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)
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 10 cm, 32 cm, 1 m, 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, $P=0.000574$).
Results

- The average Shannon-Wiener diversity index between sites was significantly different (Welch two sample t-test, $P=9.309\times10^{-14}$)
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)
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.
Thank you!
References Cited


McGowan, K.J. and Bokhour, T.A. Small mammal populations on Ohio USA strip-mined lands reclaimed with herbaceous vegetation under old and new reclamation laws. Ohio Journal of Science 86: 29-32.


