

Feasibility of underwater drones for monitoring in deep oligotrophic lakes

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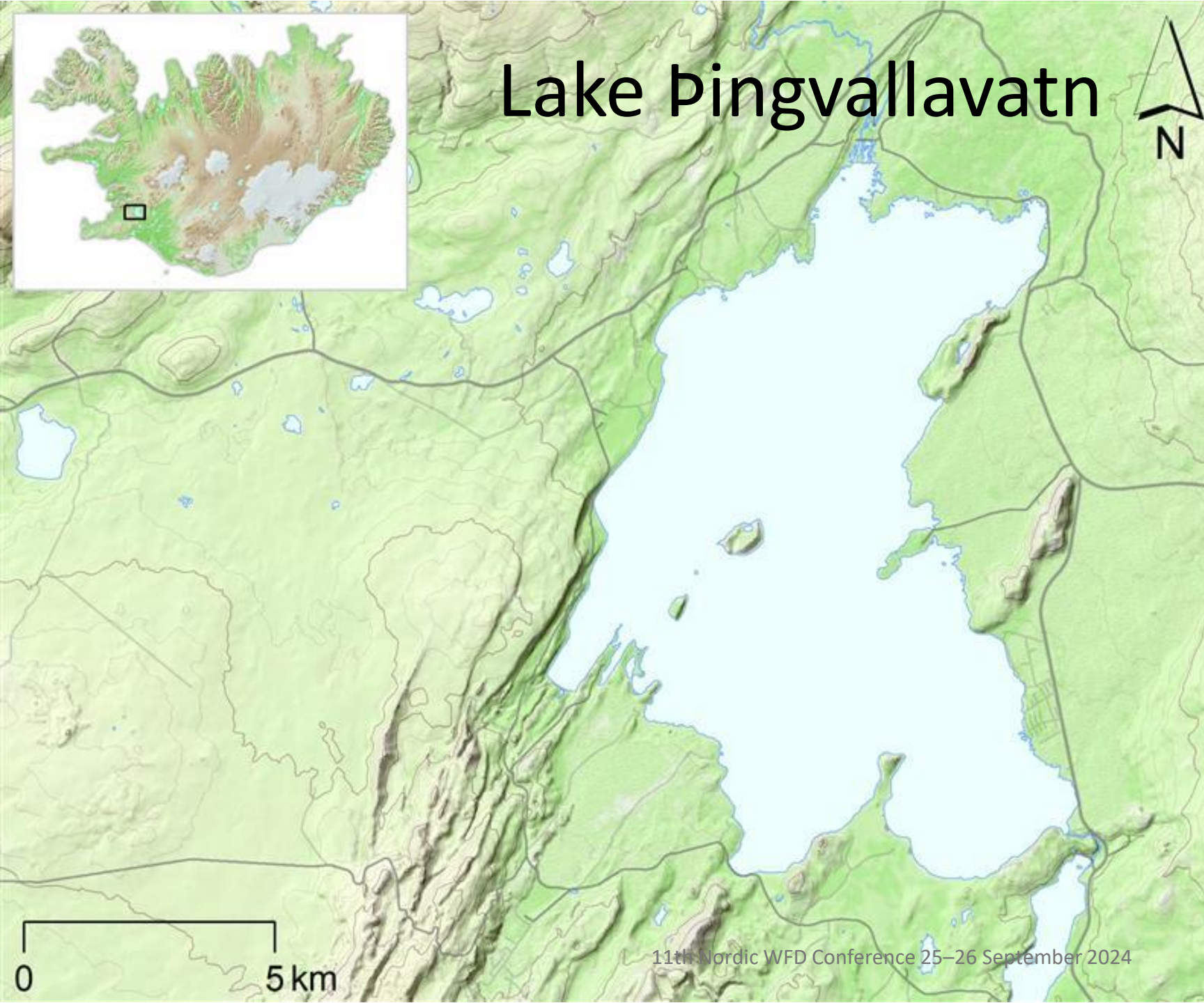
11th Nordic WFD Conference 25–26 September 2024



Lake Þingvallavatn

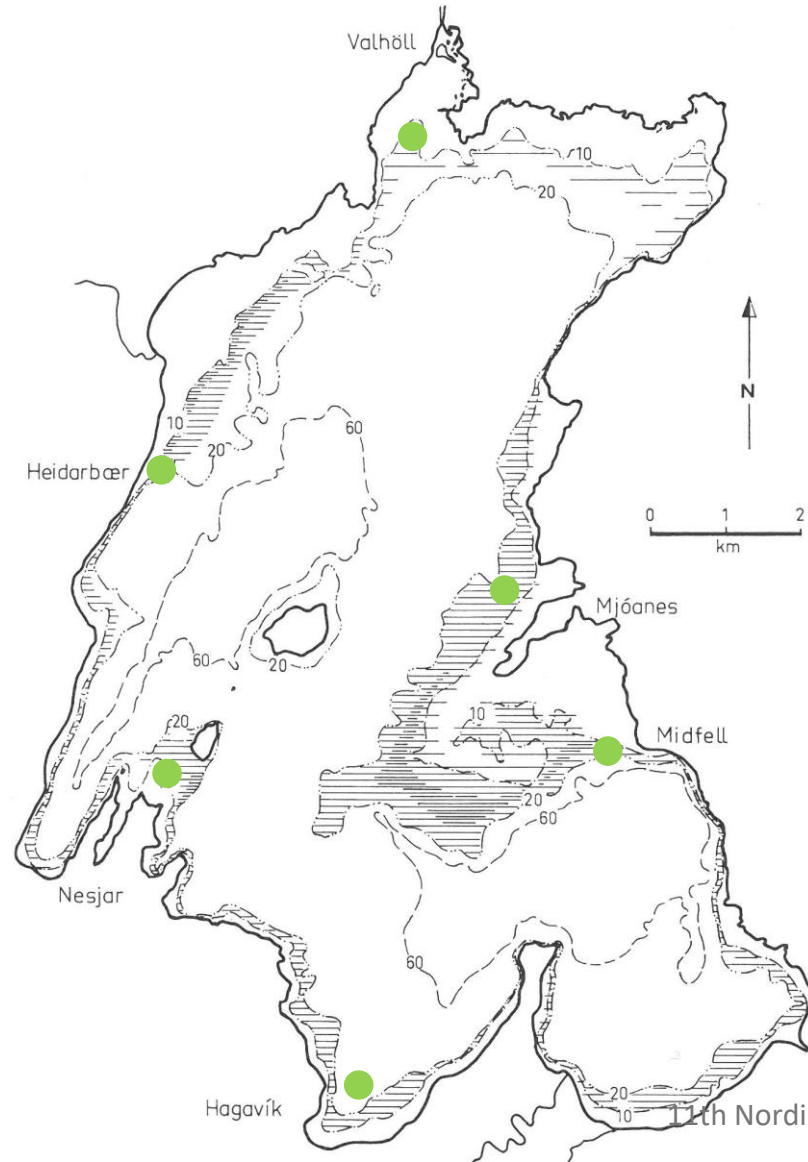


- Largest natural lake
- Area 83.7 km²
- Depth
 - 114 m max
 - 34 m mean
- Oligotrophic
 - secchi 10–15 m
- Mostly spring-fed



Nitella opaca in lake Þingvallavatn

1987

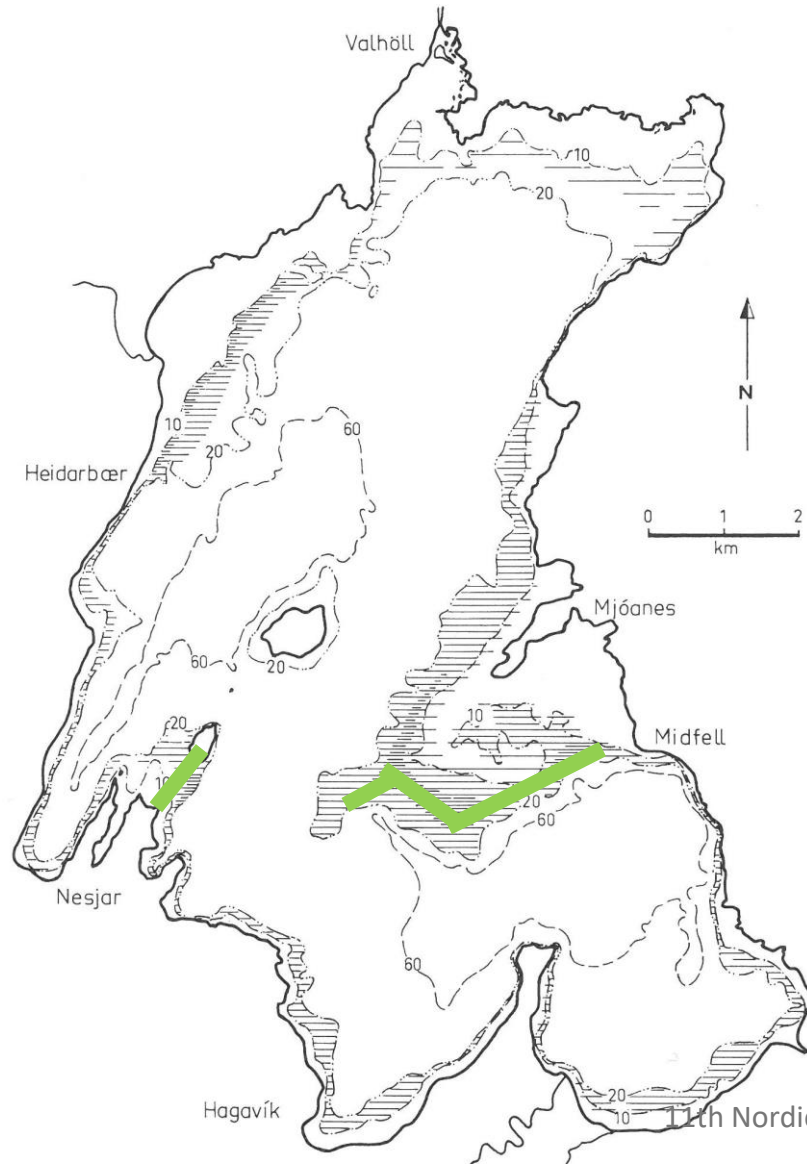


- 1978, 1985, 1987
- *Nitella* – dominant macrophyte
 - distribution, growth, production
 - 6 transects
 - Scuba divers
- Grows on 10–20 m depth
 - 5–35 m
- Beds ≤ 1 m high / small patches

Kairesalo et al. 1992. Metabolism and community dynamics within *Nitella opaca* (Charophyceae) bed in Thingvallavatn. OIKOS 64: 241–256

Nitella opaca in lake Þingvallavatn

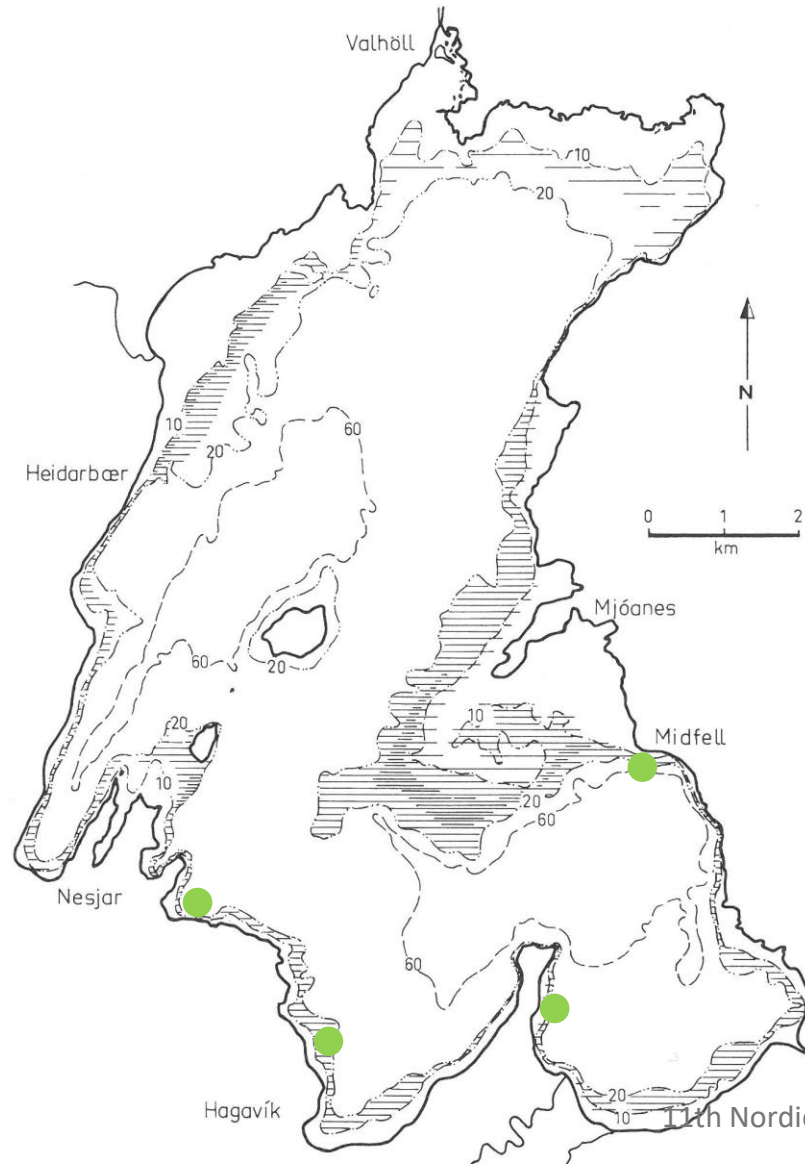
2015–2016



Finnur Ingimarsson et al. 2020. Tjarnanál (*Nitella opaca*) í Þingvallavatni. Fjölrit Náttúrufræðistofu Kópavogs 4-20. In Icelandic with English summary.

Nitella opaca in lake Þingvallavatn

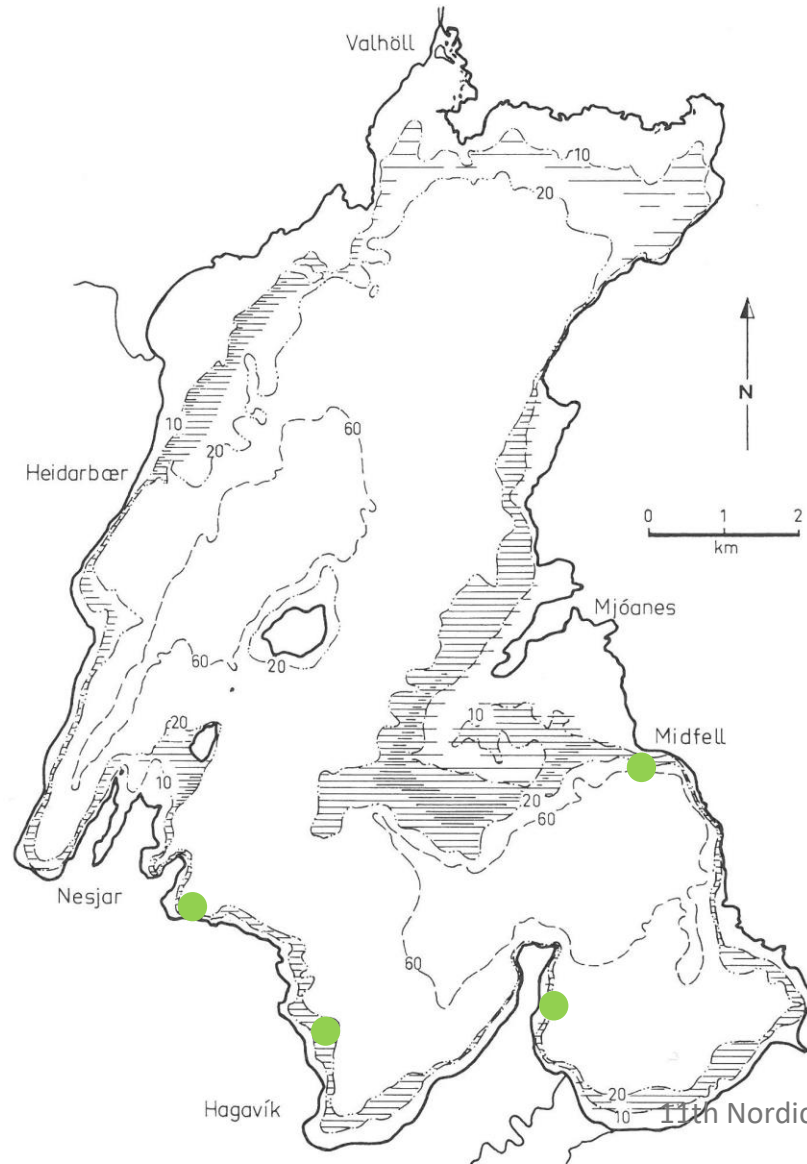
2015–2016



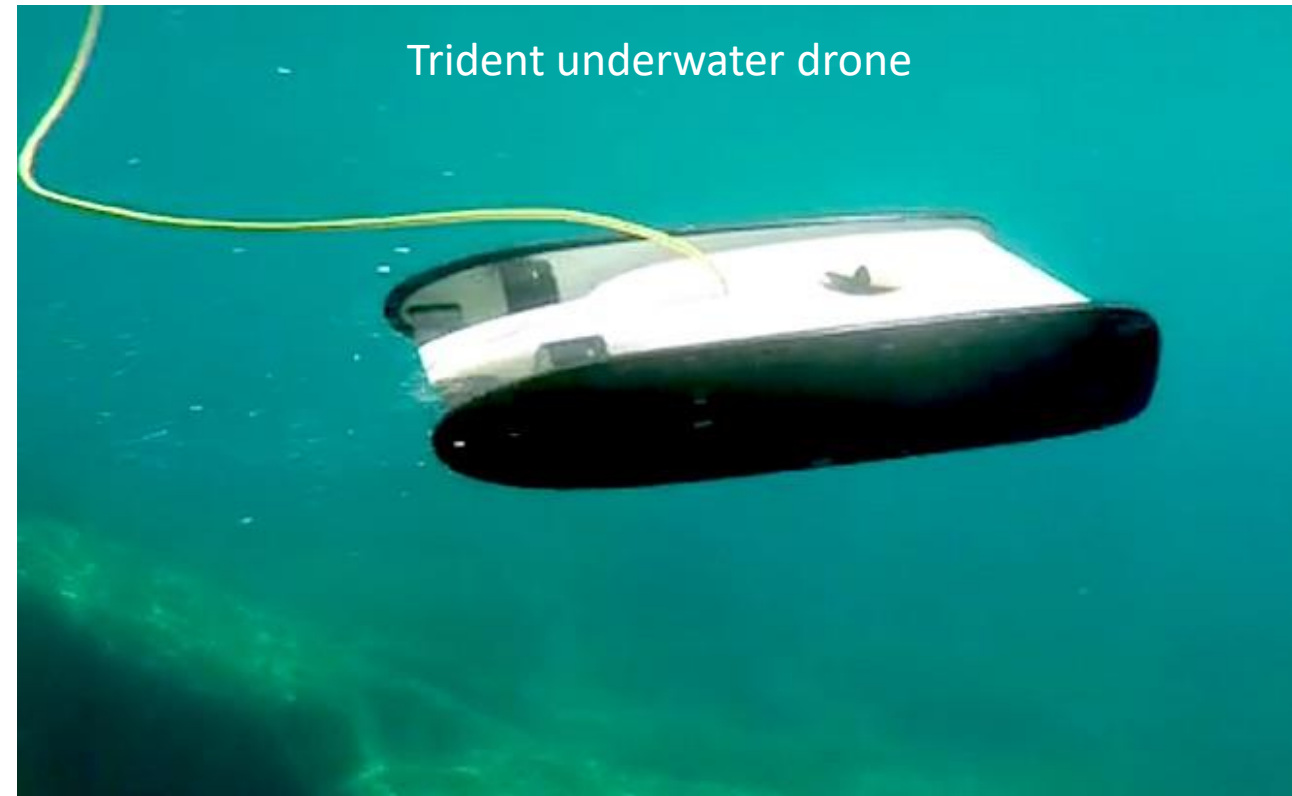
Finnur Ingimarsson et al. 2020. Tjarnanál (*Nitella opaca*) í Þingvallavatni. Fjölrit Náttúrufræðistofu Kópavogs 4-20. In Icelandic with English summary.

Nitella opaca in lake Þingvallavatn

2020



- 180 m scaled lead line, anchors at each end – the transect
- Drone sails along the lead line and records the bottom
- 100 m line between drone and control panel



07 AUG 2020

11:44:00

174 DEG

10.4M

13.37C

Continuous footage on transect

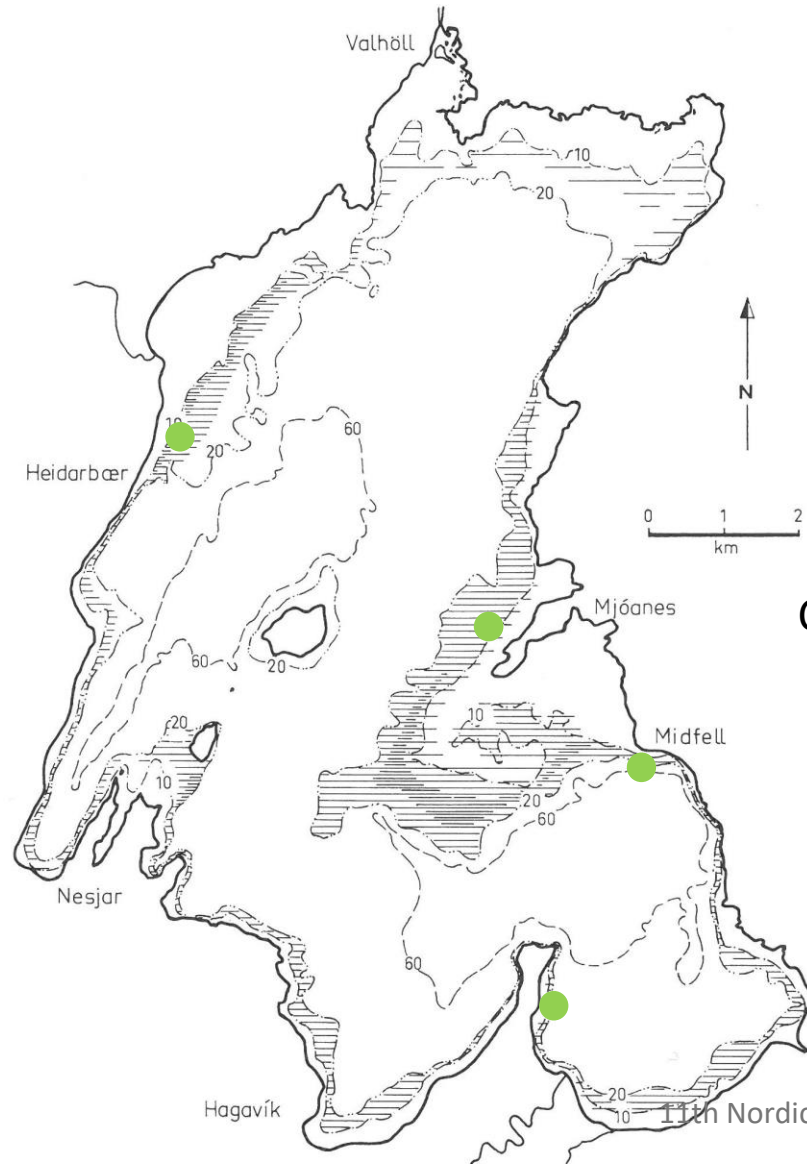
Time

Depth

Water temperature

Nitella opaca in lake Þingvallavatn

2024



- 180 m scaled lead line, anchors at each end – the transect
- Drone sails along the lead line and records the bottom
- Screen and control panel on the boat
- 200 m line from drone to control panel

CHASING M2 PRO MAX



Lead line indicates transect – 180 m

Floating lines – 2 m apart

– 1 m high, scaled at 25 cm increments

2024

An aerial photograph of a dense forest. A red and white striped pole or marker is visible, extending vertically from the bottom towards the top of the frame. The forest canopy is a mix of green and brown, suggesting some trees are bare. The sky is a pale blue.

2024

2024



Nitella opaca in lake Þingvallavatn

2024



Data

- Substrate
- ***Nitella* cover**
- ***Nitella* height**
- Depth range of *Nitella opaca*
- Visibility
- Water temperature
- Additional information
 - sticklebacks, zooplankton

Footage analysis

- Frames ca. 5 m apart
- 3 persons assess cover and height of *Nitella opaca*
 - results mostly conform
- Needs to be developed further

Thoughts on future monitoring

- Method works for the monitoring of *Nitella* for WFD
 - presence/absence data
- Practice needed
 - in the field
 - when analysing data
- Method might be used for other macrophytes (isoetids, elodeids) depending on the information needed

Thank you!

