Assessing Toxicity Test Protocol of *Folsomia Candida* (Springtail) on Reclaimation Soil

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Introduction

- **Objective:** Assess the terrestrial toxicity test protocol using *F. candida* and determine baseline soil invertebrate survival in two different reclamation soils
- Oil sands operators are under a zero-discharge policy, which has resulted in over 1 billion m^3 of oil sands process-affected water (OSPW) stored in tailings ponds[1] [2]
- OSPW contain trace levels of naphthenic acids which are the primary contributors to environmental toxicity[1] [2]
- **Proposed Solution:** Remediate OSPW using constructed treatment wetlands[1] [2]
- Remediated OSPW may be released via seepage and overland flow onsite to upland reclamation areas as a potential pathway for disposal[1] [2]
- Use *F. candida* for soil toxicity testing to determine the impacts of releasing treated OSPW
- *F. candida* selected for their importance to the soil food web and ubiquity in soil ecosystems[3]

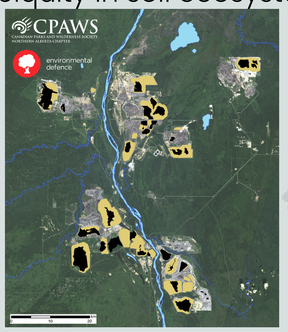

Figure 1: Tailings ponds size and location 2020

Materials and Methods

Treatment and Material Characterization

- Added 180 g of freshly salvaged peat, 180 g of stockpiled peat into small amber jars (5 reps for each soil type) and added reverse osmosis water until the material reached optimal moisture content (50%)
- Soil clumps needed to be 3-5 mm in diameter

Figure 4: Progress photos of *F. candida*

Extraction

- At the end of 28 days, soil poured into heat extractor
- Live *F. candida* evade heat and fall into collector containing antifreeze
- Count number of junvenile and adult *F. candida* in collector after 7 days

Data Analysis

- Compare variance between average number of living *F. candida* in two different peat types

Figure 2: Adult *F. candida*

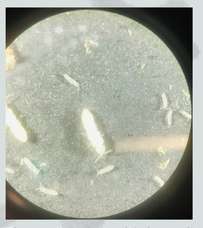

Figure 3: Adult with juvenile *F. candida*

Procedure

- Reared *F. candida* in plaster of paris for minimum of 2 weeks to acclimate culture in new environment
- *F. candida* fed yeast weekly and plaster of paris moistened to reach optimal conditions for rearing
- 10 adult *F. candida* added into each jar containing test soil
- Optimize moisture and air flow by checking on the jars daily for 28 days

Figure 5: Parts of the extrator

Discussion

Extraction still in process

Expected Outcomes

- Insignificant difference in population of *F.candida* between two different types of peat

Future Directions

- Use same procedure on springtails in OSPW and obtain toxicity curve of napthenic acid on *F. candida*
- Compare results with toxicity tests conducted using soil impacted by OSPW

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Canada

Syncrude

Citations

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