Healthy Soils: Healthy Wildlife

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Overview

• Soil & Wildlife Interactions
• Using Soils & Ecological Sites as a wildlife management tool.
The Soil Food Web

First trophic level: Photosynthesizers
Second trophic level: Decomposing Mutualists Pathogens, Parasites Root-feeders
Third trophic level: Shredders Predators Grazers
Fourth trophic level: Higher level predators
Fifth & higher trophic level: Higher level predators

Plants
Shoots and roots.

Organic Matter
Waste, residue and metabolites from plants, animals, and microbes.

Nematodes
Root-feeders

Arthropods
Shredders

Arthropods
Predators

Nematodes
Fungal- and bacterial-feeders

Protozoa
Amoebae, flagellates, and ciliates

Bacteria

Fungi
Mycorrhizal fungi Saprophytic fungi

Birds

Animals
Wildlife & Soil Interactions
Wildlife

- Small Mammals
  - Silky pocket mouse, Kangaroo rat,
- Game Birds
  - Quail, Turkey, Pheasant
- Non-game Birds
  - Vireo’s, Warbler’s, Bunting’s
- Big Game
  - Deer, Pronghorn, Elk, Bighorn Sheep
Healthy Soils Benefit Wildlife

• Increase food resources
• Improve water quality
• Development of cover
Healthy Wildlife Benefit Soils

- Reduced Soil Erosion
- Increased Soil Moisture
- Aeration
- Promote Seed Germination
Role of Small Mammals

- Burrows aerate the soil
- Alter underground moisture regimes
- Mix subsurface and surface soil layers
- Cache seeds and facilitate germination
Figure 4: Correlation between the number of plant species and the total number of trapped small mammals (sM-number) in ten different areas. Spearman-Rank-Correlation-test: 
  p=0.032; \ r_s=0.732

Figure 5: Correlation between the number of plant species and the number of occurring small mammal species (sM-species) in ten different areas. Spearman-Rank-Correlation-test: 
  p=0.004; \ r_s=0.895
Grassland Birds

- How are grassland birds impacted by soils?
Big Game

• Deer, Pronghorn, Elk, etc.

• The use of plant species that benefit both the soil and the deer.
Cover Crop Plants

- Crimson Clover
- Cowpea
- Oilseed Radish
- Pea
- Pigeonpea
- Cereal Rye
- Oats
Wildlife Food Plot Plants

- Arrowleaf Clover
- Crimson Clover
- Alfalfa
- Cowpea
- Austrian winter pea
- Radishes or Turnips
- Oats or Wheat
• “A healthy soil; the healthy foundation upon which all living things rely.”
Using Soils to Manage Wildlife Habitat

- Soil Type
- Vegetation
- Climate
- Topography
What Are Ecological Sites

- An ecological site is an area of land with specific physical characteristics that differs from other kinds of land in its ability to produce a distinctive kind and amount of vegetation and to respond to management.
Golden-cheeked Warbler habitat use and reproductive success
State & Transition Models

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**1. Tallgrass Prairie State**
1.1 Tallgrass Prairie Community
   Historic Climax Plant Community
   Tallgrasses: little bluestem, big bluestem, Indiangrass, side oats grama
   2500-5000 #/ac Annual Production

1.2 Midgrass Prairie Community
   Increase of mid and shortgrasses
   Increase of forb species
   Decrease of tallgrasses
   2000-3000 #/ac Annual Production

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**2. Shrubland/Brushland State**
2.1 Pricklypear/Shrubland Community
   Pricklypear dominant with shortgrasses
   Low quality annual forbs
   1000 - 2000 #/ac Annual Production

2.2 Juniper/Mesquite/Brushland Community
   Juniper/Mesquite dominant with shortgrasses
   Increase of Texas wintergrass and low quality annual forbs
   1800 - 2500 #/ac Annual Production

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**3. Grassland State**
3.1 Open Seeded Grassland Community
   Removal of brush leads to midgrass dominant with little bluestem, side oats grama and Indiangrass
   Low quality annual forbs still exist
   2000 - 4000 #/ac Annual Production

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** LEGEND **
1.1A Heavy Continuous Grazing, No Brush Management, No Fire, Brush Invasion
1.2A Prescribed Grazing, Brush Management, Range Planting, Prescribed Burning
1.1B Heavy Continuous Grazing, No Brush Management, No Fire
1.2B Prescribed Grazing, Brush Management, Range Planting, Prescribed Burning
T1A Heavy Continuous Grazing, No Brush Management, No Fire, Brush Invasion
T1B Heavy Continuous Grazing, No Brush Management, Range Planting
T2A Brush Management, IPT, Range Planting
R2B Heavy Continuous Grazing, No Brush Management, No Fire
T2B Brush Management, IPT, Range Planting
R3B Heavy Continuous Grazing, No Brush Management, No Fire
R3A Prescribed Grazing, Prescribed Burning
State & Transition Models
• Identifying limiting resources such as food and water will aid biologists and resource managers in developing better management plans.
Conclusion

• If healthy and sustainable populations of wildlife are your goal, develop the foundation of all life on the land—your soil.
Questions?

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