

Managing Invasive Grass Carp in a Man-Made Lake: Ecological Impacts and Restoration Strategies for Reflection Lake, WA

Sam Savage, Patrick Bennett, Abel Cameron, John Bergin, Environmental Studies Department, Gonzaga University



Introduction:

- Reflection Lake is a man-made body of water located in Elk, WA.
- Currently, the lake contains an uncontrolled population of grass carp.
- Grass carp are a highly invasive fish species that are rapacious plant eaters and can disrupt aquatic ecosystems by decimating their plant population and destroying habitat and shelter for native species.
- Reflection Lake has little in the way of healthy aquatic plants.

Question:

- How can we work to decipher the presence, quantity, and impact of grass carp in Reflection Lake?
- How can researching the grass carp population contribute to improvements in overall ecosystem health and management strategies at Reflection Lake?

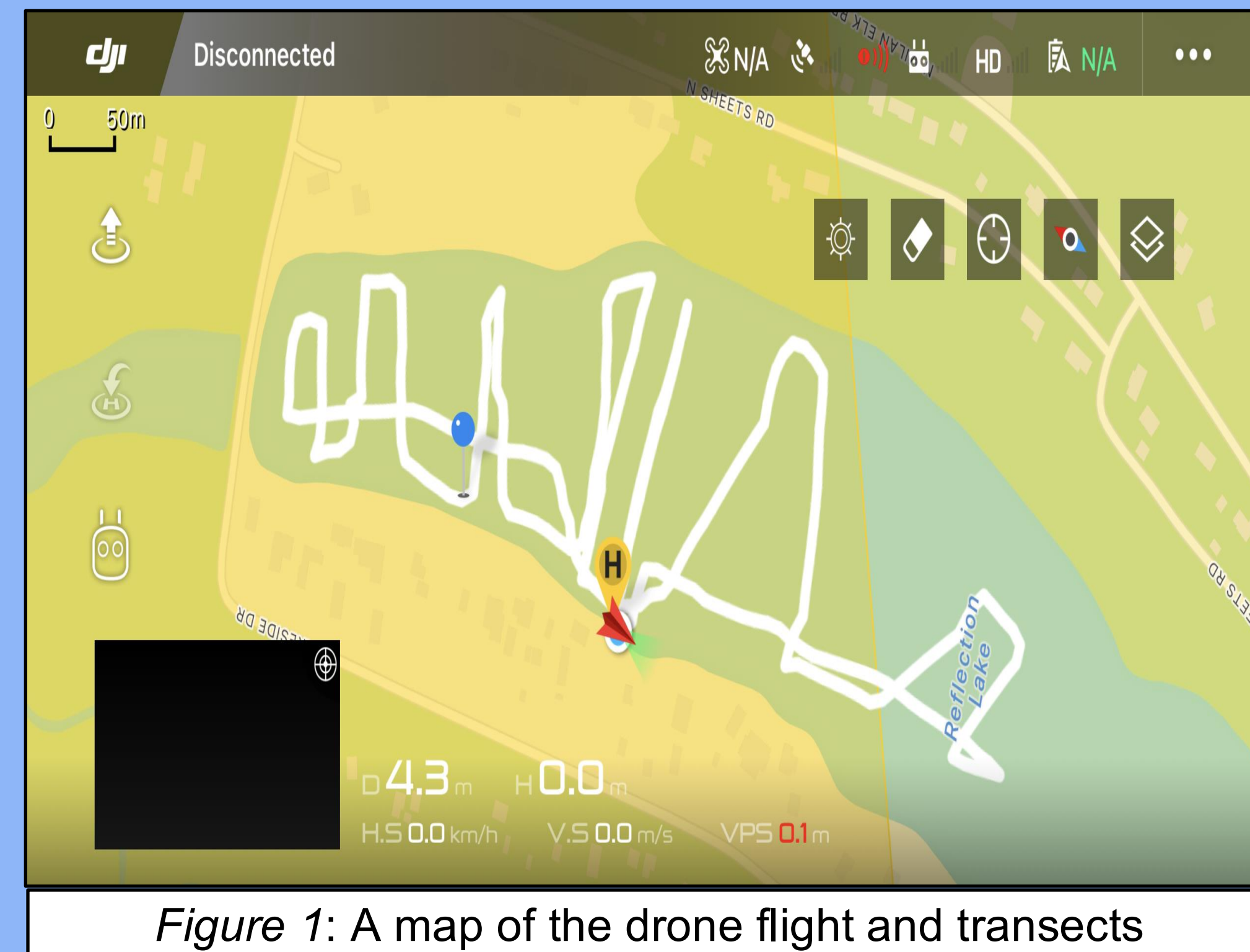


Figure 1: A map of the drone flight and transects

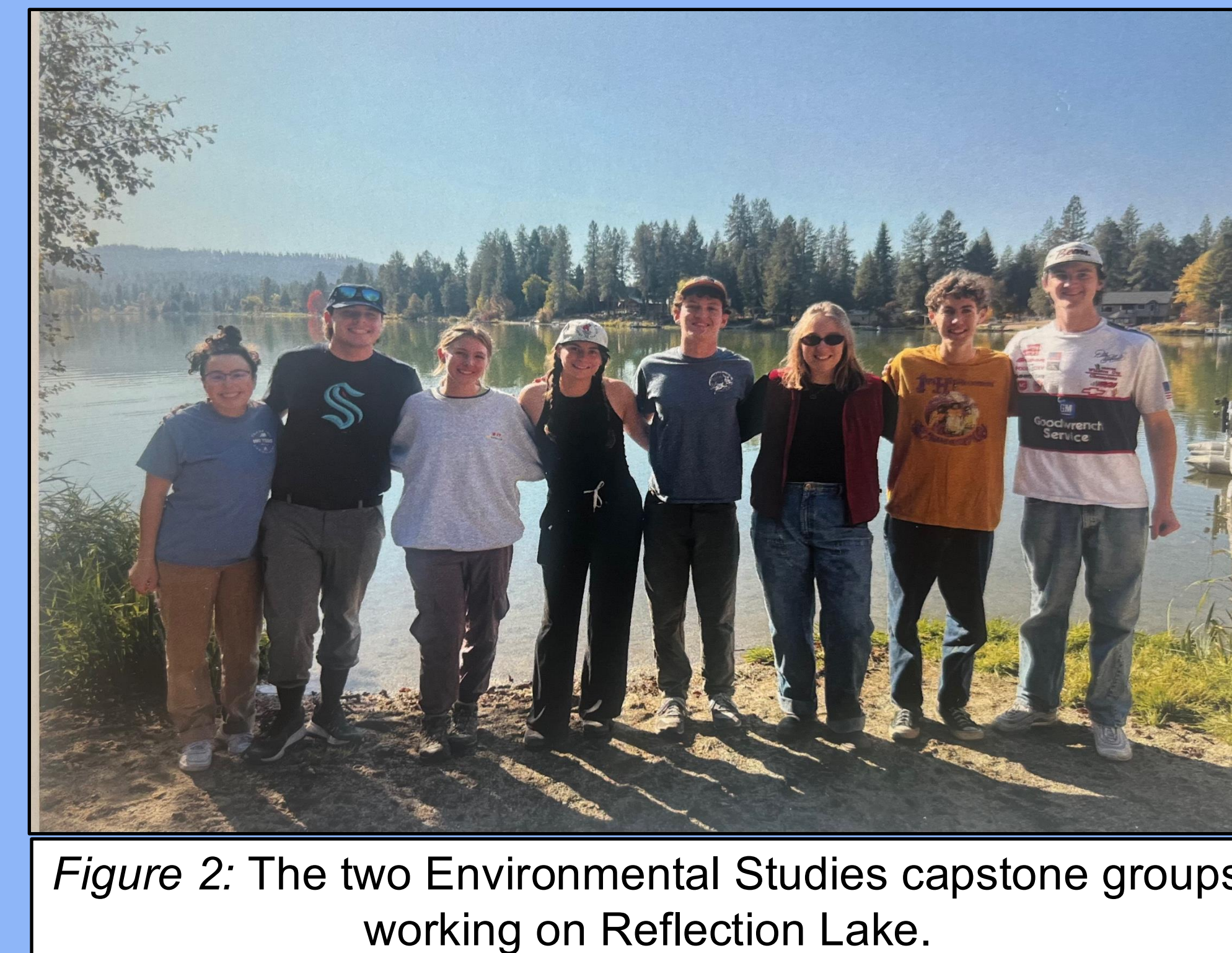


Figure 2: The two Environmental Studies capstone groups working on Reflection Lake.

Methods:

- **Literature Review** was conducted to better understand the behavior of grass carp and the history of Reflection Lake in order to effectively address the needs of the community.
- **Camera Trap Surveys** consisted of baited cameras suspended at a 5ft depth beneath the lake ice. Bait was suspended in holes 10ft from the cameras and positioned in view of the cameras.
- **Drone Surveys** consisted of 14 transects on which the drone was flown across the lake at a 10m elevation to record video looking for carp (Figures 1 & 3).
- **Boat-assisted Sonar Transect Surveys** utilized a small 12ft watercraft equipped with a Garmin LVS34 live sonar system to scan the Reflection lake Basin in real time (Figure 4).



Figure 3: A photo taken by drone of a school of 78 grass carp in Reflection Lake

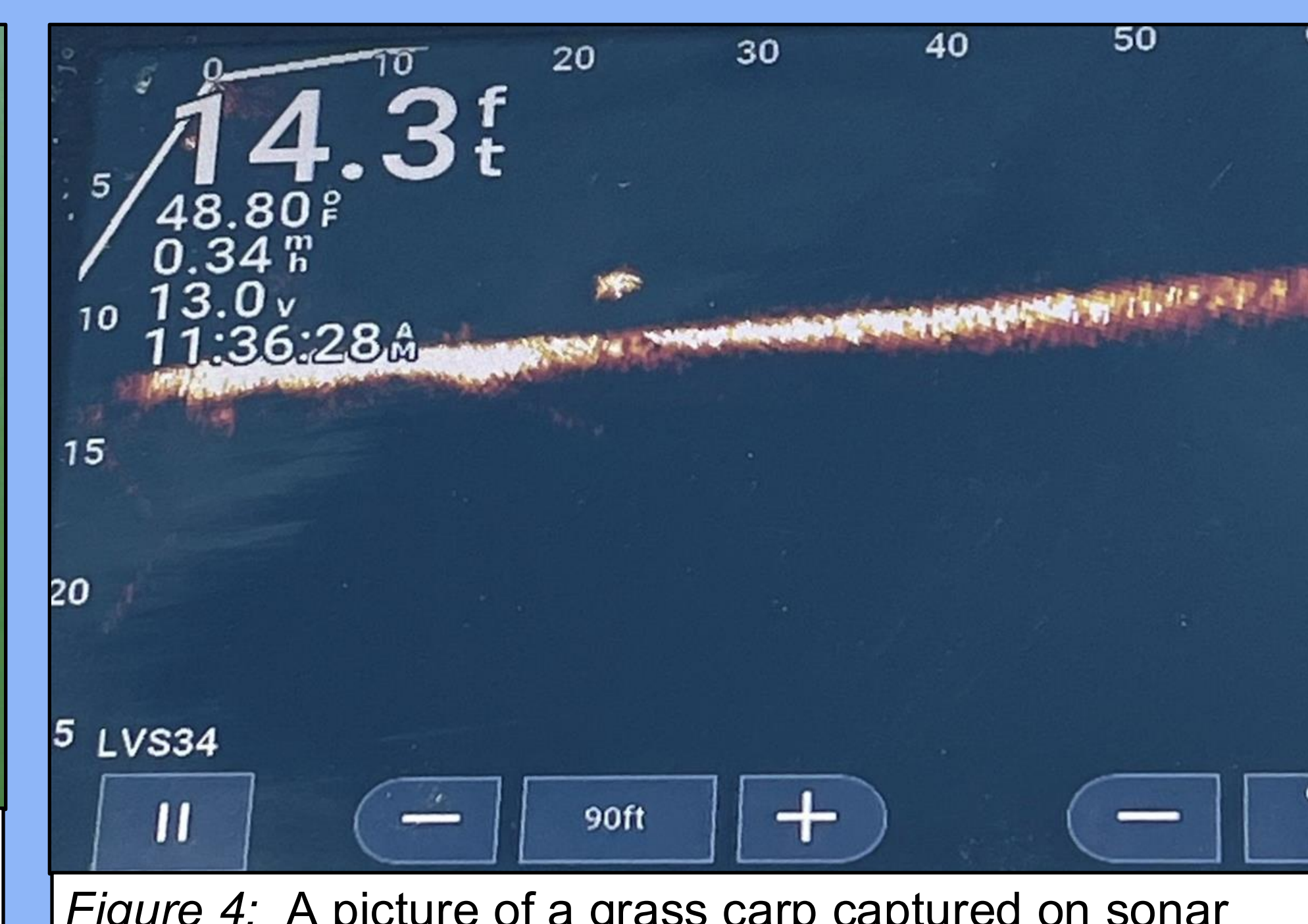


Figure 4: A picture of a grass carp captured on sonar

Results:

- In spring of 2025, we were able to confirm the presence of a significant grass carp population in Reflection Lake.
- We estimate the grass carp population to number at least 300 individuals.
- The large population of grass carp, lack of plant life, and success of the plant pen signify that grass carp are partially to blame for the poor ecosystem health of Reflection Lake.

Conclusion:

With unsustainable growth of the grass carp population decimating the overall health of the lake and its ecosystem benefits, future management plans should focus on removal of the carp and the introduction of native plant species.

Acknowledgements:

We want to thank Randy and Diana Kenworthy, Keith Cox, the Reflection Lake Community, and Jimmy Barrone for their assistance in making this project possible. Additionally, we would like to thank, Dr. Betsy Bancroft and Dr. Sammi Munson for their guidance during this project.