



Animal Data Summary – Minesite Area

Technical Meeting
February 2-4, 2005



Animal Data - Minesite

- Animal data include:
 - Small Mammals
 - Population Data
 - Tissue Data
 - Animals for Bioaccumulation Tests
 - Earthworm Bioassay
 - Bioassay Results
 - Tissue Data
 - Invertebrate Community Structure



2002 Animal Sampling

Location	Mammals	Earthworms	Soil Fauna
Ref Soil Area	10/10	10/10	10/10
Mine Site – Soil Area 3	10/10	10/10	10/10
Ref Scar	NA	10/10	10/10
Mine Site Scar – Soil Area 7	NA	10/10	10/10
Ref Riparian	10/10	10/10	10/10
Mine Site Riparian – Soil Area 9	10/10	10/10	10/10

Animal Data Quality

Objectives

- Small mammals a risk to predators that ingest them (whole body tissue concentrations; animals for bioaccumulation test)?
- Waterfowl a risk to predators that ingest them? (no ducklings found)
- Soil invertebrates a risk to predators that ingest them (whole body tissue concentrations from earthworm bioassay)?
- Soil invertebrate community at risk (earthworm bioassay and native soil fauna data)?



Small Mammals

Populations

Tissue Analysis

Animals for Bioaccumulation Tests



Data Collection

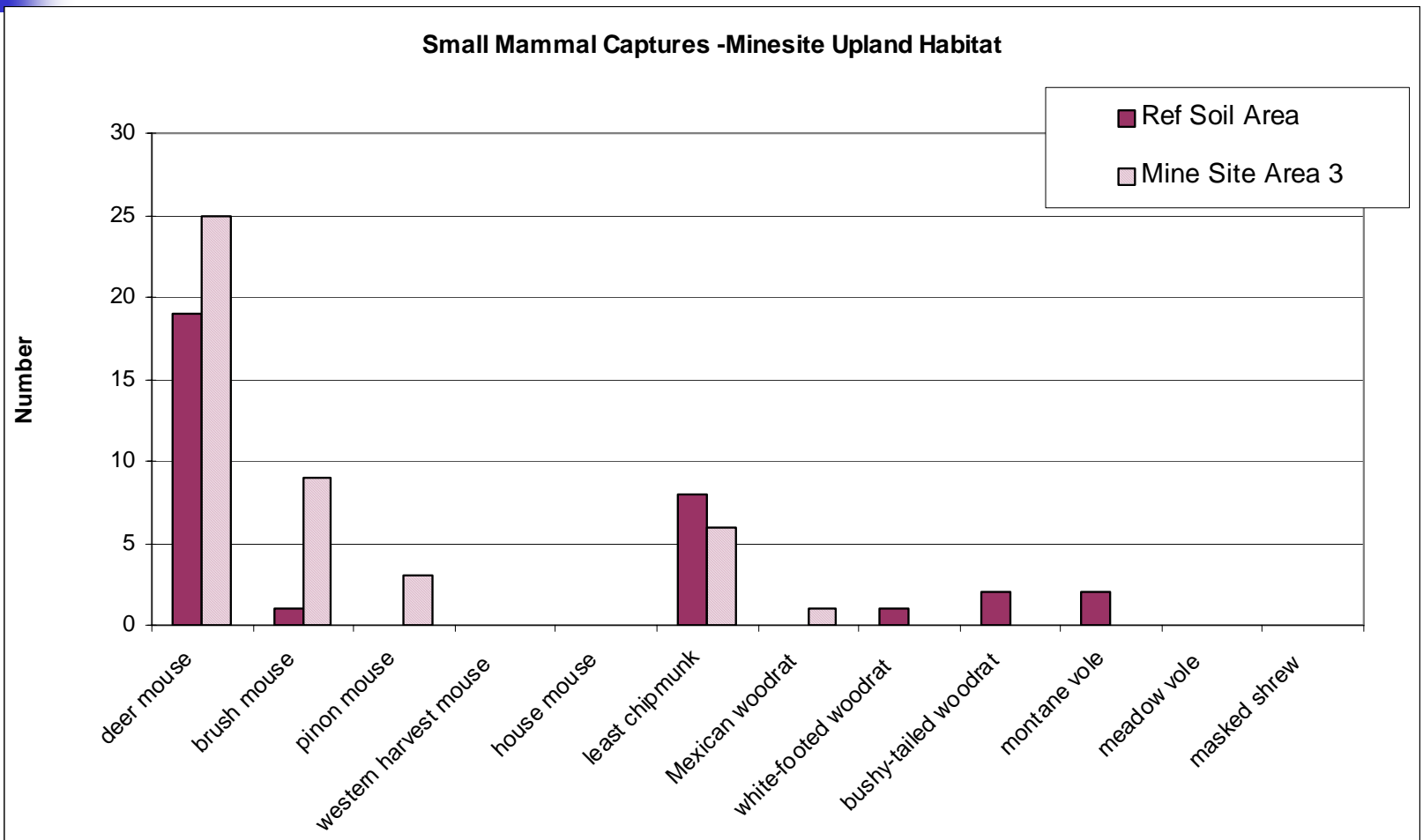
- Small mammals were collected in Fall 2002 and Spring 2003
- Snap trap and live trap
- 10 randomly located sampling locations within each exposure and reference area (40 total)
- Co-located with bioassay, vegetation, and soil samples
- Animals for bioaccumulation test from the toe of Capulin Rock Piles



Small Mammal Populations

- Population data are semi-quantitative
- Objective - obtain sufficient mass for tissue analysis
 - Achieved
- Different level of trapping effort applied at different locations
- Provides:
 - General overview of species
 - Suggests level of diversity and density

2002 Small Mammals - Results





Small Mammal Tissue Concentrations

- Small mammals collected, processed, shipped
- Whole body metals analysis
- Mine site animals collected in 2002
- 25 metals analyzed



Small Mammal Tissue Concentrations Summary

- No statistically significant differences in onsite whole body concentrations compared to reference
- BAFs all <1
- Met all DQOs

Animals for Bioaccumulation

Tests

- Large rodents were collected from the toe of Capulin Rock Pile
- Identified to species, sex, and weighed
- Dissected out kidney and liver
- Have carcass, liver, kidney metals data from five animals
- 25 metals analyzed
- Data can be used in BERA
 - Rock Pile compare to rest of Area 3
 - Individual variability
 - Uptake into various tissues

Animals for Bioaccumulation Test Summary



- Estimated whole body concentrations lower than or similar to animals from Ref Soil Area
- Use of whole body data will not underestimate risks to predators of small mammals
- Met all DQOs



Earthworm Bioassay - Minesite

Bioassay Results

Tissue Metals



Earthworm Bioassay - Minesite

- Bulk soils collected, shipped
- 60 sampling locations total
 - 10 minesite, 10 scar, 10 minesite riparian
 - 10 minesite ref, 10 ref scar, 10 riparian ref
- Laboratory control
- *Eisenia foetida* 28-d toxicity test
- Survival, growth, reproduction
- Surviving worms sent to lab for metals analysis



Earthworm Bioassay Summary

- Survival differed significantly only between the mine site scar-ref scar pair ($p < 0.01$)
- No statistically significant effect on growth or reproduction
- Is effect biologically relevant?
 - Difference of only 7%
 - $< 10\%$ in bioassays w/in “control” limits
 - Soil fauna data show scars poor habitat
- All DQOs were met

Earthworm Tissue Metals - Minesite



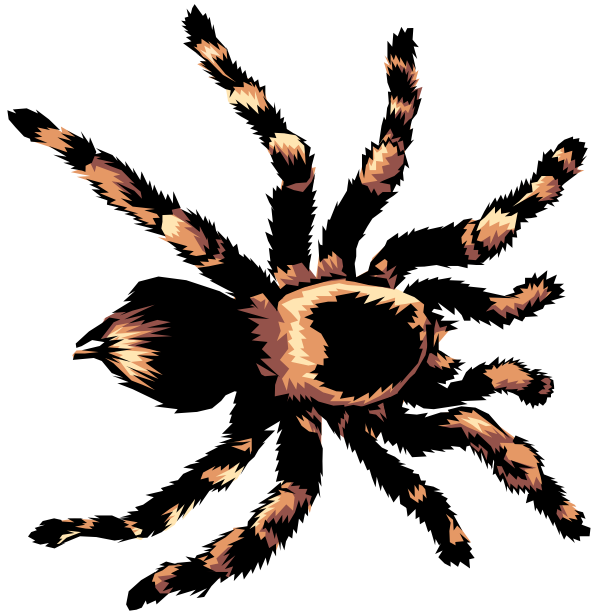
- Metals were measured in tissue and soil
- Data to be used in the BERA to quantify uptake in the dietary ingestion pathway
- Examine relationship between tissue and soil metals (i.e., bioaccumulation)
- 25 metals analyzed

Earthworm Tissue Metals

Summary

- No metals in earthworms significantly higher at Mine Site than in the corresponding reference area ($p < 0.01$)
- Some metals significantly higher in Mine Site Riparian than in Mine Site Riparian Reference ($p < 0.01$)
- BAFs < 1 for all metals except Cd, Se
- Use measured data to predict contribution from dietary pathway for animals consuming invertebrates in BERA
 - No one best site-wide way to model metal uptake in invertebrates
 - Less uncertain than modeling from literature
- DQOs met

Invertebrate Community Structure



Invertebrate Community Structure



- 60 soil samples collected in the field; brought to field lab
- Placed in Berlese funnel; applied light
- Bugs move downward away from light and dryness; fall into petri dish and drown
- Identified to lowest possible taxa and counted
- 2002 data semi-quantitative
 - Gives snapshot in time of diversity



Soil Invertebrate Community Structure Summary

- Scar areas had lower numbers of taxa
- Visually apparent during site surveys
- Low numbers of taxa throughout
- No effects in earthworm bioassay except scars
- DQOs were met