Comparison of Long-Term Recovery Between Managed and Unmanaged Reclaimed Mine Lands

Taylor Macy
Honors Tutorial College - Ohio University
Athens, OH
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Adviser: Dr. Natalie Kruse

Reclaimed Mine Lands

- Reclaimed to establish basic topsoil depth and biomass coverage
- Restoration after reclamation to re-establish original biological processes occurring before the disturbance

Evaluating Success of Disturbed Site

- Three main indicators
  - diversity
  - vegetation structure
  - ecological processes
- Important to consider native and invasive vegetation

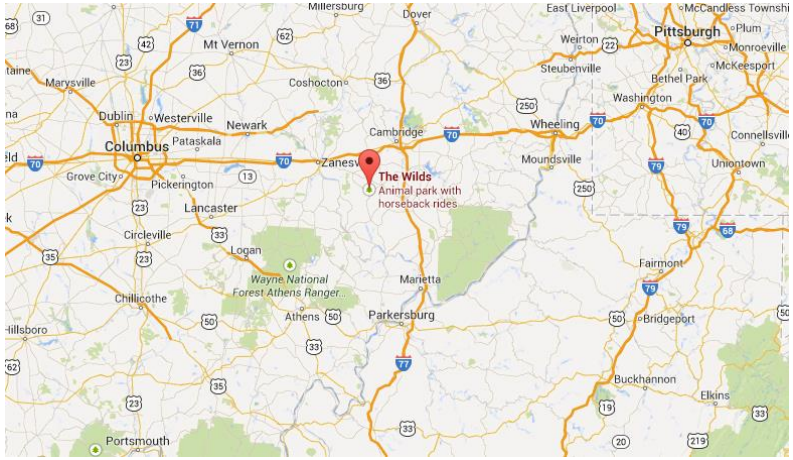
Objectives

- Compare success of sites that have undergone restoration after reclamation and sites that have not

- Evaluate species richness, vegetation diversity, and proportion of native to invasive plants between sites

Survey Sites

- Wilds sites with both reclamation and restoration
- AML totaling 108 acres (21 total sample sites)



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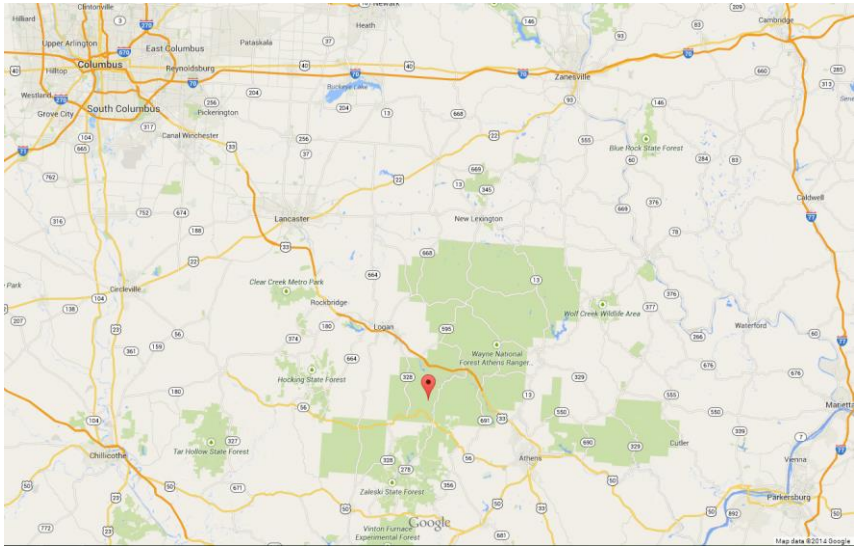
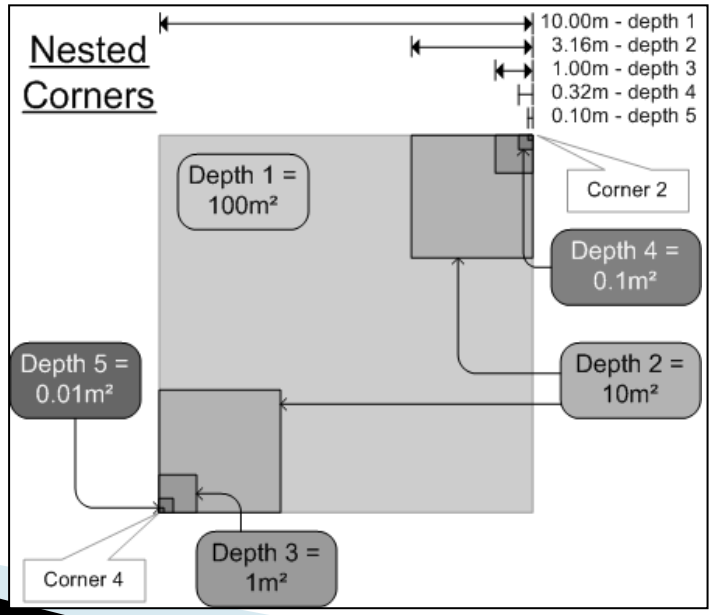
Survey Sites

- 6 sites in Ohio reclaimed mine lands with only reclamation (21 total sample sites)
- Flint Run, Salem Road, East Branch, Harble Griffith, Orland, and Rock Run
- Located in 4 counties in Ohio



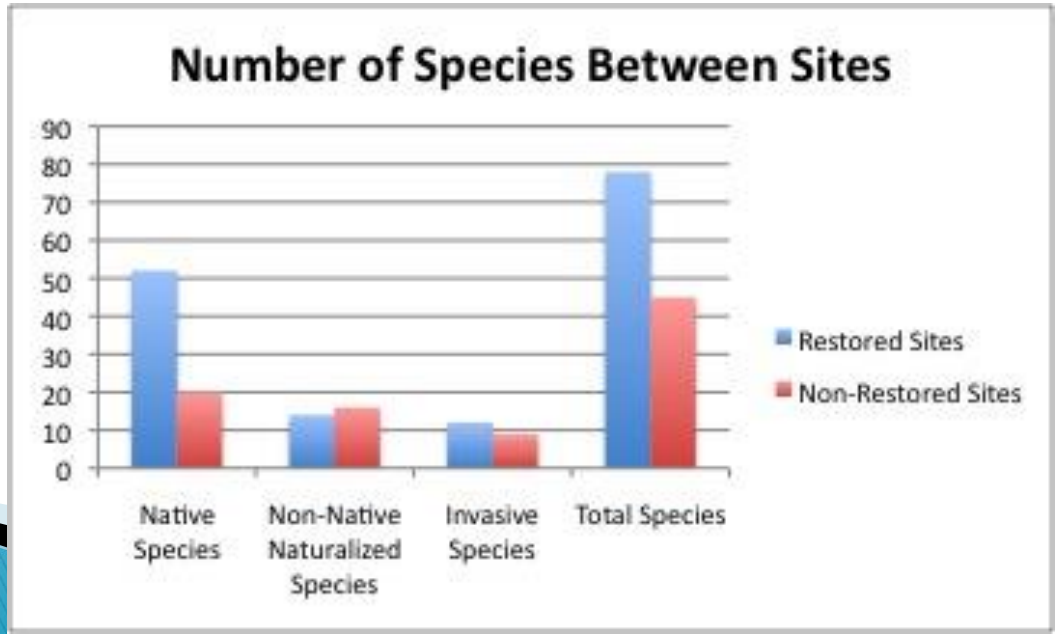
Methods

- Modules points were chosen by using a random GPS point generator
- 10 m x 10 m module laid out in the northeast direction
- Species present at 10cm, 32 cm, 1m, 3.2 m, and 10 m of two corners were recorded along with abundance



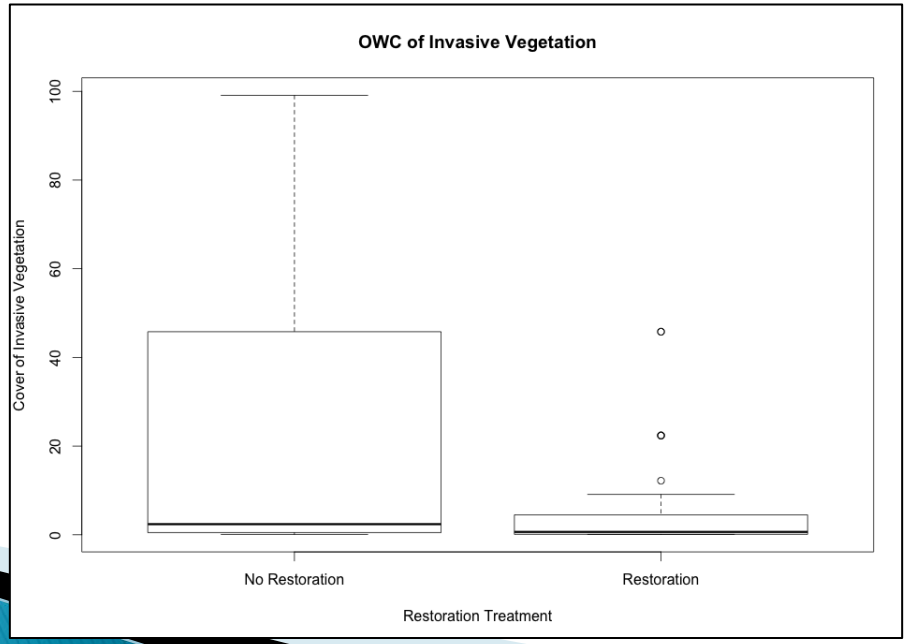
Results

- Seventy-eight total species found in restored areas
  - Fifty-two were native, fourteen were non-native naturalized, and twelve were invasive
- Forty-five total species were found in non-restored areas
  - Twenty of these species were native, sixteen were non-native naturalized, and nine were invasive



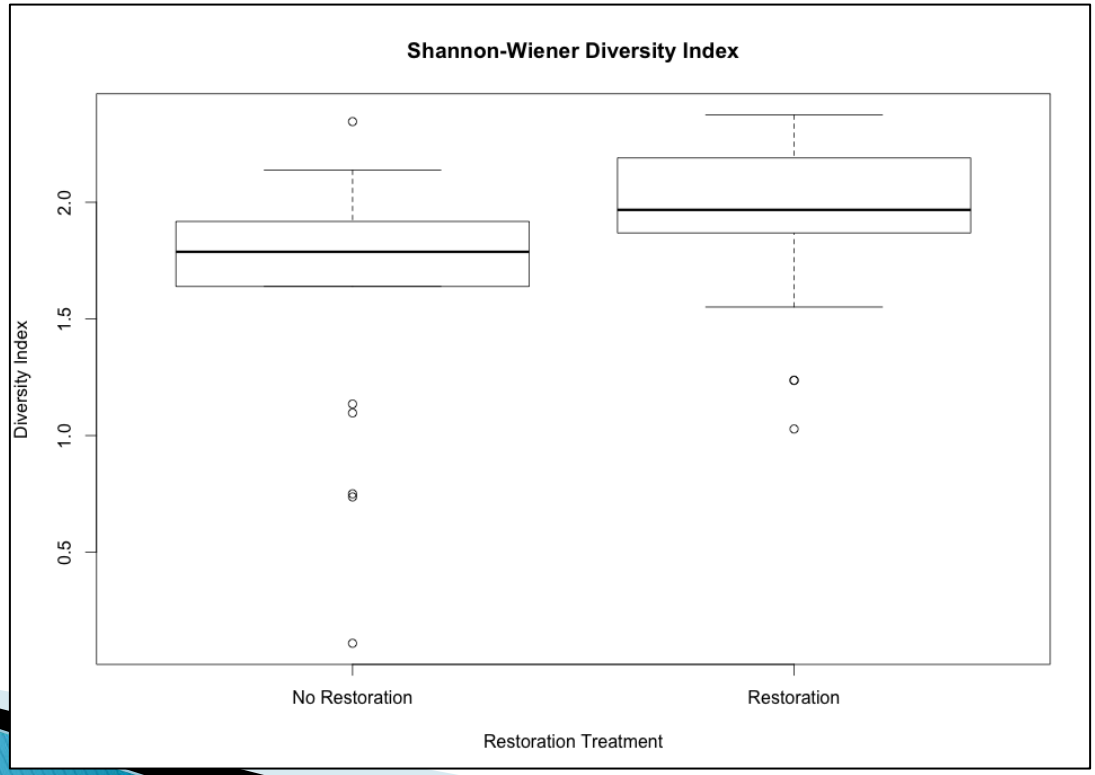
Results

- OWC (occurrence weighted cover) of native and non-native naturalized species between sites were not significantly different
- OWC (occurrence weighted cover) of invasive species between sites were significantly different (Welch two sample t-test, P=.000574)



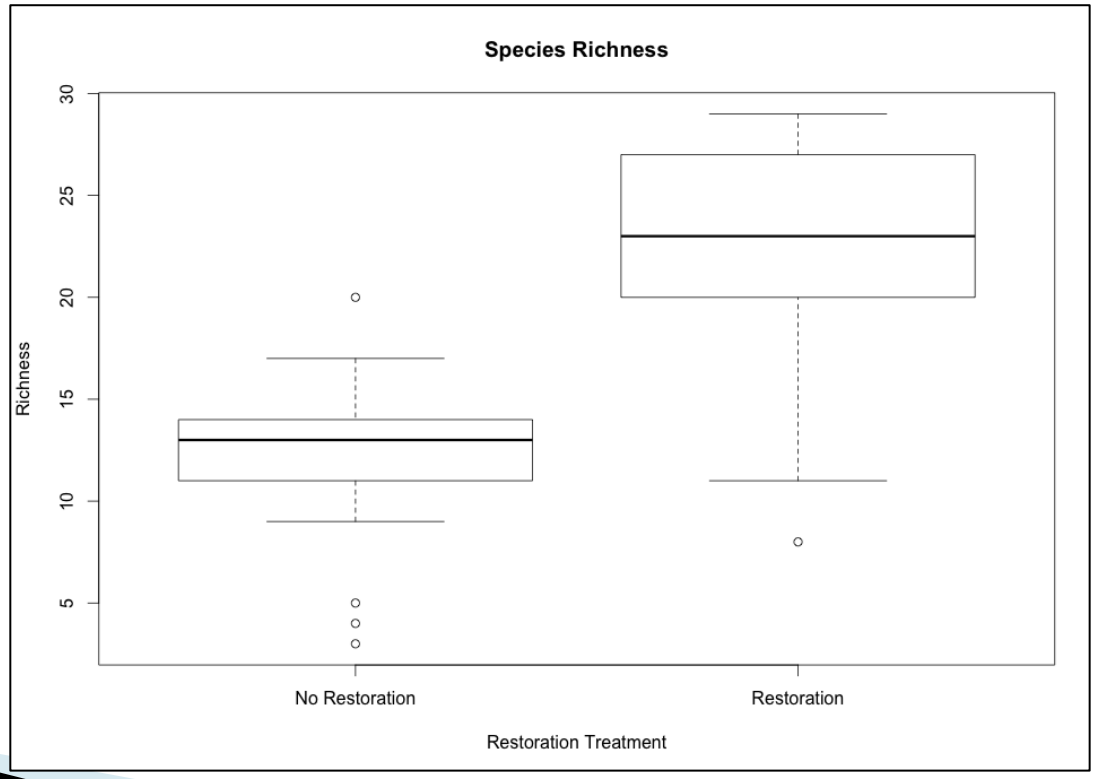
Results

- The average Shannon-Wiener diversity index between sites was significantly different (Welch two sample t-test, P=9.309E-14)



Results

- Average vegetation richness was significantly different between sites (Welch two sample t-test, P=2.236E-7)



Results

- Significant difference between organic matter at managed and unmanaged sites
- However, managed sites were restored earlier and the results may be skewed (Chambers et al., 1994)

Discussion

- In this study restoration did not significantly increase the overall establishment of native plants
- However, restoration is able to combat the invasion of exotic species, increase species richness, and increase species diversity
- Higher diversity index indicates high health of a plant community (Drexler, 2002)
- Also, correlates to a higher ability to adapt to change or disturbance (Drexler, 2002)
- Close relationship between species diversity and ecosystem function (Peterson et al., 1998)

Conclusion

- The purpose of reclamation is to restore a disturbed site to a state of equal or greater value than its pre-disturbance condition (ORC, 2009), and the results from this study confirm that current reclamation regulations do not attain this goal when vegetation richness and abundance is considered.
- Post-reclamation vegetation management is shown to increase vegetative species richness and abundance, and increase resistance to invasive species.

http://www.ma[illegible]biol/biomes/images/succession/wildsbm.jpg

Thank you!

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