



Identification of Gardiner Basin Ecological Sites

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Project Goal and Objectives



C.E. Sloane

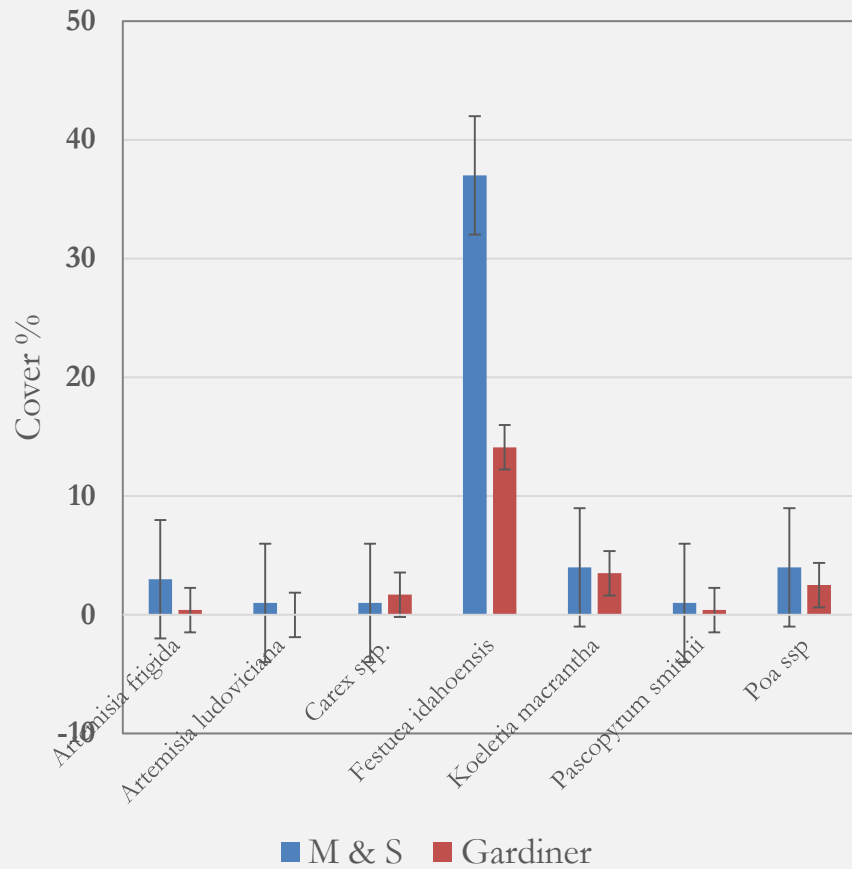
- Goals
 - Develop ecological baseline for comparison as system shifts from elk to bison dominated
- Objectives
 - Identify historic data sets that might serve as baseline
 - Construct reference from new field data

Challenges to Developing Site Descriptions

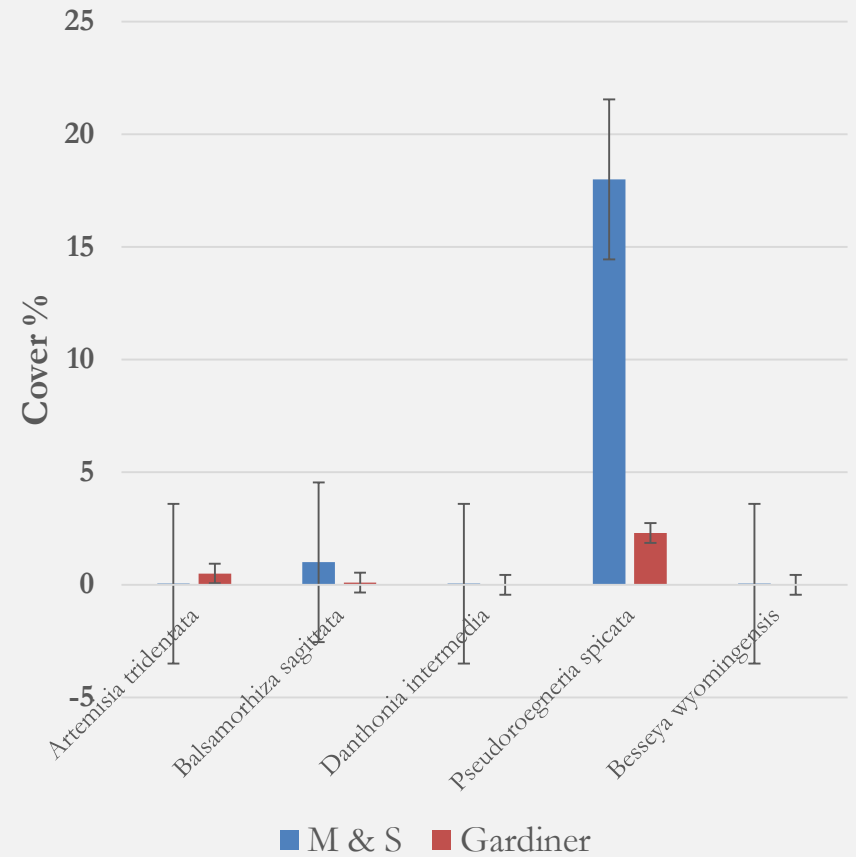
- Historic plant community descriptions
 - Too few exclosures (unique landform settings)
 - Long term monitoring sites (allotments)
 - Pre-FS grazing impacts (not well quantified)
 - Livestock + wildlife cycles (single season counts)
 - Technician variability (plant identification skills)
- Ecological Site Descriptions Incomplete or undeveloped
 - Transition models difficult because of heavy grazing, historic logging, mining and long term fire suppression

Historic Records

Mid Seral

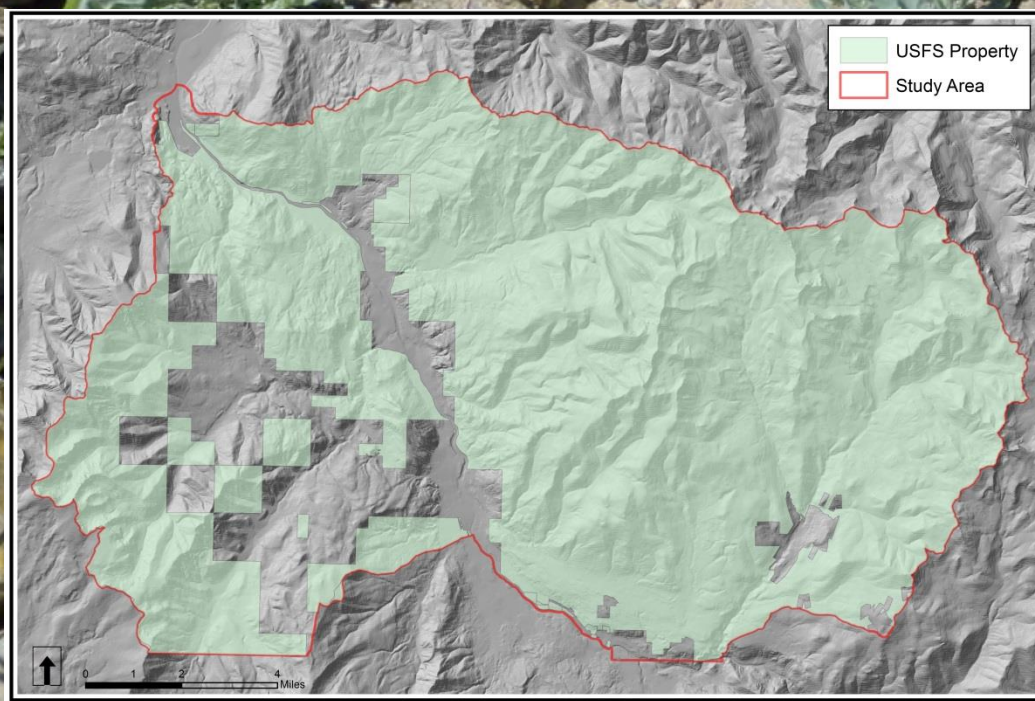
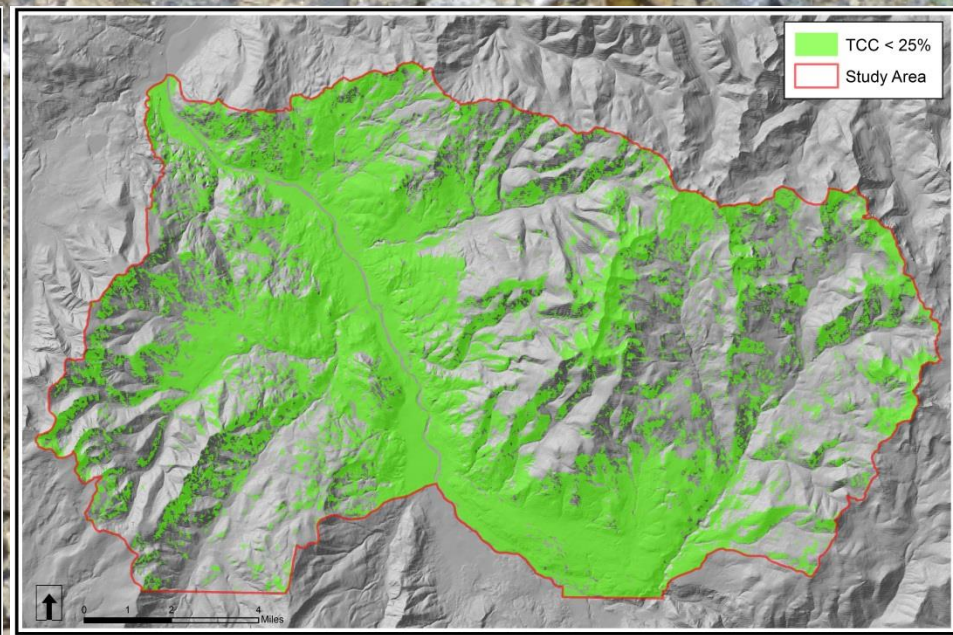
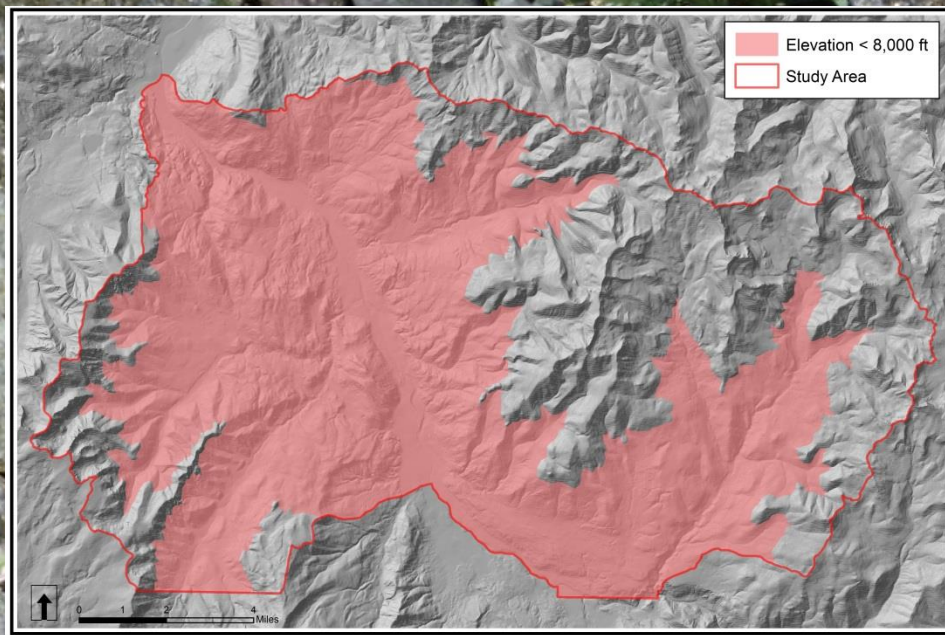


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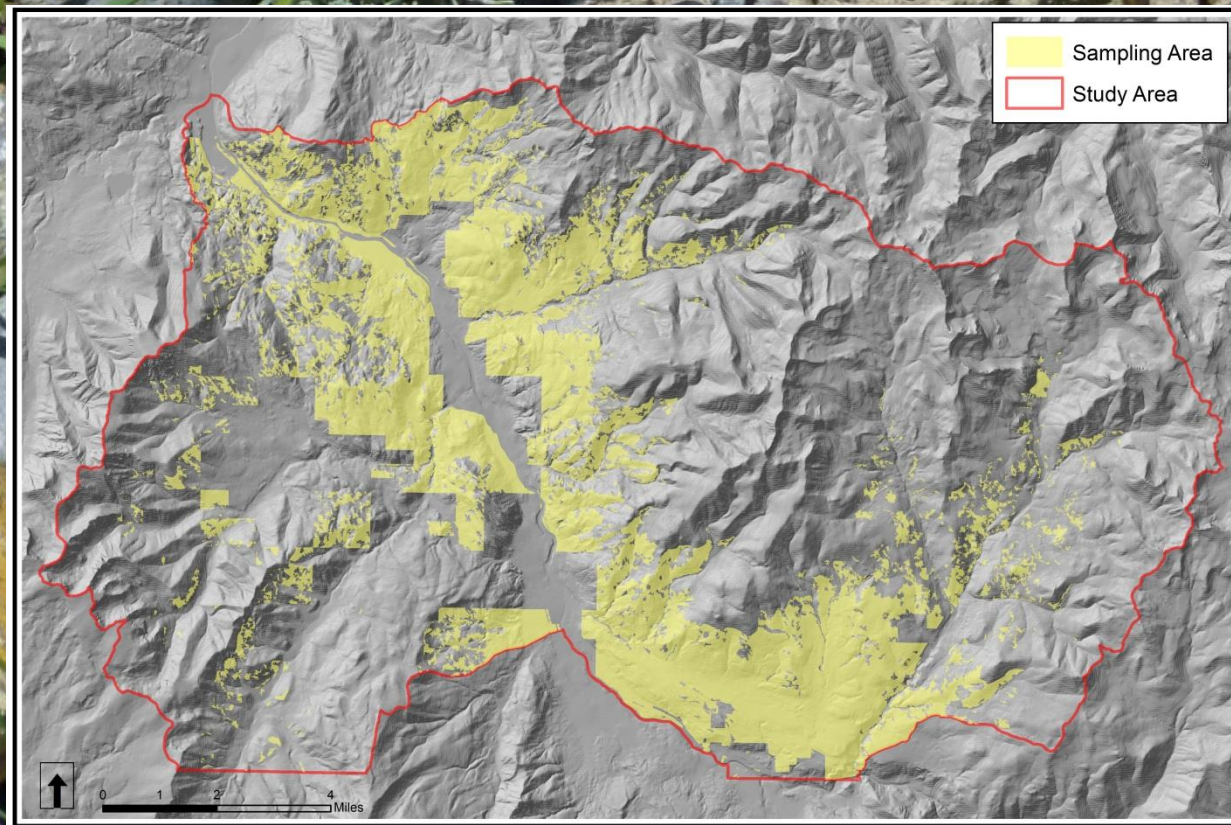
Field Data Collection to Construct Gardiner Basin Reference Baseline

- Sampling Stratification
 - Physical Layer
 - Tree canopy cover, slope, aspect, elevation, bedrock and unconsolidated
- Background Information
 - Custer/Gallatin NF Hydrologic and Geologic maps
 - Bison Landform preferences (NBR)



SAMPLING AREA

Study Area = 113,873 ac
Sampling Area = 29,368 ac



Geology

Aspect

Slope

Unconsolidated
 $\geq 20''$

SW

0-4%

4-15%

15-35%

35-60%

NE

4-15%

15-35%

35-60%

Bedrock Control
 $\leq 20''$

SW

0-4%

4-15%

15-35%

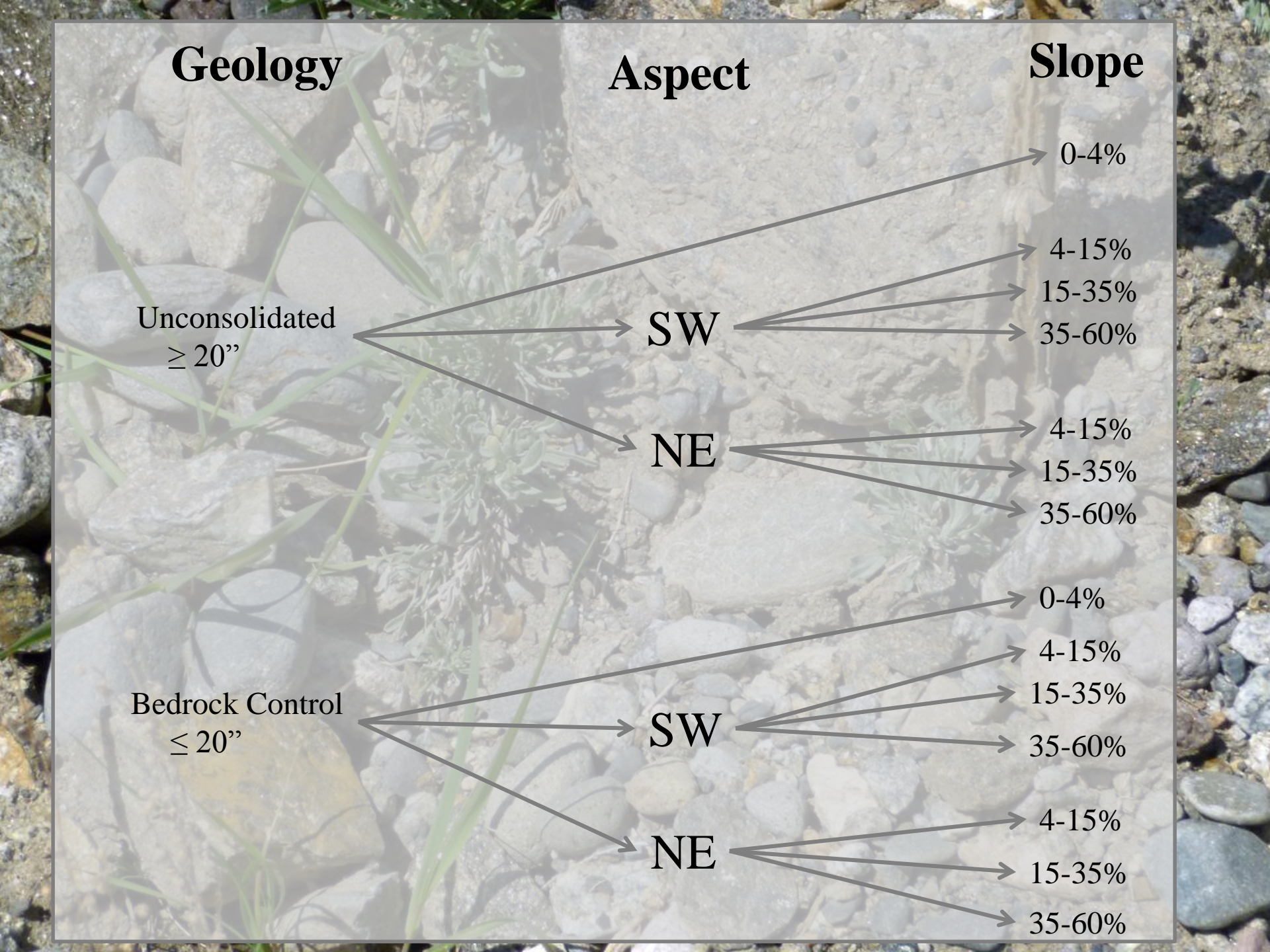
35-60%

NE

4-15%

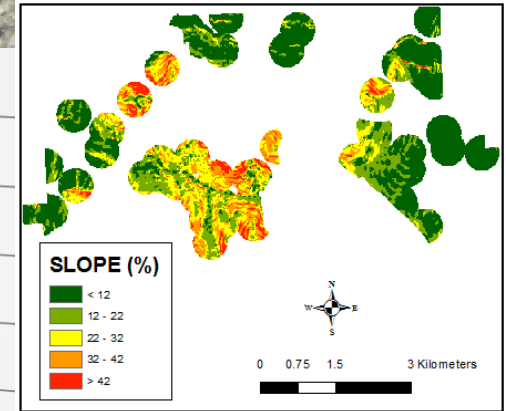
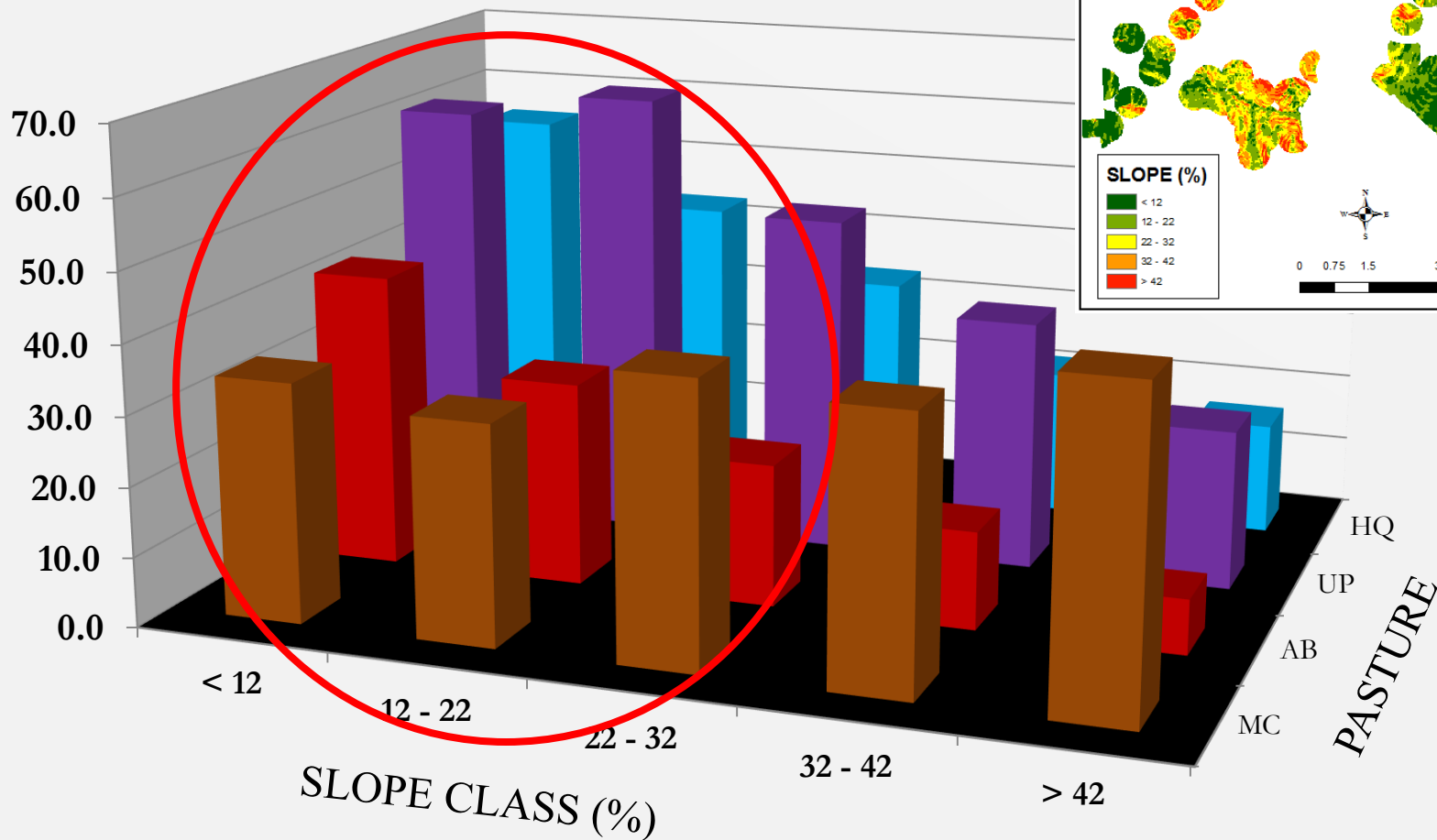
15-35%

35-60%

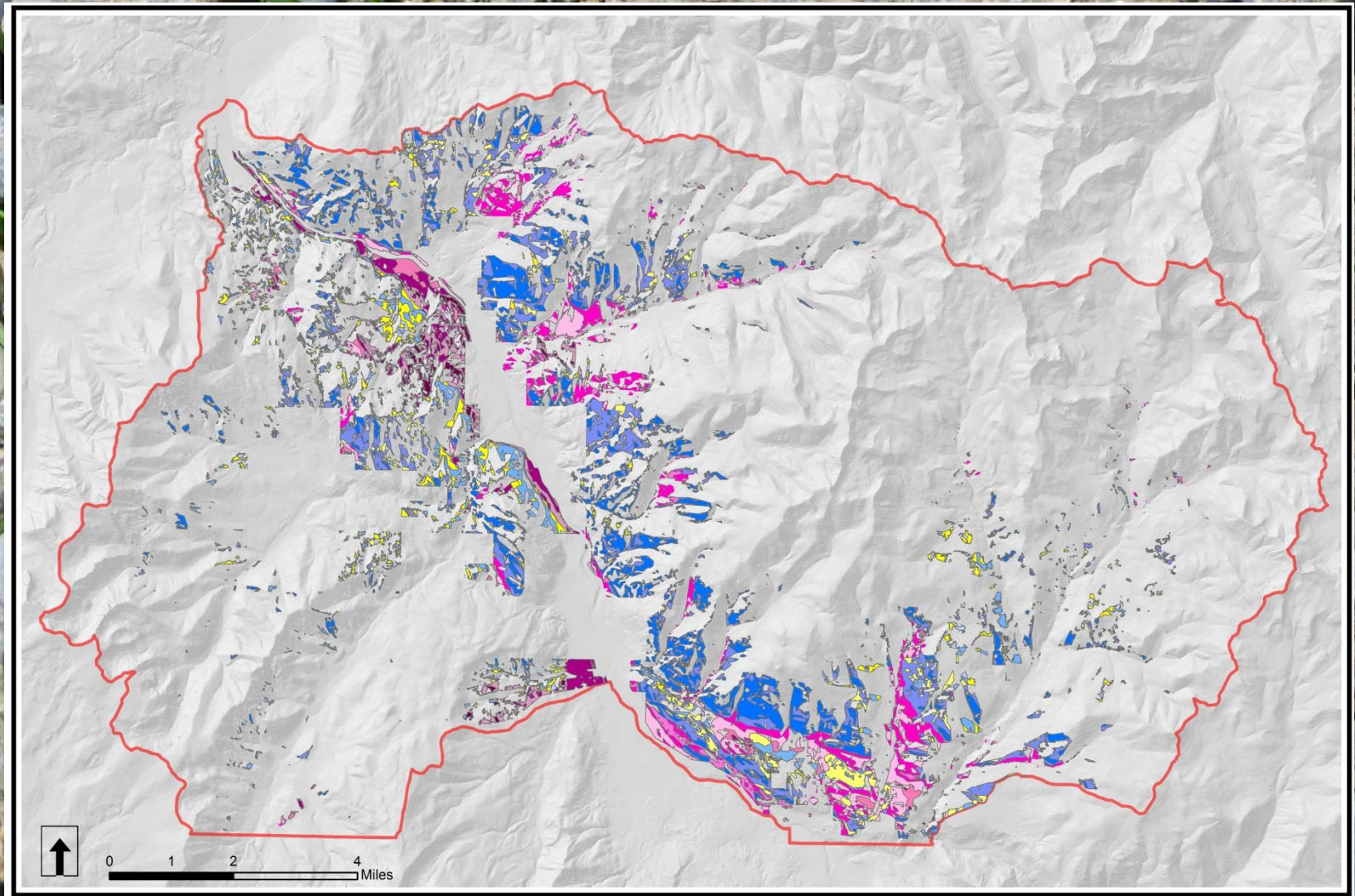


National Bison Range - Slope class

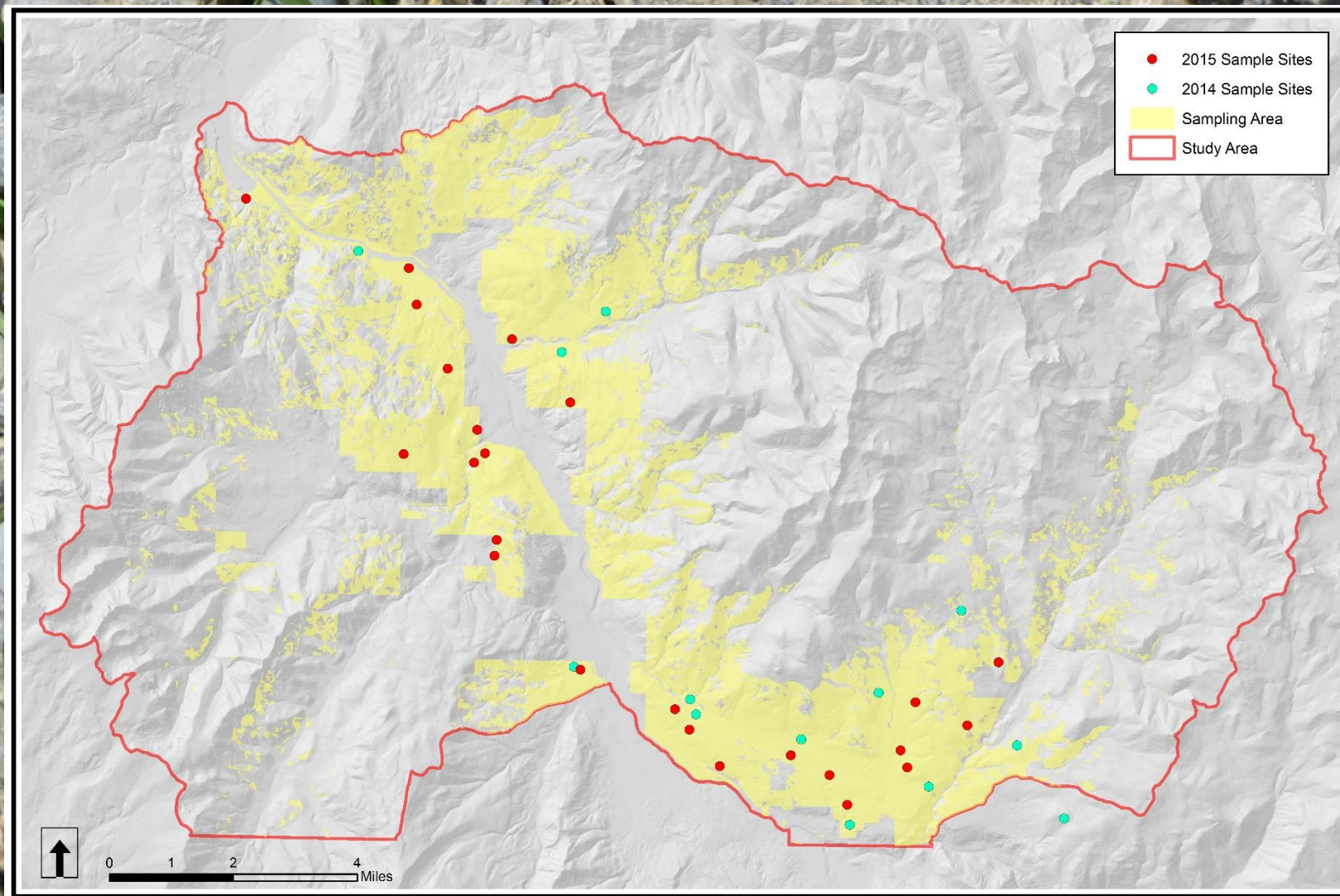
PREFERENCE (%)



SAMPLING CLASSES – Representing Sites Most Likely Used



2015 - SAMPLING SITES



Soil Layer

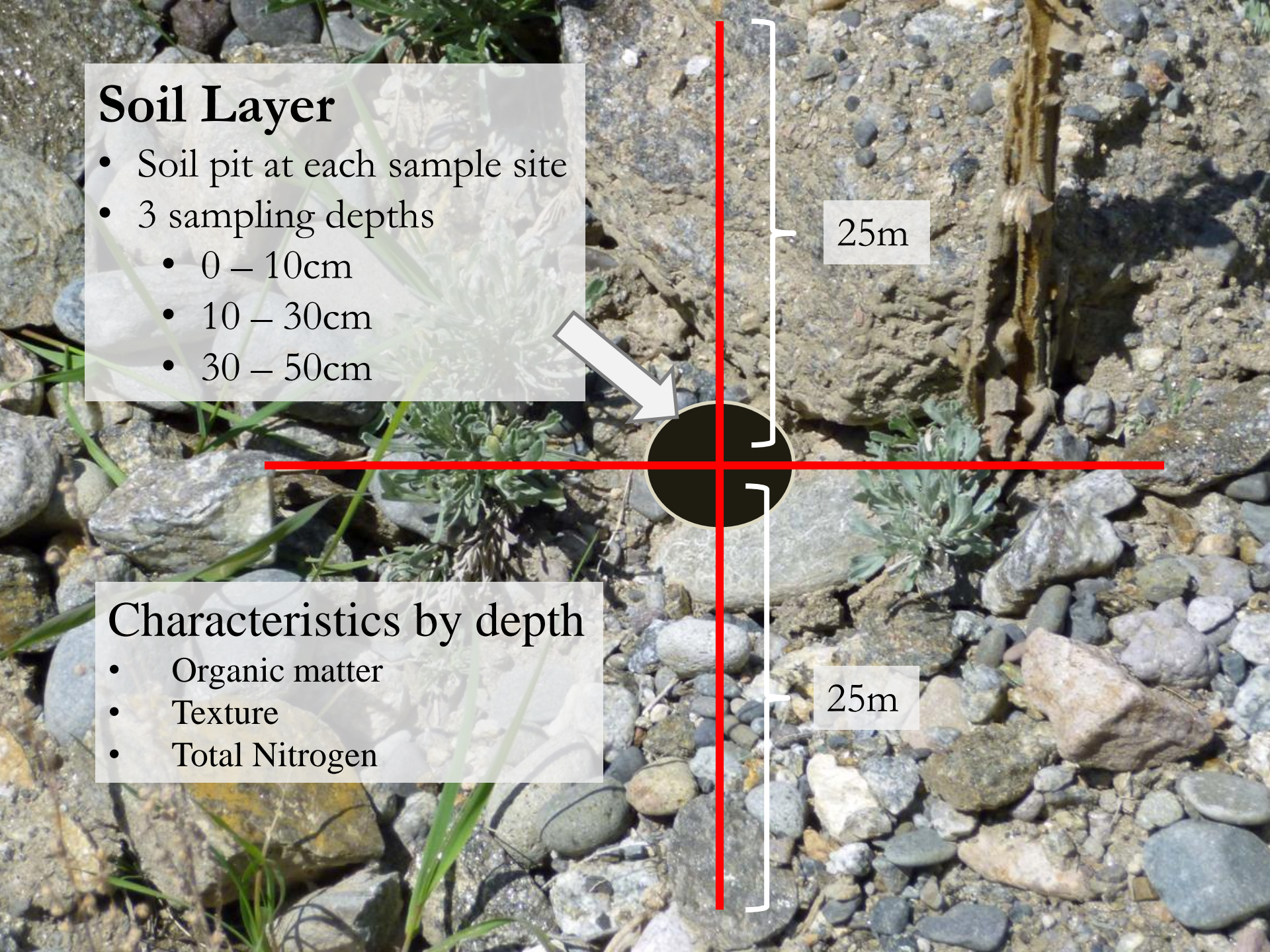
- Soil pit at each sample site
- 3 sampling depths
 - 0 – 10cm
 - 10 – 30cm
 - 30 – 50cm

Characteristics by depth

- Organic matter
- Texture
- Total Nitrogen

25m

25m



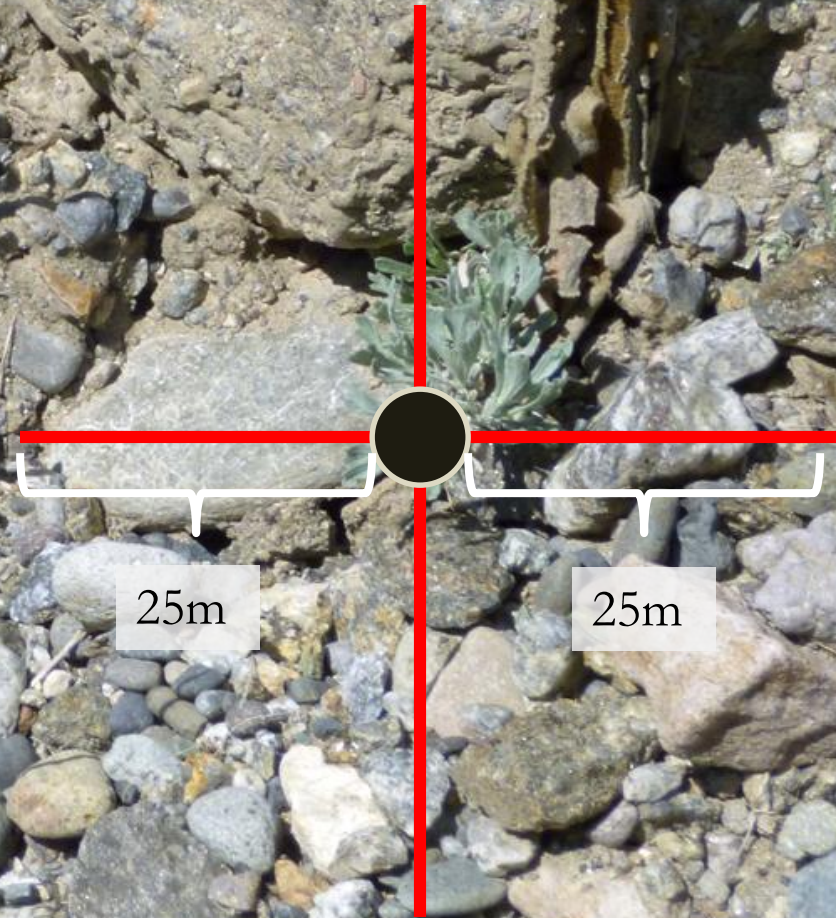
Vegetation Layer

Frequency (n = 100)

- 1m interval
- Bare, litter, basal, canopy

Canopy Cover (n = 16)

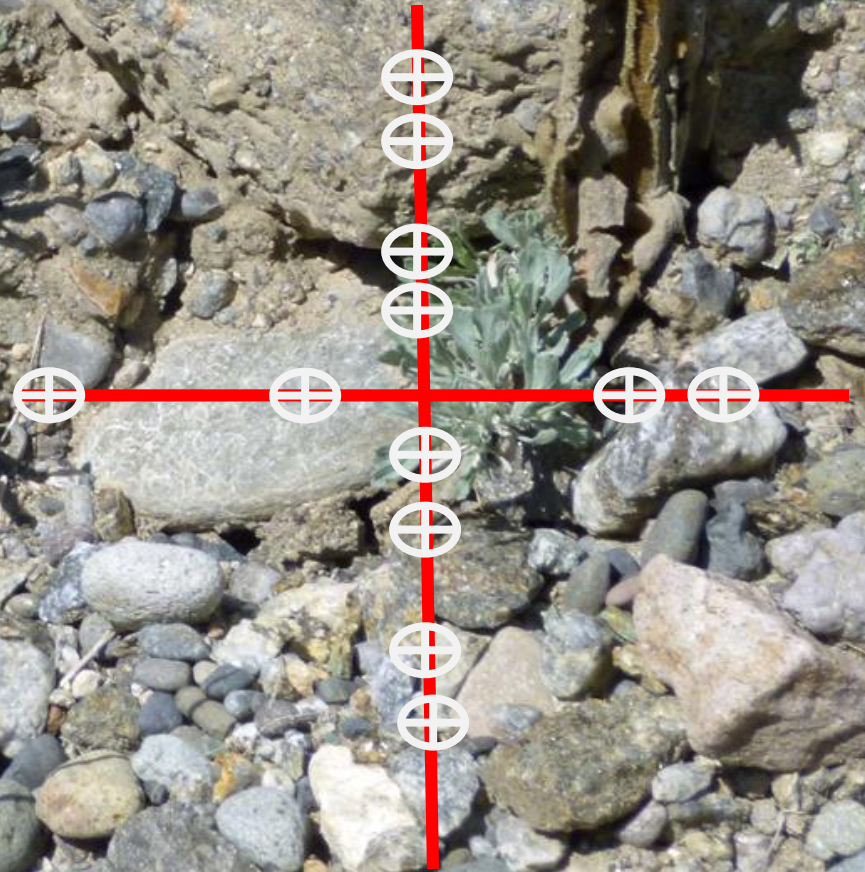
- 5, 10, 15 and 20m
- Daubenmire Cover Classes
- Bare, litter, canopy



Shrub Canopy Cover

Second Measure

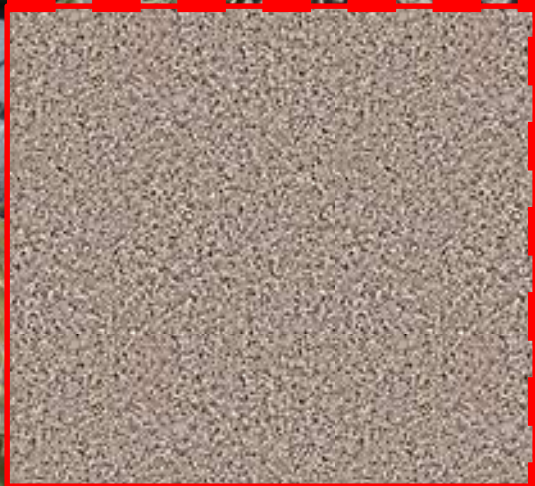
- 50 meter
- Identify species
- Measure length and width of shrub intercept



Shrub Density

2 – 25m x 25m

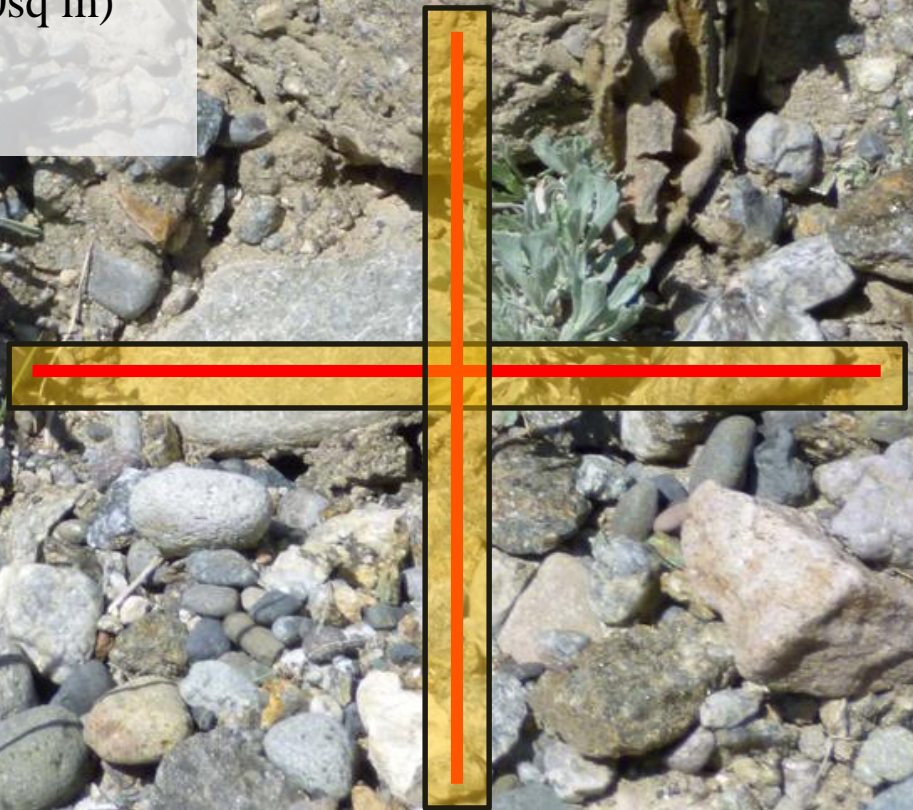
- Count all shrubs by species



Site Occupancy

Manure and Pellet Groups

- 2 – 2m x 50m belt transects (200sq m)
- Bison, elk, small ungulates



Data Set

- Soils
 - Depth, texture, rock content, organic matter, N
- Vegetation
 - Bare ground, litter, basal area, canopy cover, shrub cover, shrub density
- Occupancy
 - General level of use on the site

Data Analysis

- Number of sites to be sampled
 - Detect 20% change in soil or vegetation in parameters with 80% accuracy
 - 2014 preliminary data suggests 57 sites
- Initial Review
 - Stepwise Multiple Regression
 - Which combination of soil features predict herbaceous and shrub cover
 - Non-metric multidimensional scaling
 - Clustering similar vegetation assemblages to create Gardiner Basin community types.

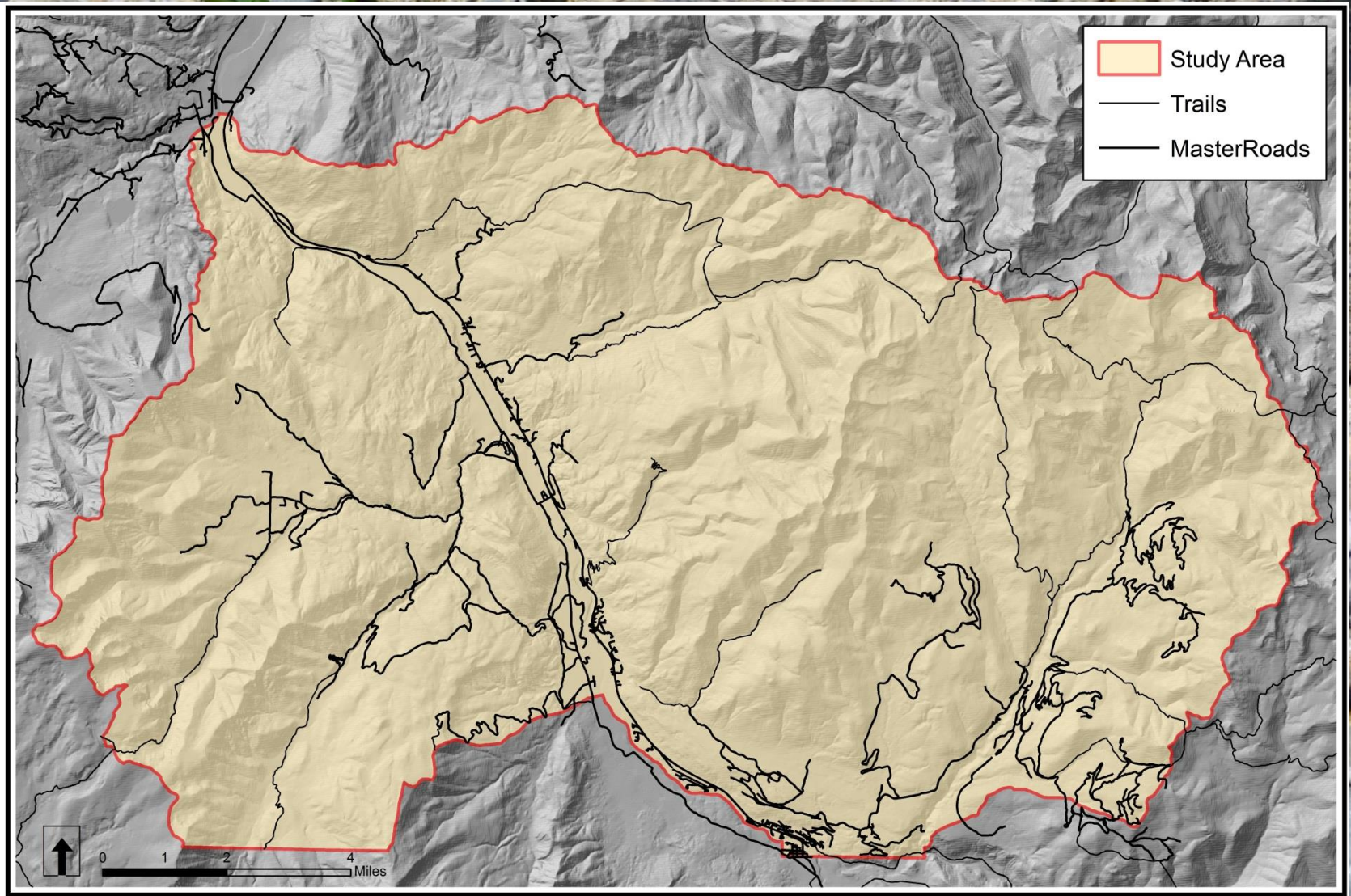
End Product – Well defined plant/soil
community description for tracking
ecological condition



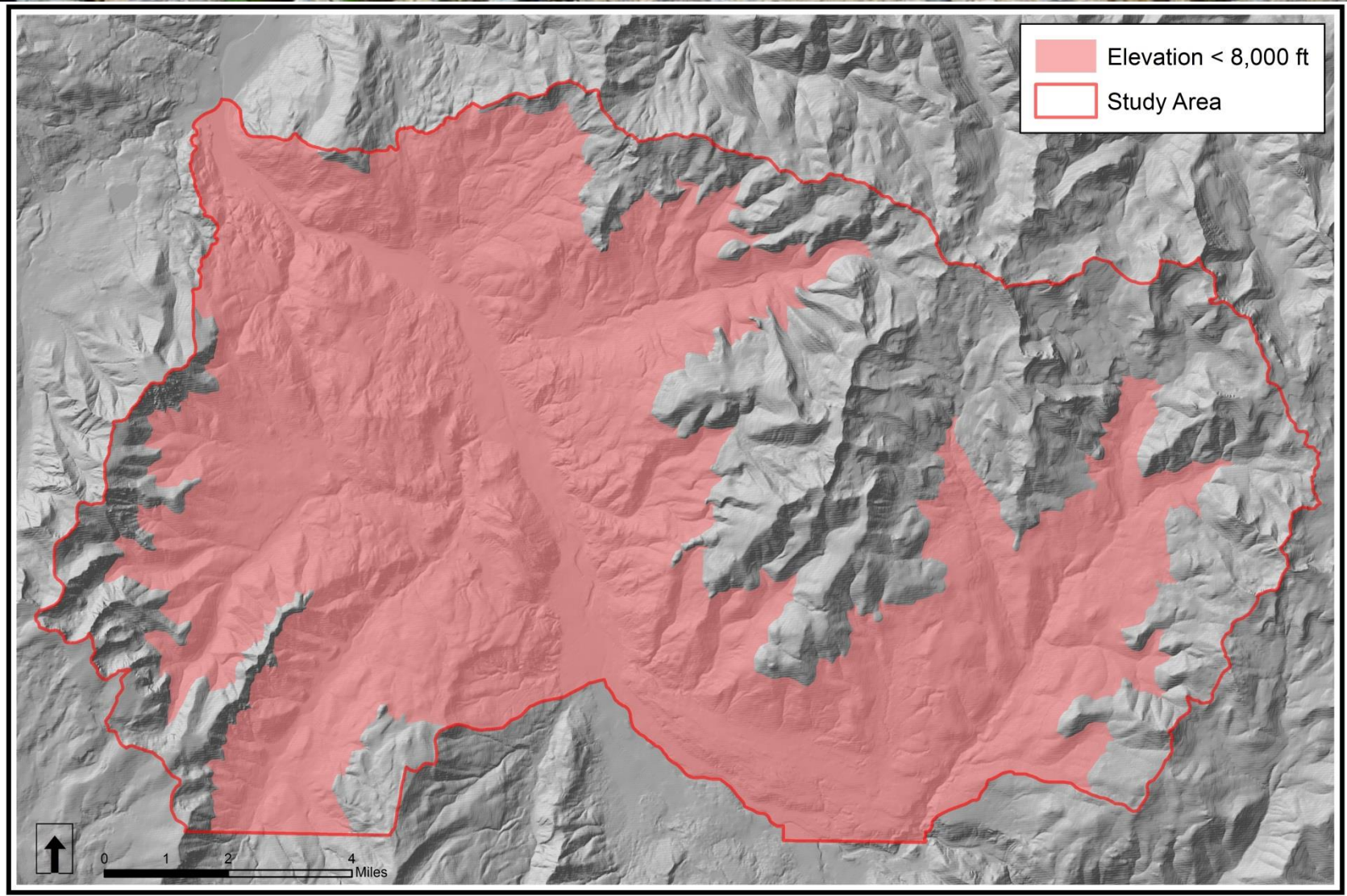
Questions?



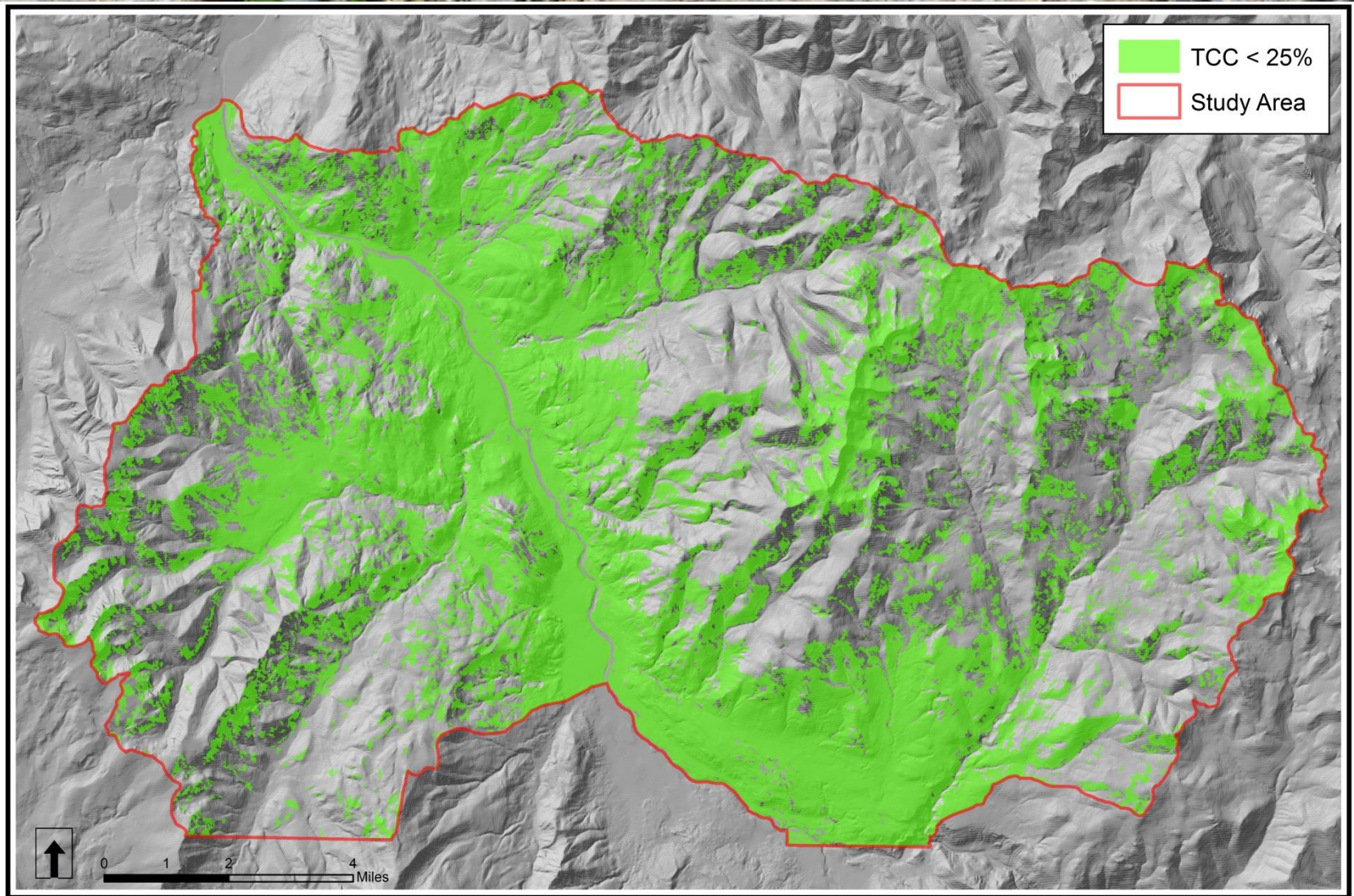
STUDY AREA



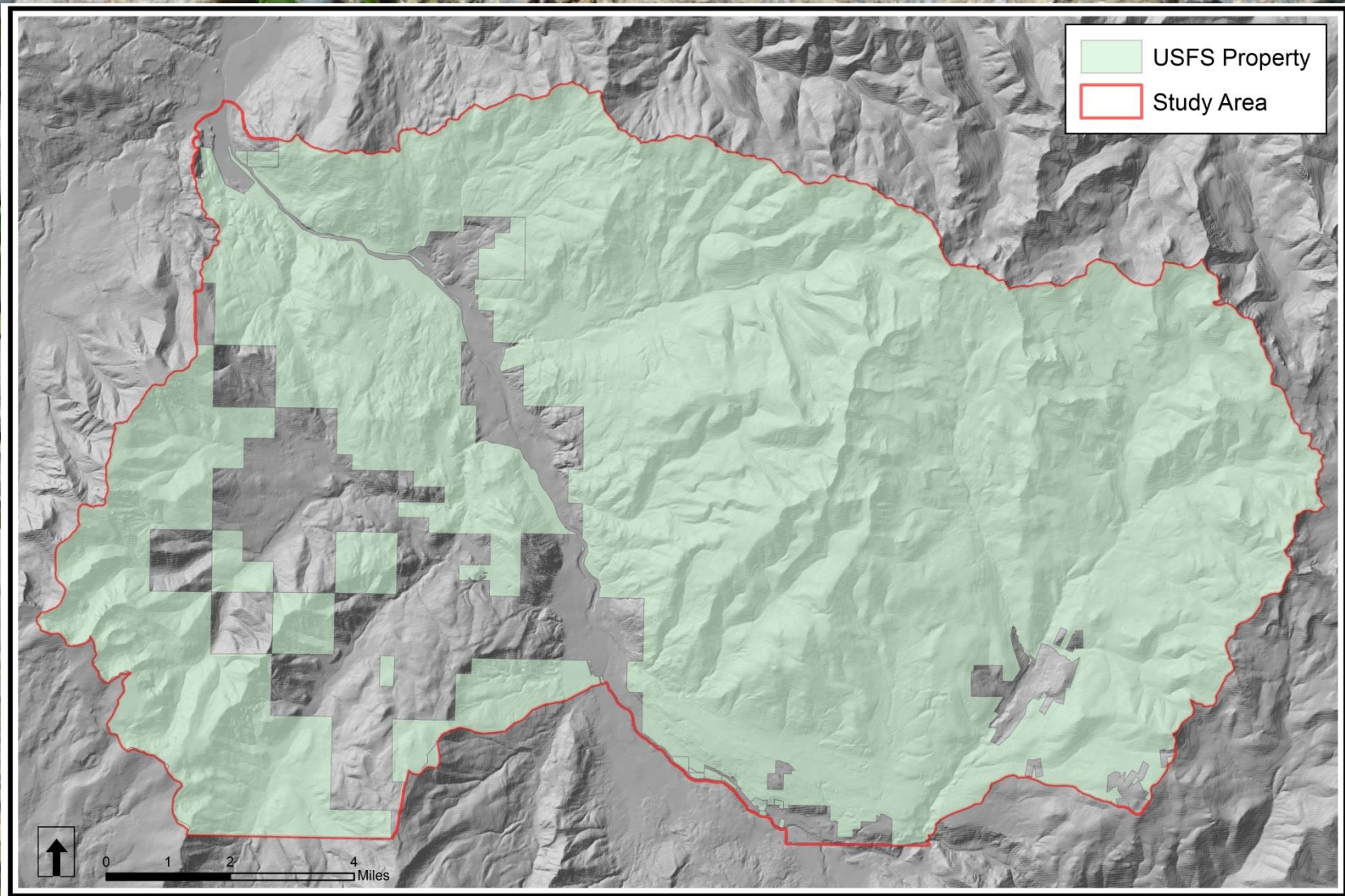
ELEVATION BOUNDARIES



TREE CANOPY COVER



USFS BOUNDARIES



SAMPLING AREA

