



Small but mite-y: Soil invertebrates in reclaimed coal mines

Poster #10

Stephanie Chute-Ibsen¹ and M Anne Naeth¹

BACKGROUND

Human activities and disturbances are decreasing global biodiversity and critical habitat types

- Land reclamation returns disturbed land to a usable state; in Alberta, industry is legally required to reclaim and monitor any disturbed lands. Regulations ensure disturbed lands are returned to a productive state; indicators include soil and vegetation properties, but fail to consider ecosystem complexity and function.

Are current reclamation indicators effective? Can we ensure long-term reclamation success?

- Soil invertebrate diversity and composition are directly linked to ecosystem health, biodiversity, function, and stability; presence or absence of specific soil invertebrate groups can influence reclamation outcomes
- Two forest reclamation sites and an undisturbed forest at Genesee Coal Mine southwest of Edmonton, Alberta were assessed using current reclamation criteria and overall soil invertebrate abundance and composition
- Key soil invertebrate groups were identified and differences between research sites explored

RESULTS

- Most abundant invertebrate classes collected were Oribatid, Prostigmatid, and Collembolans, compromising 29.3%, 31.4%, and 31.3% of the total individuals, respectively.



Oribatid mites: slow, heavily armoured, low reproductive rates, contribute to soil organic matter



Prostigmatid mites: soft bodied, often prey, quick reproductive rates, diverse feeding habits



Collembola: Springtails, omnivores, often prey, very mobile due to jumping appendage (furcula)

- Overall soil invertebrate abundance was significantly different between the research sites; the undisturbed forest had significantly higher soil invertebrate abundance in soil and litter samples compared to reclamation sites
- Oribatid mites and Collembolans were strongly significantly positively correlated with soil organic matter and litter, while Prostigmatid mites exhibit a weak correlation



Spruce Reclamation Site: lowest oribatid abundance of all sites, predator mite abundance similar to forest site



Forest Site: oribatid mites 3x, prostigmatid mites 2x, and collembola 1.5x higher abundance than reclamation sites



Aspen Reclamation Site: lowest collembola abundance of all sites, lower prostigmatid mite abundance than other reclamation site

CONCLUSIONS

- Oribatids mites are indicators of ecosystem recovery and these 10+ year old reclamation sites are lagging in oribatid mite abundance and diversity.
- Reports have shown that current reclamation practices, criteria and monitoring used in a majority of Alberta's certified reclaimed sites, **DO NOT** meet government standards. We need to do more to ensure reclaimed systems will be successful especially in the wake of climate change.

We owe it to future generations to take care of our planet, there is no PLAN-et B.

PARTNERS



UNIVERSITY OF ALBERTA
FUTURE ENERGY SYSTEMS

¹ Department of Renewable Resources, University of Alberta, AB

