

Effect of Trout Stream Restoration on Woody Vegetation Composition

Ethan Adkins, Jaylen Vaughn

Dr. Amanda Little

Overview

Woody vegetation is important in riparian ecosystems⁴. Age of trout stream restoration and management practices combine to alter the woody vegetation density along riparian corridors.

Questions

Primary: How does age of trout stream restoration affect woody vegetation within a riparian ecosystem?

Secondary: What does the current distribution and density of woody stems suggest about best management practices for restoration maintenance, fishing access and biodiversity?

Study Site

The Gilbert Creek triangle is an area of publicly accessible land for both hunting and trout fishing. This area has had multiyear restoration projects starting in 2003 in hopes of improving the habitat for native brook trout.³

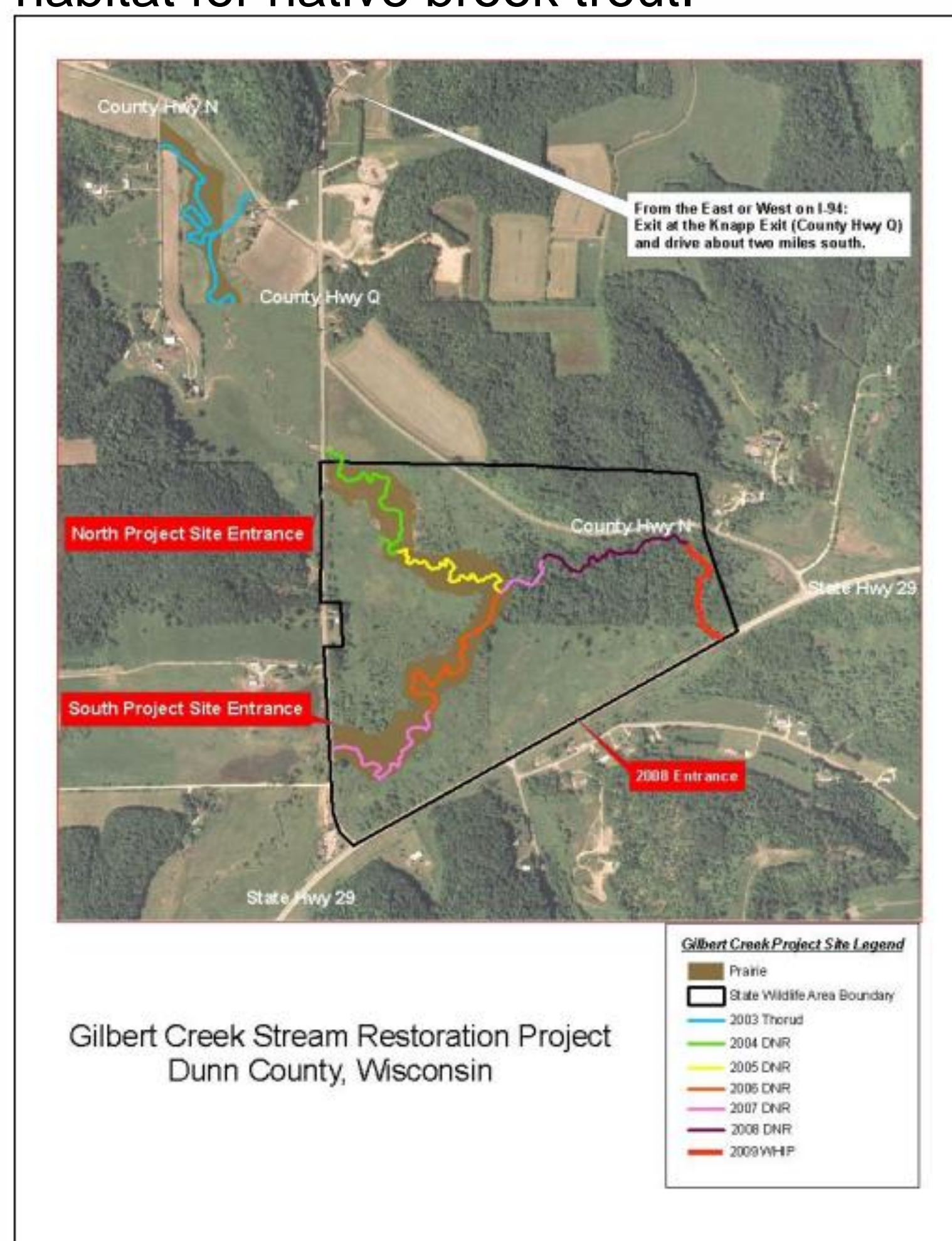


Figure 1: Aerial photo of Gilbert Creek study site

Methods

Located west of Menomonie, WI on Hwy 29. Belt plot of 1 m² quadrants created at 0 -1, 2 - 3, and 5 - 6 meters from the stream¹

Belt plot recreated every 30 meters along each bank of the stream (Fig. 2).

All woody stem species within the quadrant is documented on GPS form

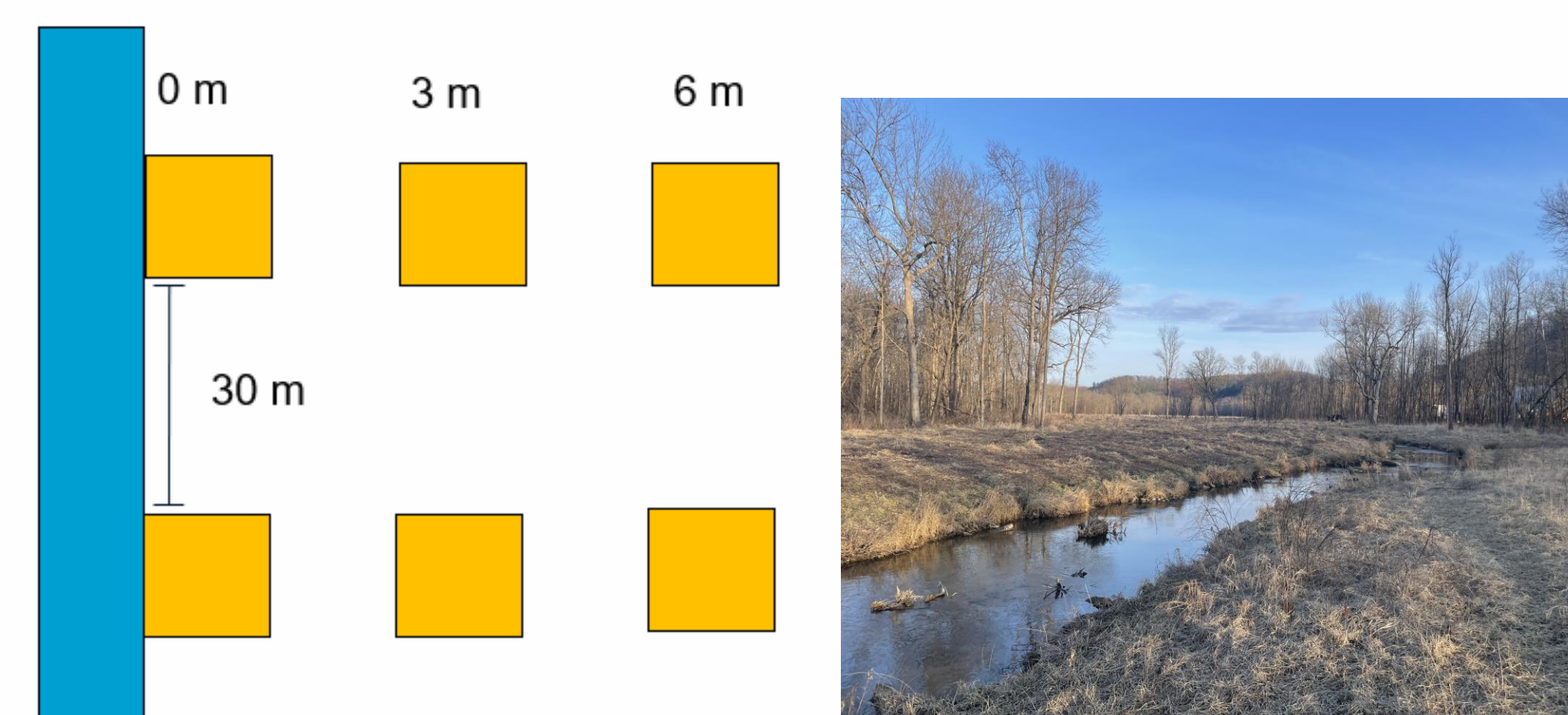


Figure 2: Vegetation analysis method for this study



Figure 3: Stretch of Gilbert Creek located south of 2009 reach

Woody Stem Distribution by Reach

Total stems differed significantly with reach (Kruskall-Wallis ANOVA, $P < 0.001$). Large ($P < 0.001$) and small stems ($P = 0.003$) also showed significant differences by reach (Fig.4).

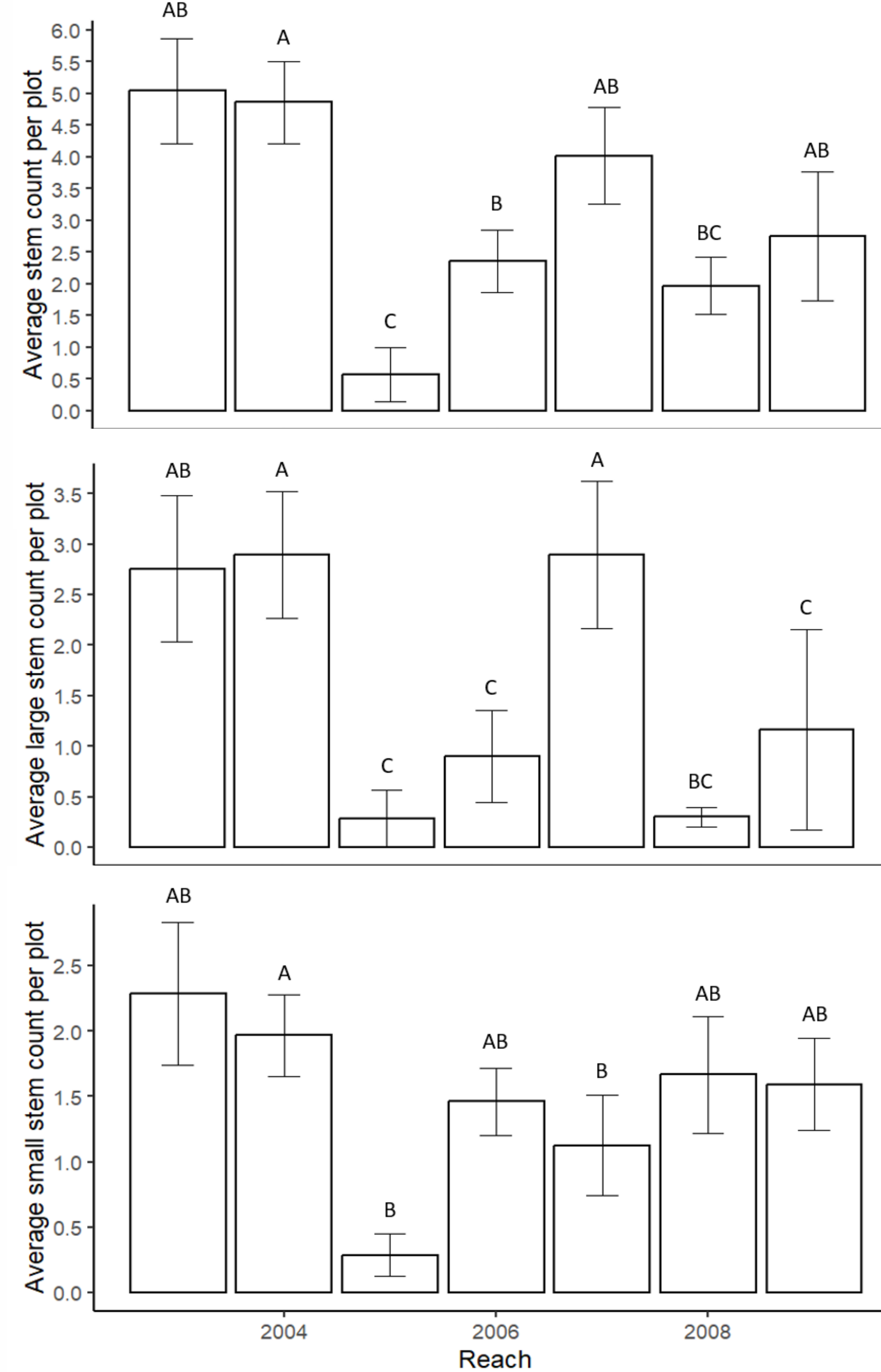


Figure 4: Average total, large, and small stem count per plot as a factor of reach

Mapping Stem Density

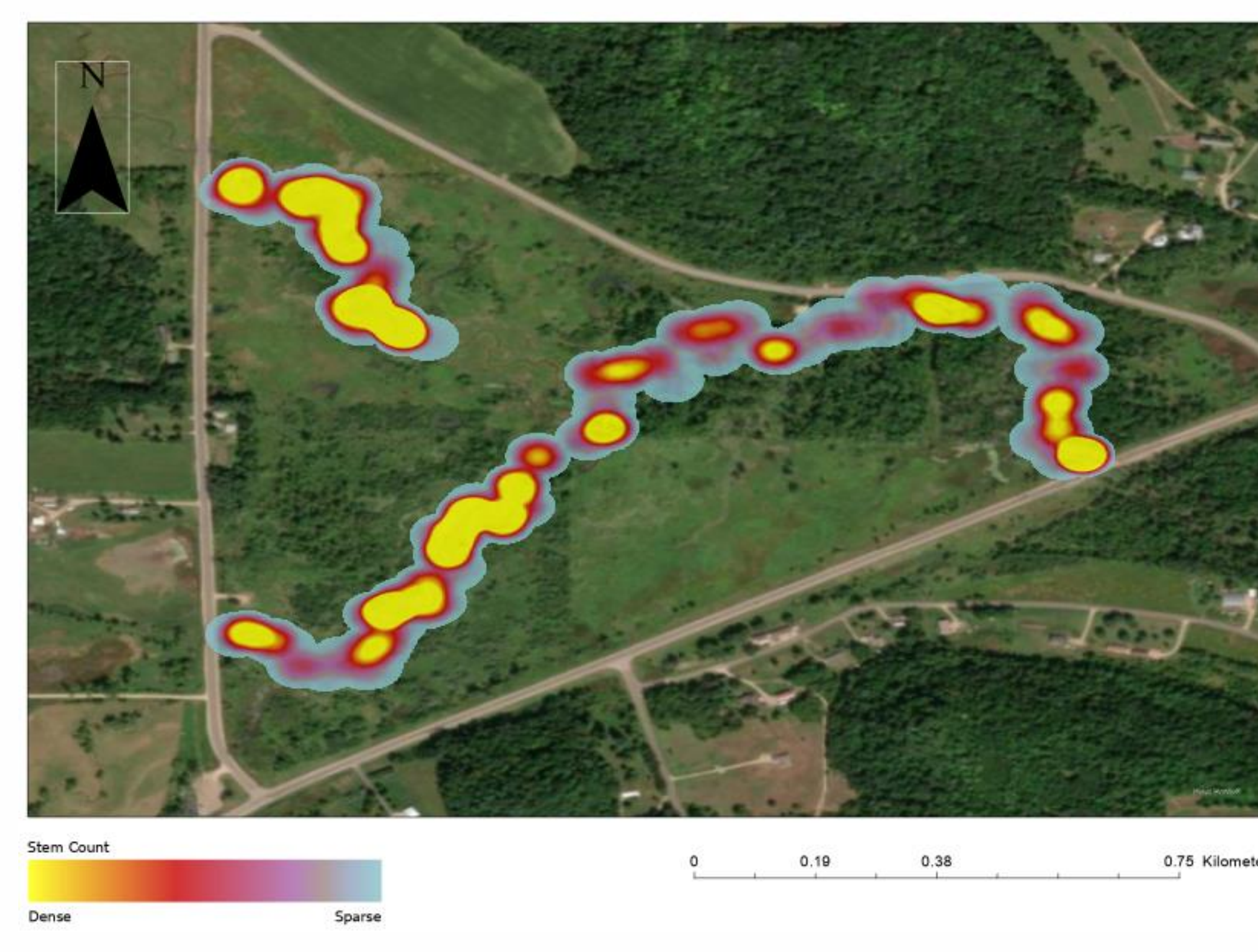


Figure 5: Heat map of total stem count to display areas of high stem density throughout the entire Gilbert Creek triangle

Woody Stem Distribution by Distance from Stream

Total stems differed significantly with distance (Kruskall-Wallis ANOVA, $P < 0.001$). Large ($P = 0.02$) and small stems ($P < 0.001$) also showed significant differences by distance (Fig 6).

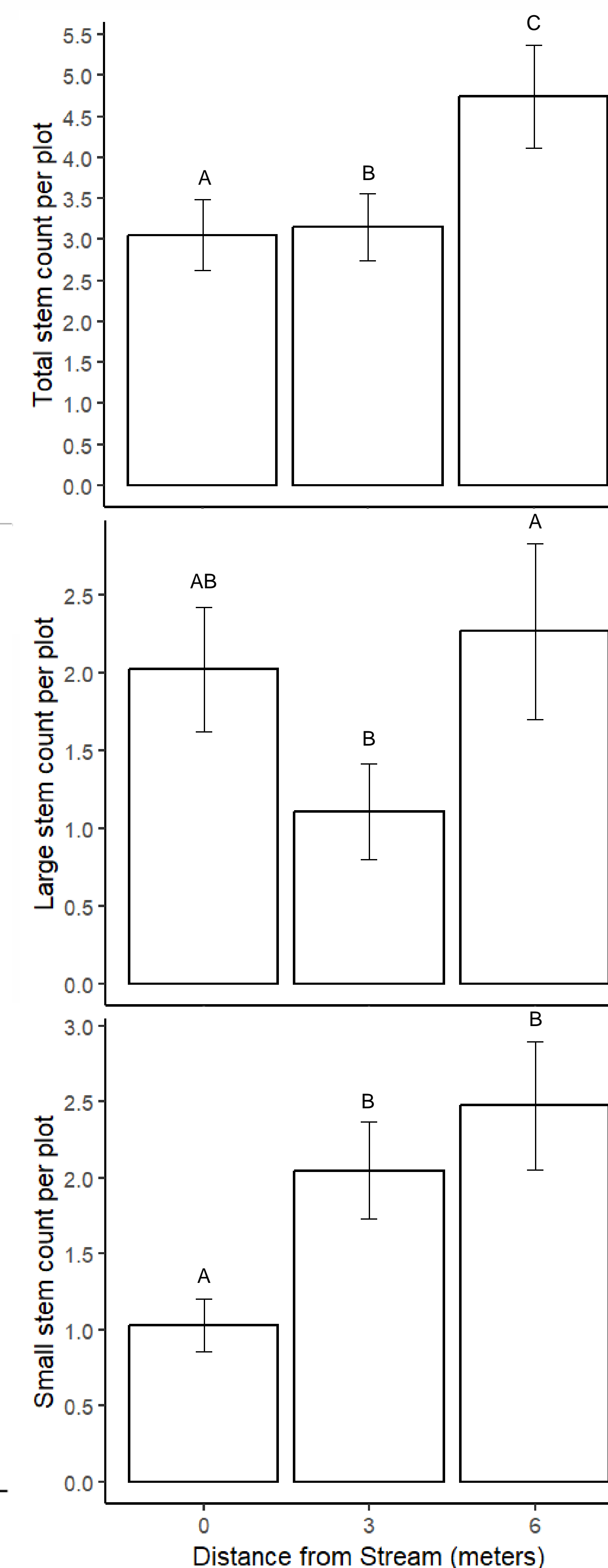


Figure 6: Average total, large, and small stem count per plot as a factor of distance from the stream

Woody Stem Distribution in Mowed vs. Un-mowed Banks

Total stems did not differ with mowing (Kruskall-Wallis ANOVA, $P > 0.05$). However, large ($P < 0.001$) and small stems ($P < 0.001$) showed significant differences by mowing (Fig 7).

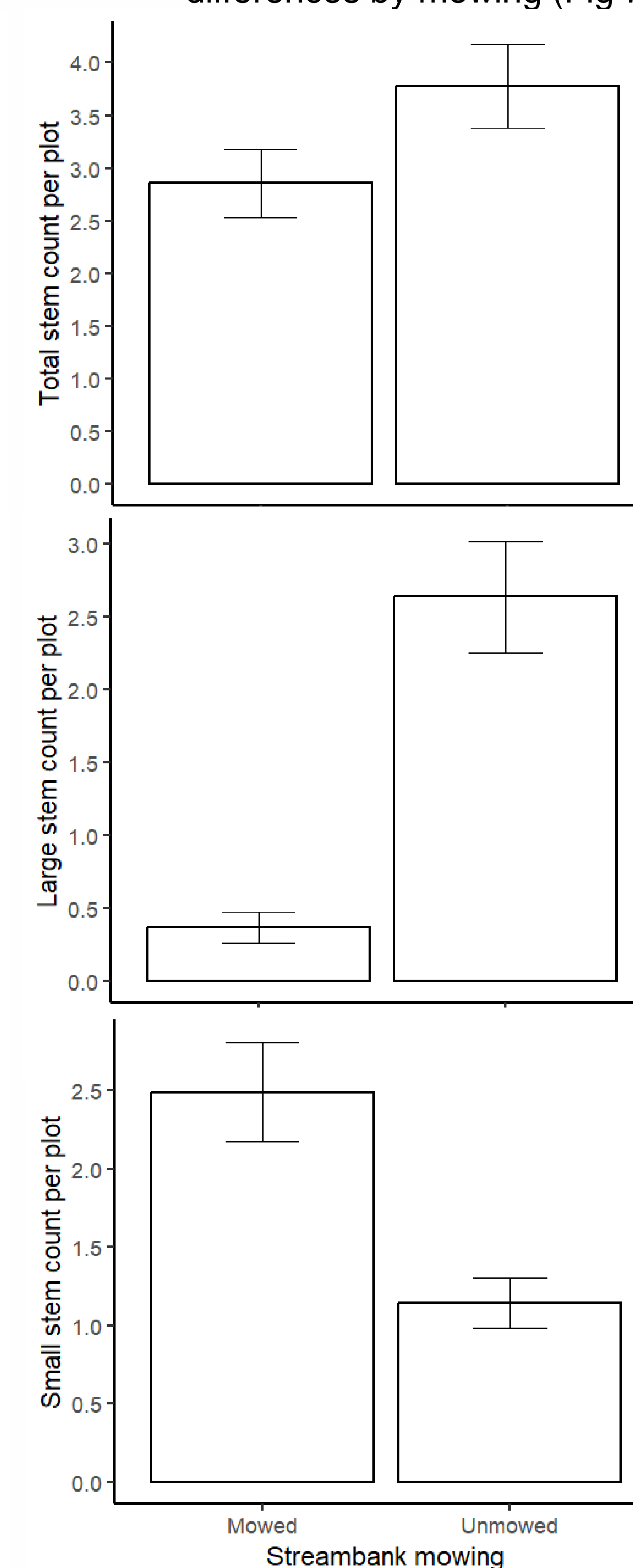


Figure 7: Average total, large, and small stem counts per plot as a factor of mowing



Figure 7: Large *Salix discolor* stem found in 2008 reach



Figure 8: Brook Trout caught in 2009 reach



Figure 9: Overhanging stems in 2007 reach

Conclusions

- Mowing and distance from the stream are key factors of large and small stem distribution
- Higher density of small stems can be found in mowed areas within plots farther from the stream
- Higher density of large stems can be found in un-mowed plots within plots both 0 meters and 6 meters from the stream
- Continued mowing increases fishing access, but promotes continued small stem growth
- The possibility of future prescribed fires could increase biodiversity and access while removing strong competitors^{2,5}

Acknowledgements

Thank you to the UW-Stout facility members Dr. Amanda Little, Dr. Nicole Hayes, and Dr. Julia Chapman for the guidance and equipment use for this capstone project. Thank you to the UW-Stout archives for research guidance on the history of Gilbert Creek. Special thanks to the Wisconsin DNR employee Nathan Anderson for supplying past restoration and management information of the site.

References

1. Dr. Amanda Little, January 23rd, 2024, University of Wisconsin-Stout Biology Department
2. Dwire, K.A., & Kauffman, J.B. (2003). Fire and riparian ecosystems of the western USA. *Forest Ecology and Management*, 178, 61-74
3. Nathan Anderson, February 8th, 2024, Wisconsin DNR.
4. Obedzinski, R. A., Shaw, C. G., III, & Neary, D. G. (2001). Declining Woody Vegetation in Riparian Ecosystems of the Western United States. *Western Journal of Applied Forestry*, 16(4), 169-181. <https://doi.org/10.1093/wjaf/16.4.169>
5. Olson, D. H., Anderson, P. D., Frissell, C. A., Welsh Jr, H. H., & Bradford, D. F. (2007). Biodiversity management approaches for stream-riparian areas: perspectives for Pacific Northwest headwater forests, microclimates, and amphibians. *Forest Ecology and Management*, 246(1), 81-107.