



Geophagy and Movements of Greater Sage-grouse in the Upper Green River Basin

Josh Hemenway

Dale Woolwine

Bryan Bedrosian

Matt Holloran

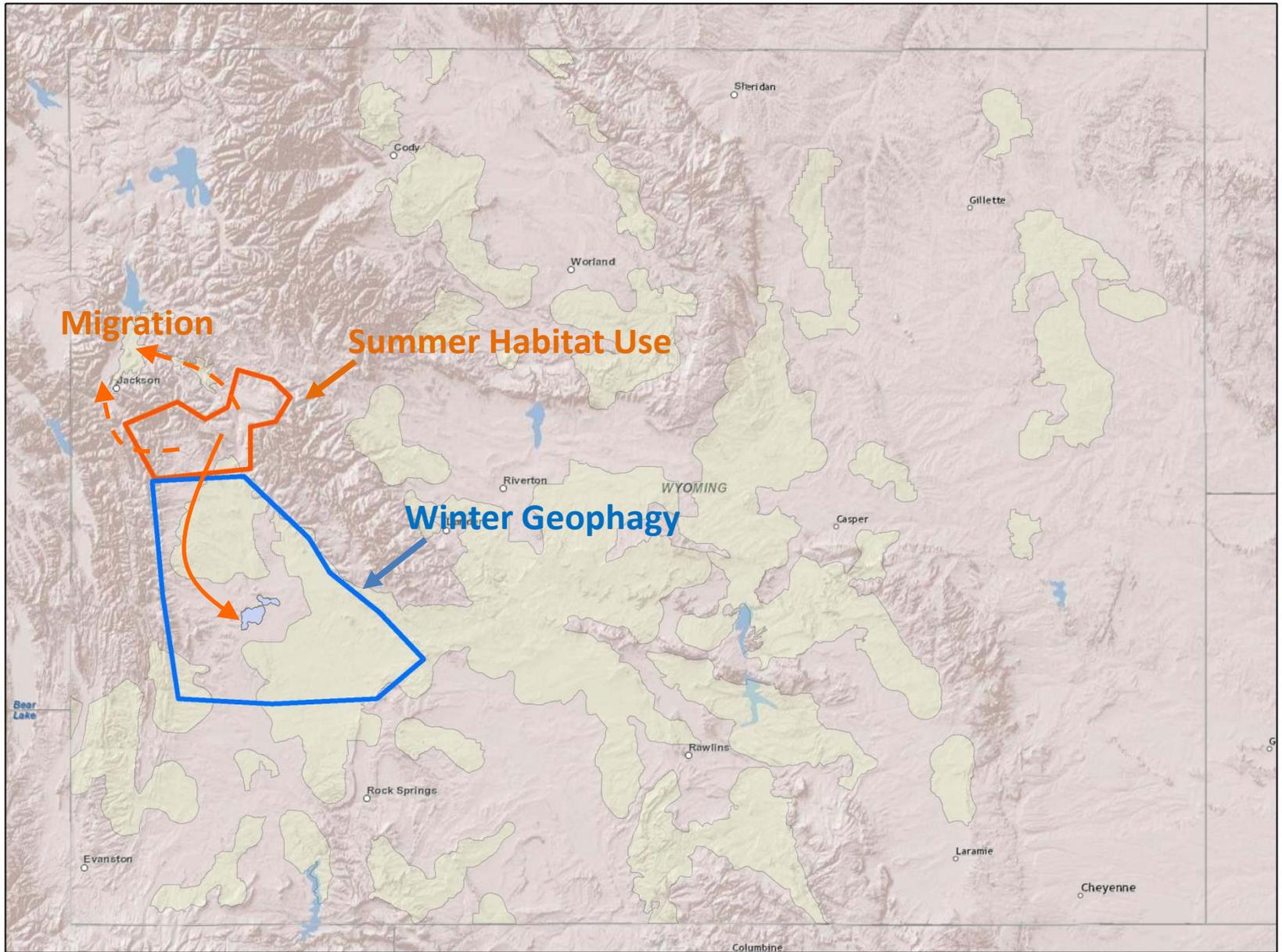


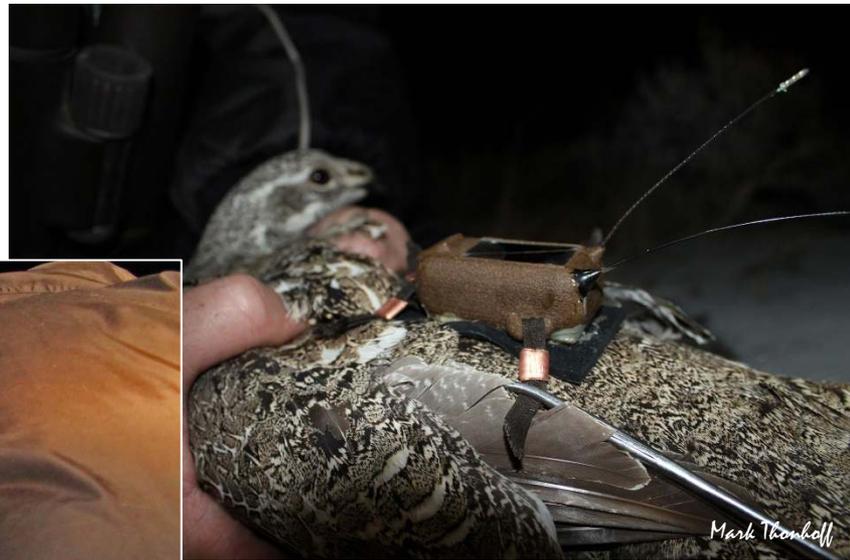
*Wildlife Research
Management Support*

Multiple Projects

- Geophagy of sage-grouse in winter
- Summer habitat use on Bridger-Teton National Forest
- Migrations and movements







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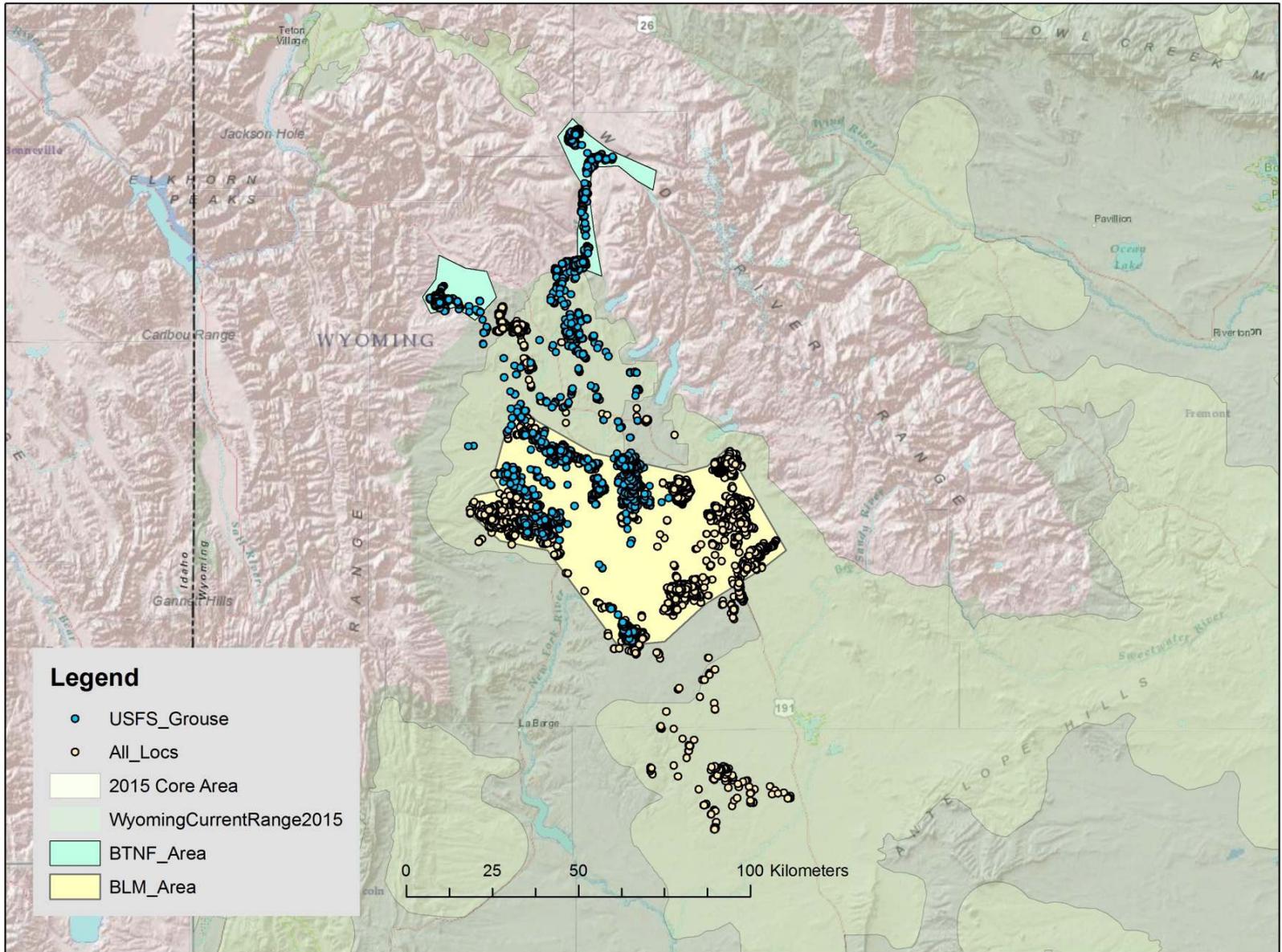


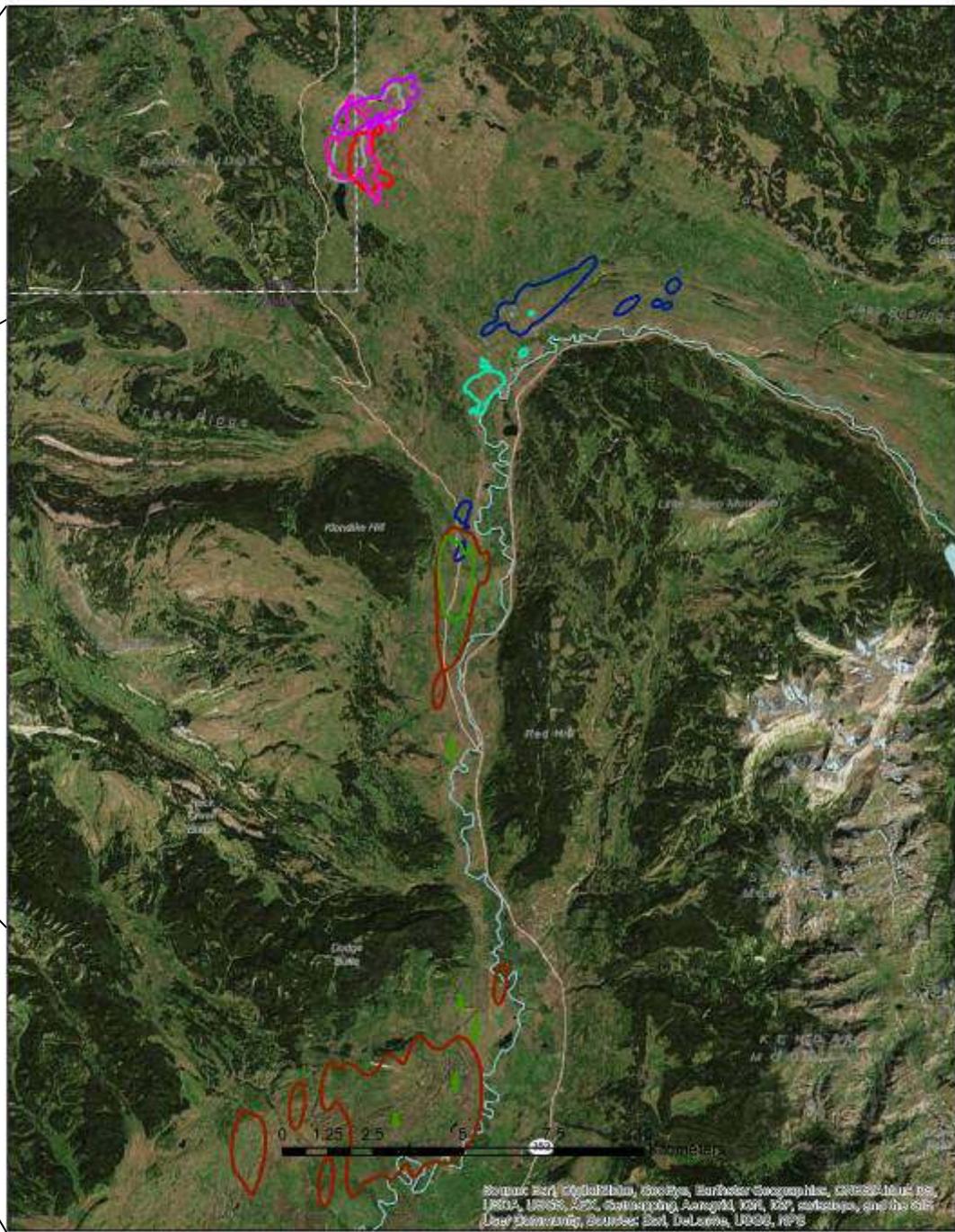
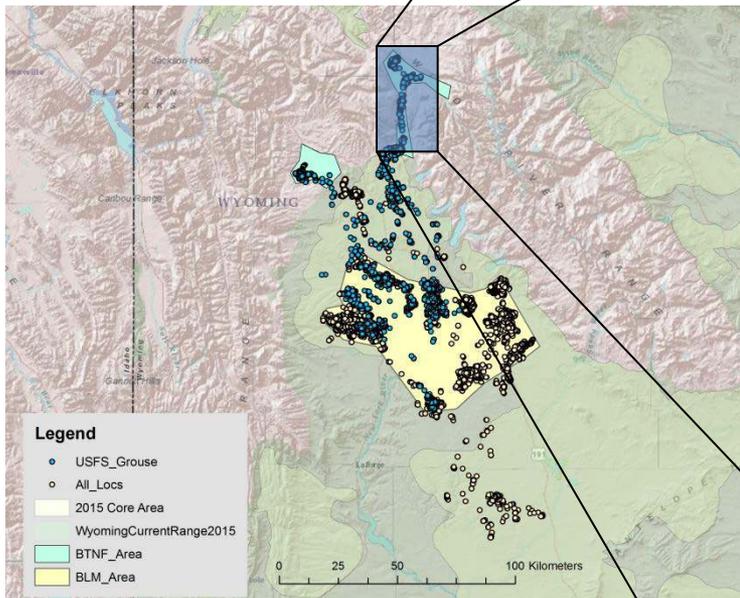
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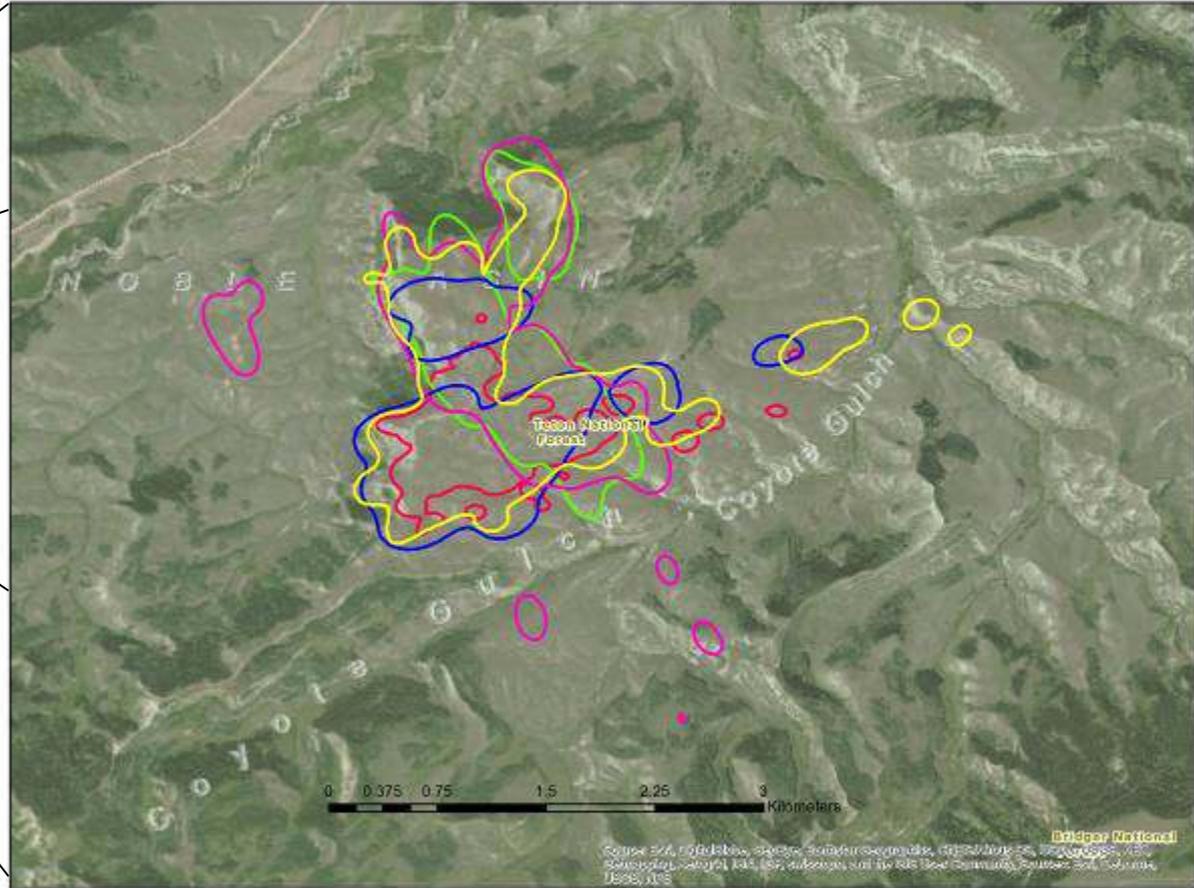
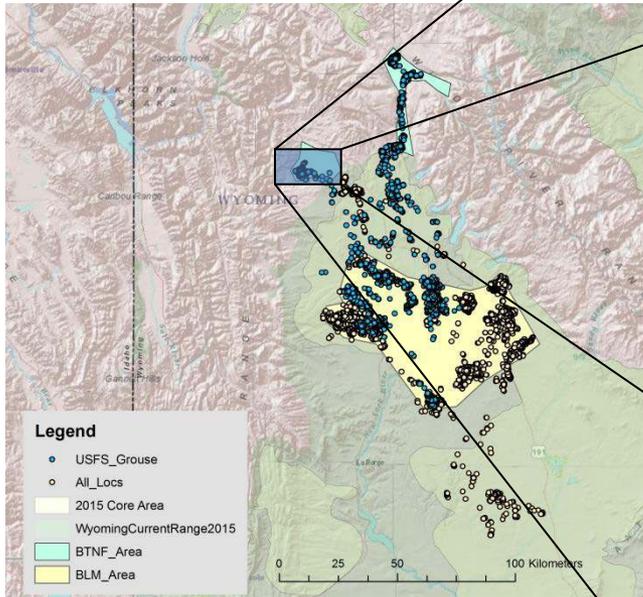
Trapping and Deployment

- N = 52 total (2014-15)
 - 26 Bridger-Teton NF
 - 26 BLM
- 36 Female
- 16 Male
- 8 Mortalities/slipped packs
- >50,000 point locations to date

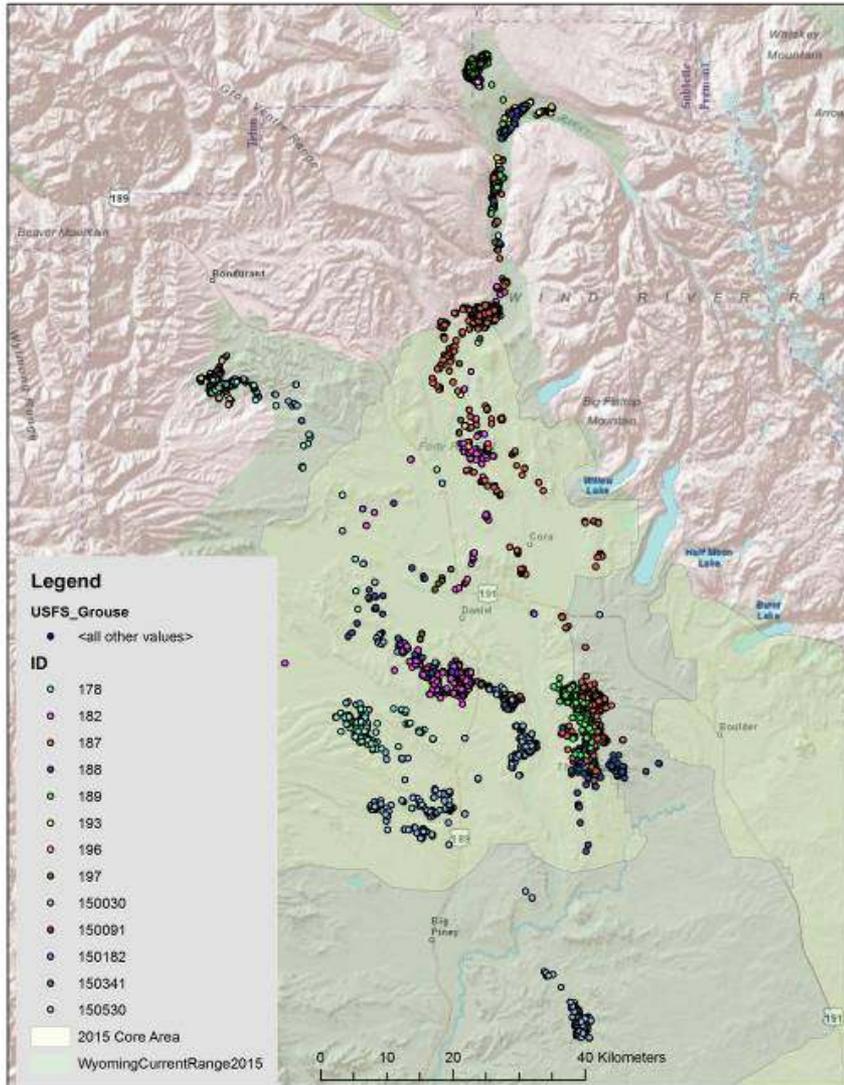








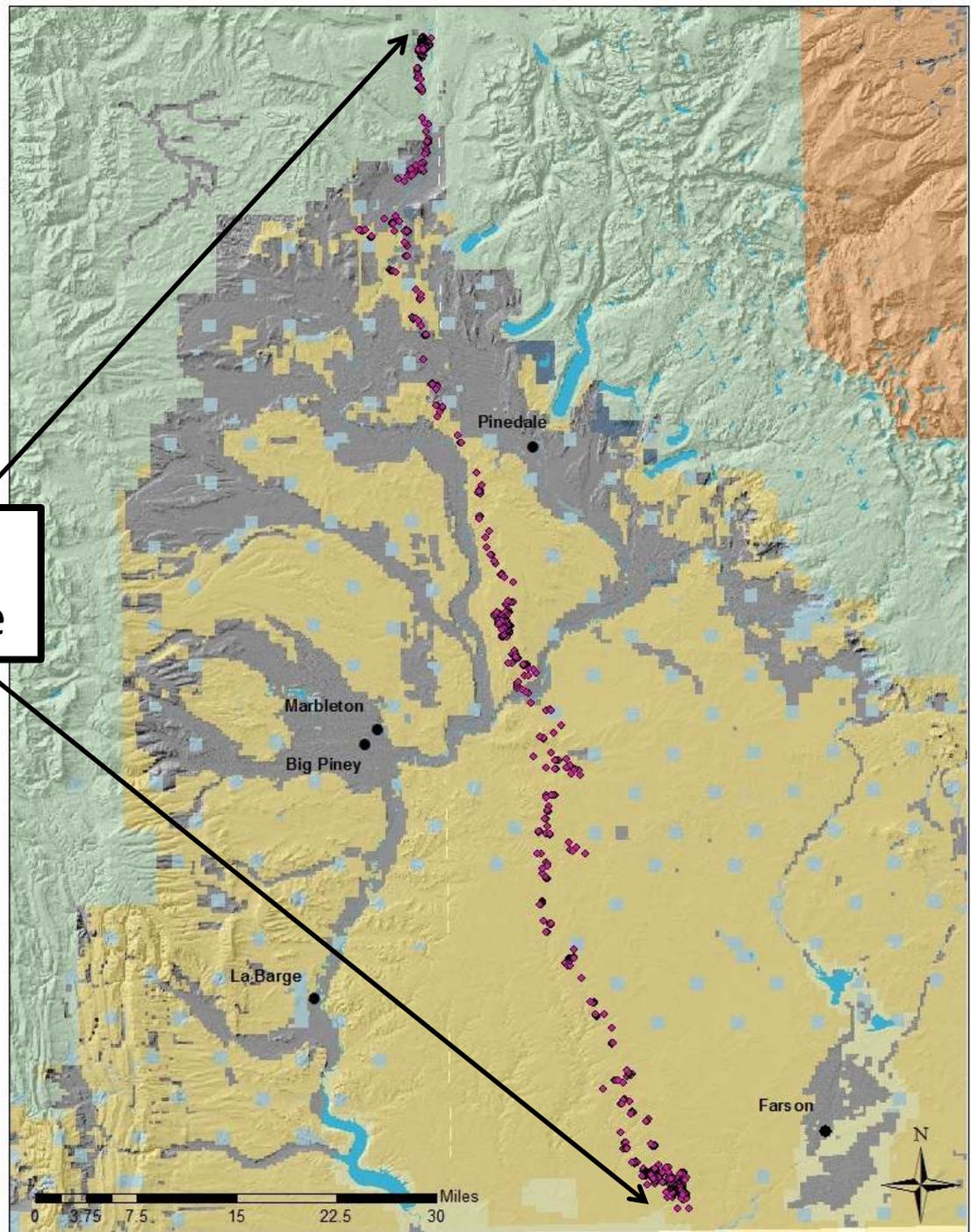
Migration & Movement



- Mean Distance = >80km
- Range (58-112km)
- Fall Departure Windows
 - 2014 10/30-11/12
 - 2015 11/13-11/21
- Males return late March
- Females return early April

Migration & Movement

87 miles straight line
>100 miles cumulative



Winter



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Geophagy

- > 160 species known to ingest soil
 - Geese, parrots, pigeons, passerines, neotropics
- Mineral supplementation
- Digestive aid (pH buffering)
- Relief from endo-parasites
- Reduction in dietary toxins





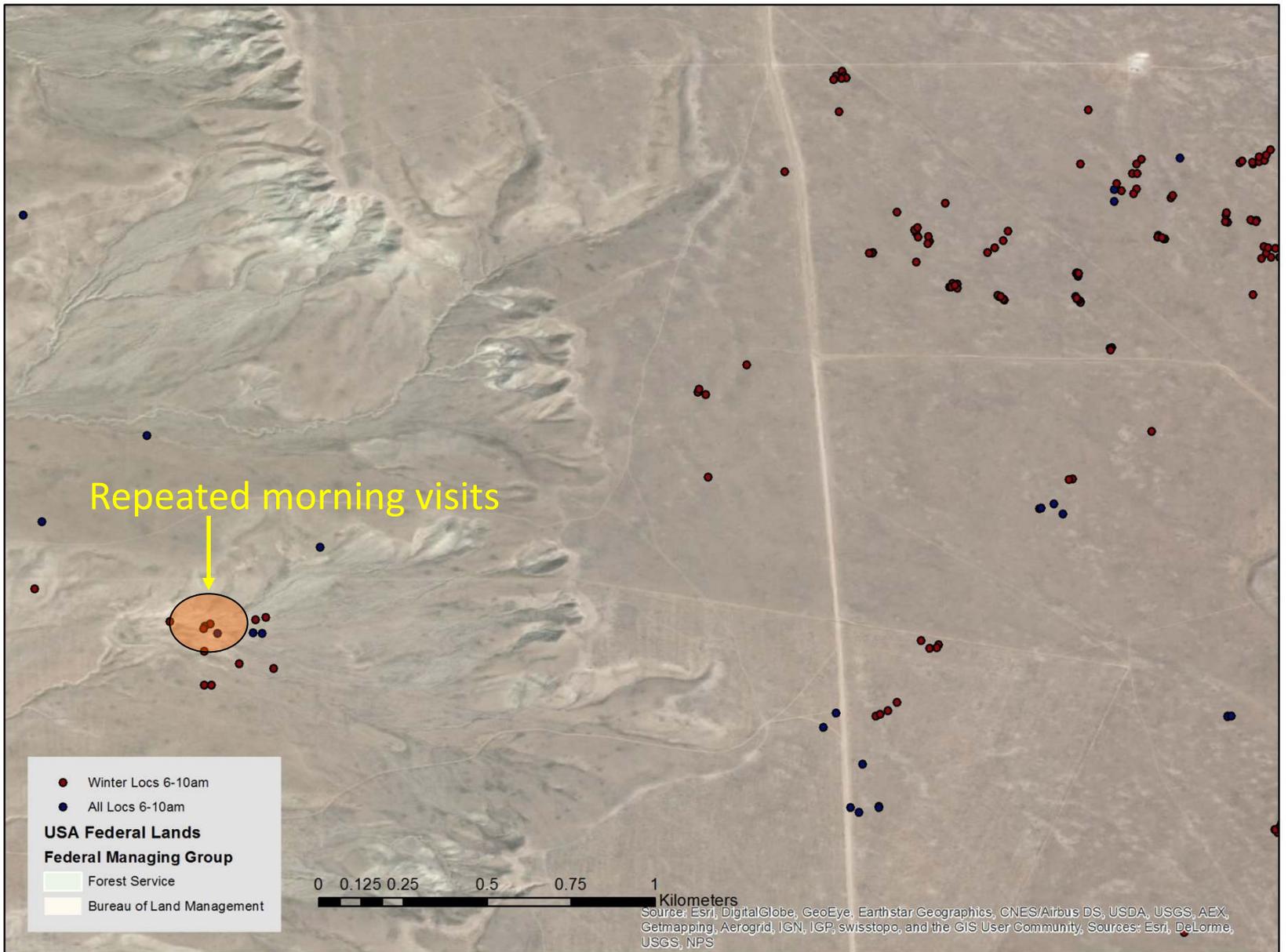
Geophagy

1. Necessary for Egg Laying/Breeding
 - May be seeking nutrients to prepare for breeding and nesting
2. Nutritional Supplementation of Winter Diet
 - Sage-only diet may be deficient in key minerals for physiological health
3. Detoxification of Winter Diet
 - Aid in detoxification on sagebrush
4. Influencing Winter Distribution
 - This resource may affect selection of winter habitats

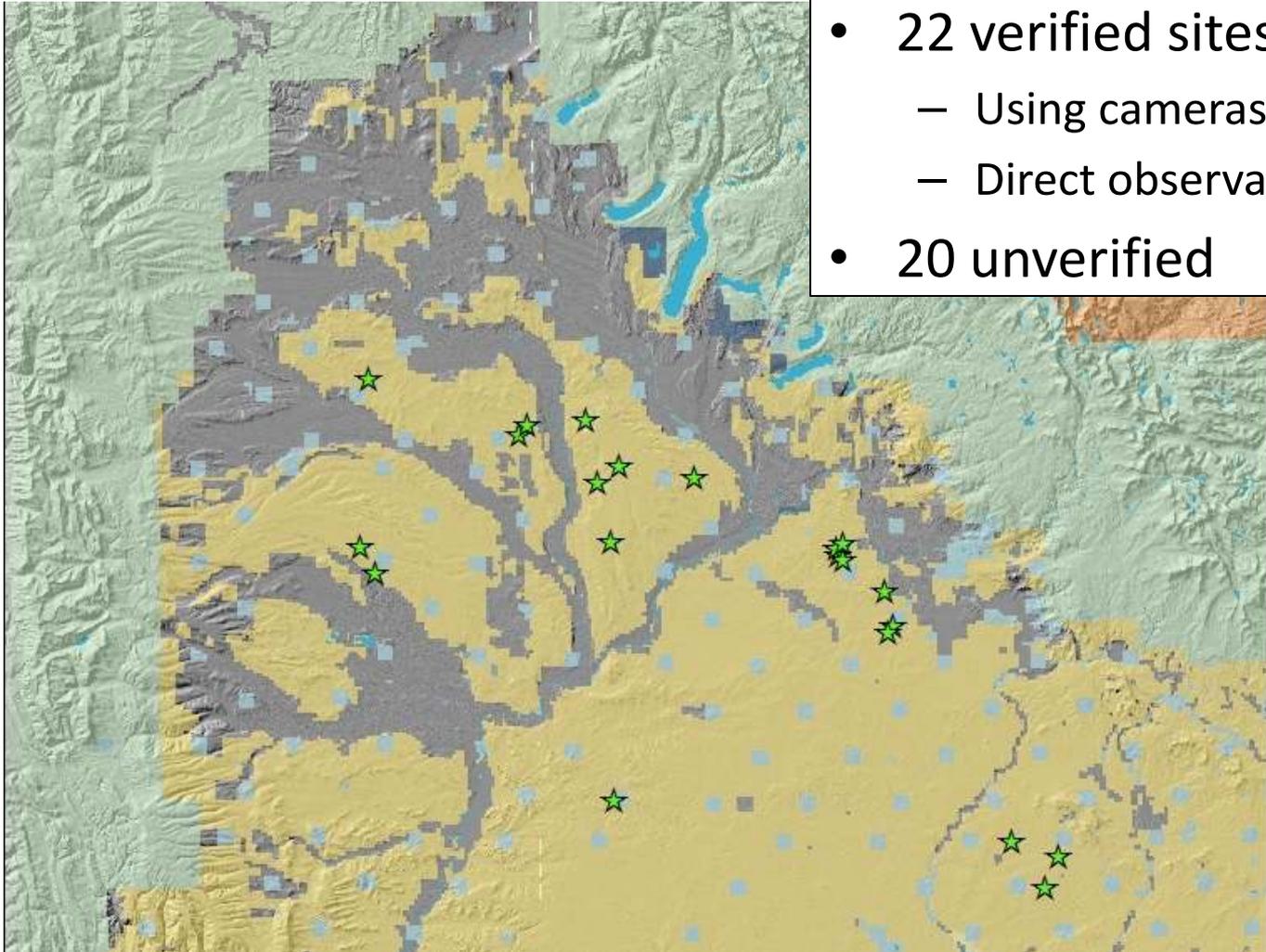
Geophagy



- Large and Small Groups
- Morning
- Hens and Roosters
- Site Fidelity
- Frequency Varies
- Habitat
 - Not Classic Winter Habitat
 - Leks
 - Disturbance (i.e. reservoirs)



Geophagy



- 22 verified sites
 - Using cameras
 - Direct observation
- 20 unverified

Soil Collection

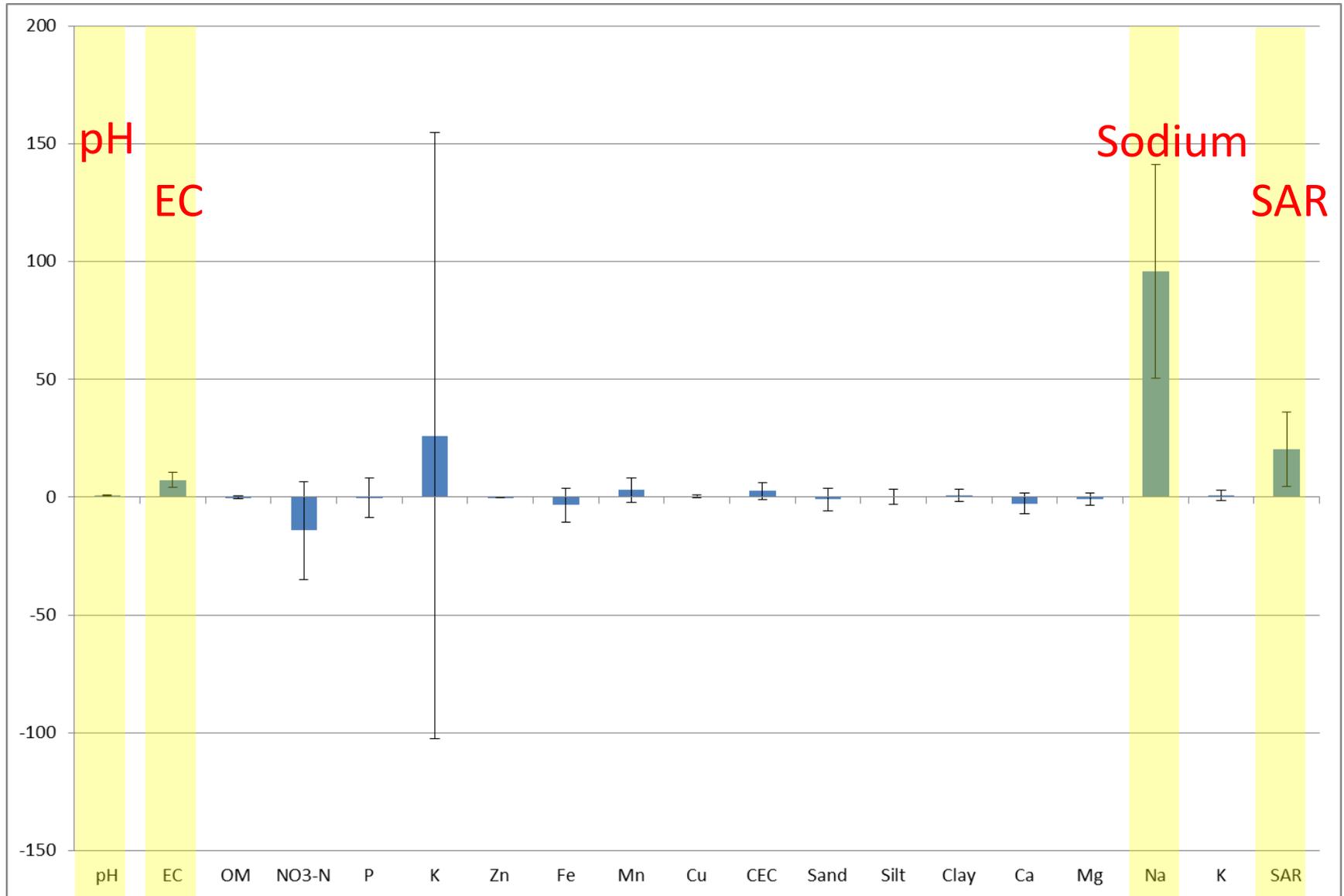
- At site
- Paired site within 150m in a random direction
- Random sites (available)



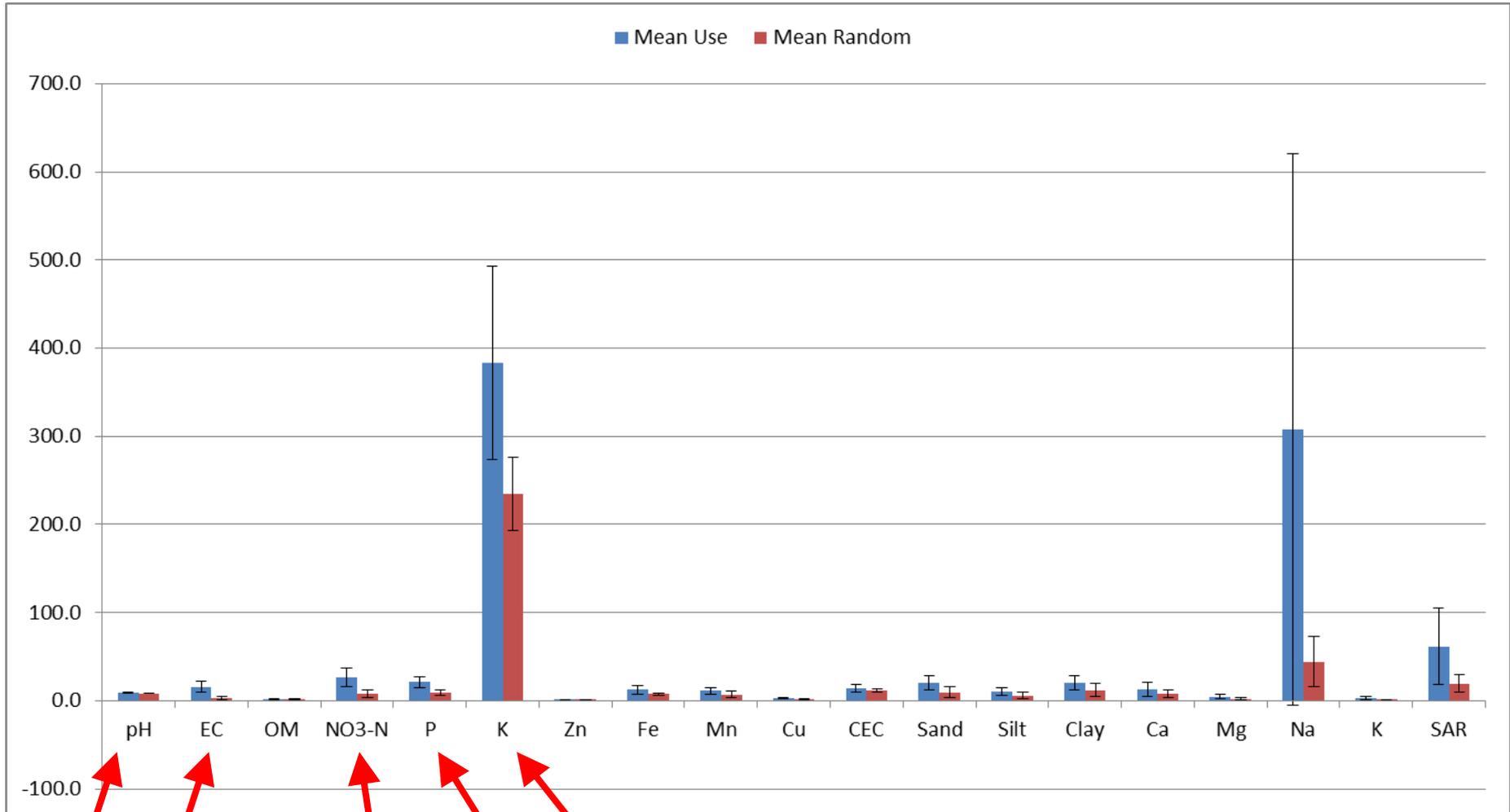
Soil Collection

- Nitrogen
- Phosphorus
- Potassium
- Zinc
- Iron
- Manganese
- Copper
- Calcium
- Magnesium
- Sodium
- Sodium Absorption Ratio (SAR)
- Cation Exchange Compound (CEC)
- pH
- Nitrates
- Organic Matter
- Sand
- Silt
- Clay
- Texture

Use vs Paired Sites



Use vs Available Sites



pH EC NO3-N P K

Lime and Texture

- **LIME**
 - ca. 62% of use and random high lime content ca. 33% of use and random low lime content
- **CLAY**
 - Higher proportion of used sites contained clay (54%) compared to random (37%)
- **LOAM**
 - Lower proportion of sites contained loam (50%) compared to random (77%)
- **SAND**
 - ca. 60% of both used and random sites contained sand

Soil Testing Summary

- Higher Sodium
- Higher pH
- Higher clay
- Generally higher for most minerals



Possible Reasons

- Nutrient supplement?
 - Sodium
 - Generally higher minerals
- Digestion aid?
 - Higher pH
 - Higher clay
 - No CEC difference
- Endo-parasites???



Future Work

- Continue ID of new sites
- Individual use patterns
- Effects on winter distribution/movements (RSF)
- Effects on fitness
- Supplement experiments
- Lek associations



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Funding/Logistics

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Geophagy

