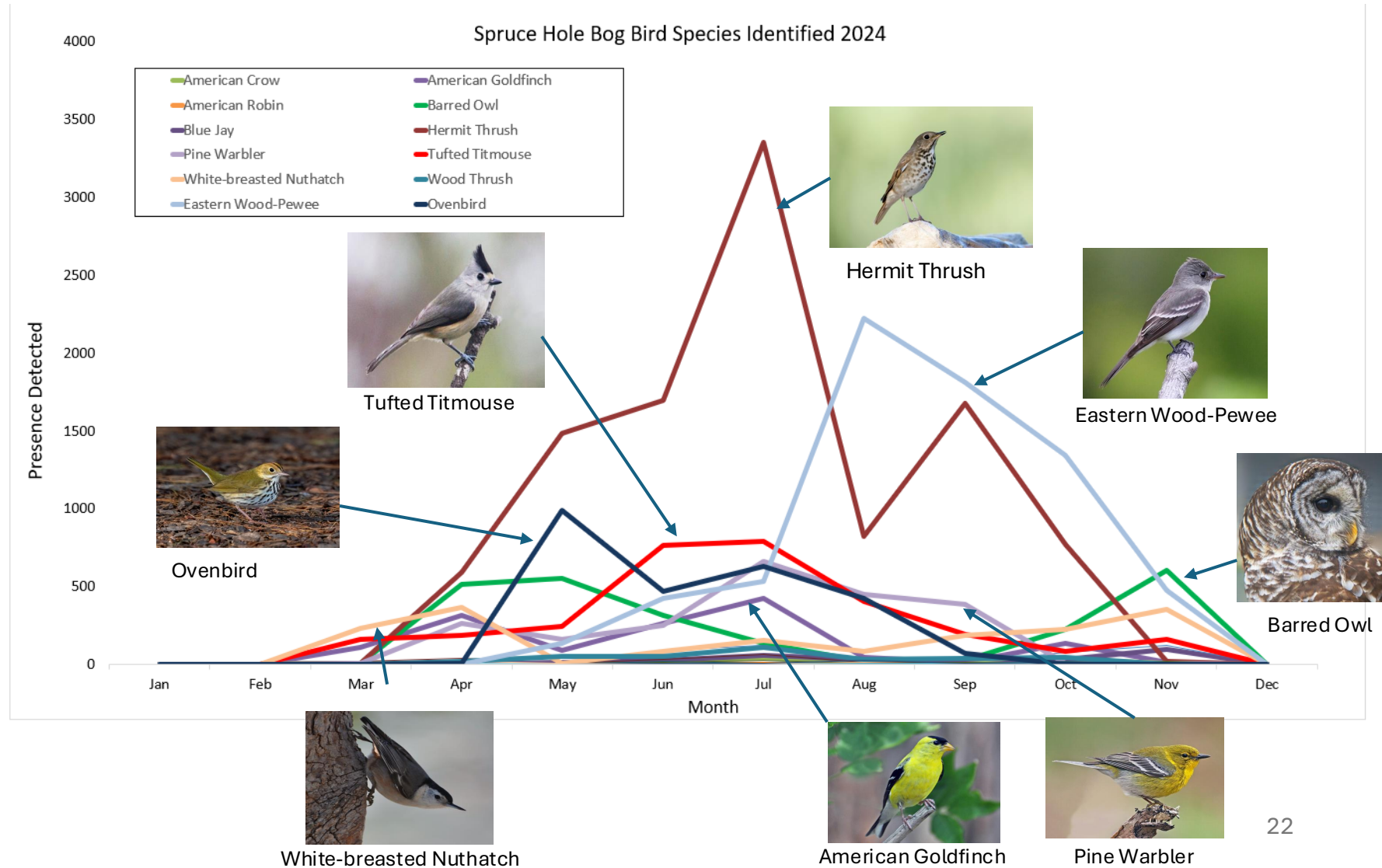
Pine Warbler



Early Season Bird Activity

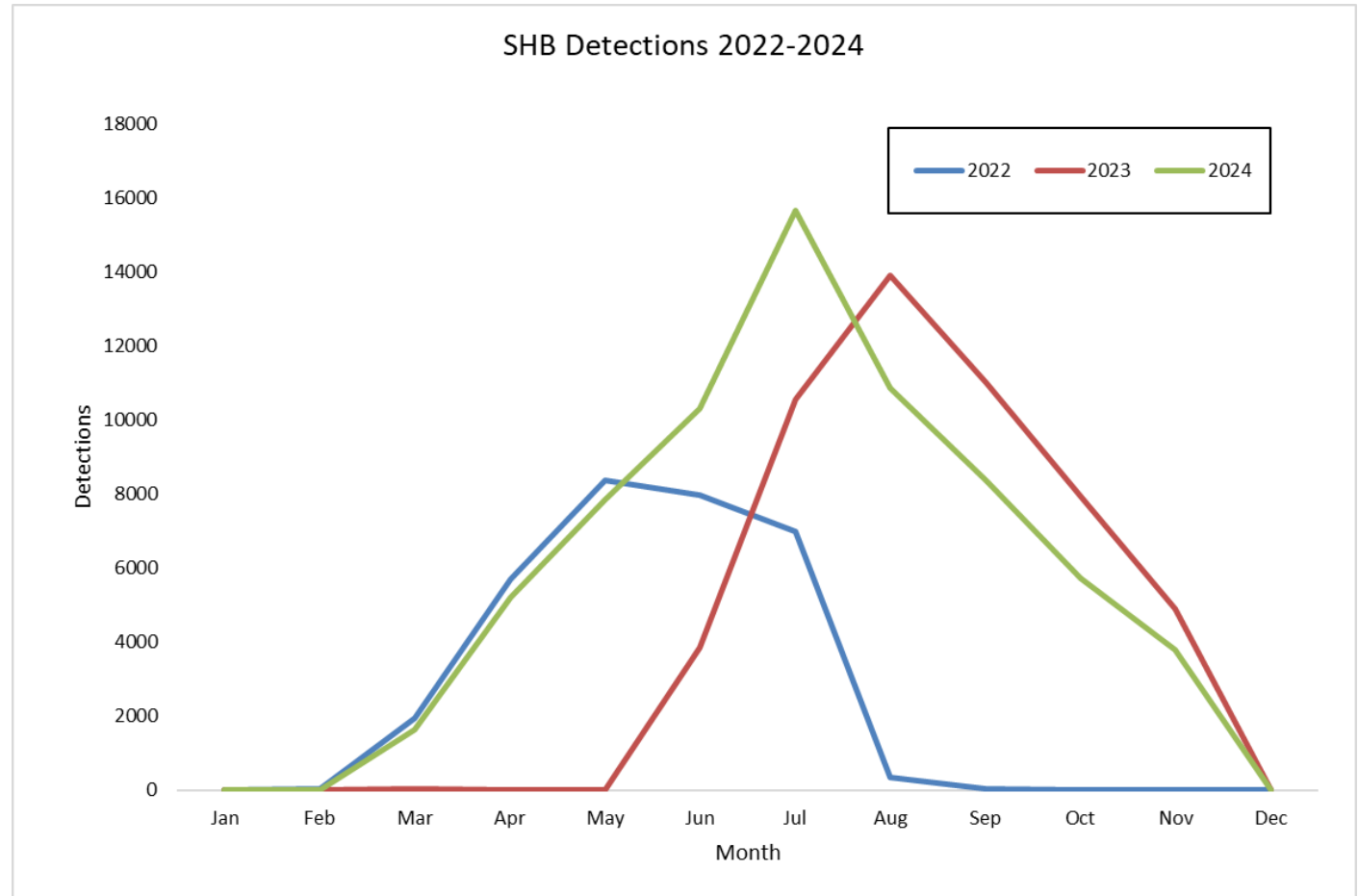
Example year: 2024
Peaks in May–June rather than only during migration months

- Not just a migration stopover — it is also breeding habitat.



Spruce Hole Bog detections over the years

- Bird detections increase beginning in spring
- Greater number of detections from June/July - September





American Bittern



Sora



Common Redpoll



Greater Yellowlegs



Gadwall



Herring Gull



Purple Martin



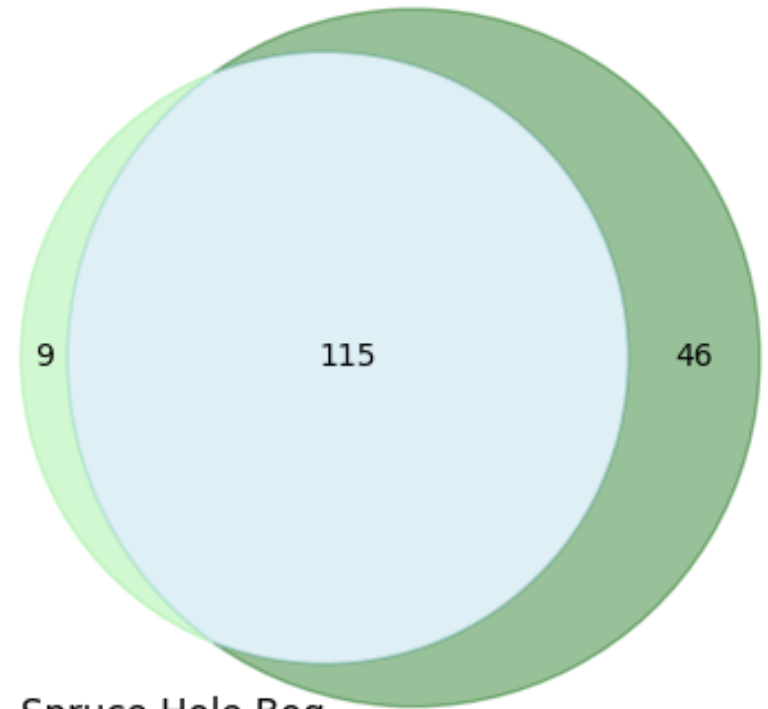
Northern Rough-winged Swallow



House Wren

Overlap of Species Across Oyster River Forest and Spruce Hole Bog

Overlap = 67.6%



Spruce Hole Bog

Oyster River Forest

Spruce Hole Bog attracts unique birds



American Bittern
(2022-2025)



Sora
(2022-2025)



Common Redpoll
(2022-2025)

Spruce Hole Bog attracts unique birds

Spruce Hole Bog is used by **early-returning migrants**



Indicator Species

- Canada Warbler (2022, 2023, 2024)
- White-throated Sparrow (2023 and 2024)
- Palm Warbler (2022, 2023, 2024)

Protected Species

- Bald Eagle (2023)



Looking for input on data usage:

- What might you/the town be interested in learning about Spruce Hole Bog?
- Data products of interest?

