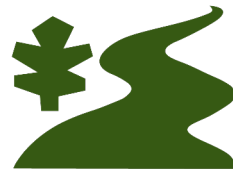




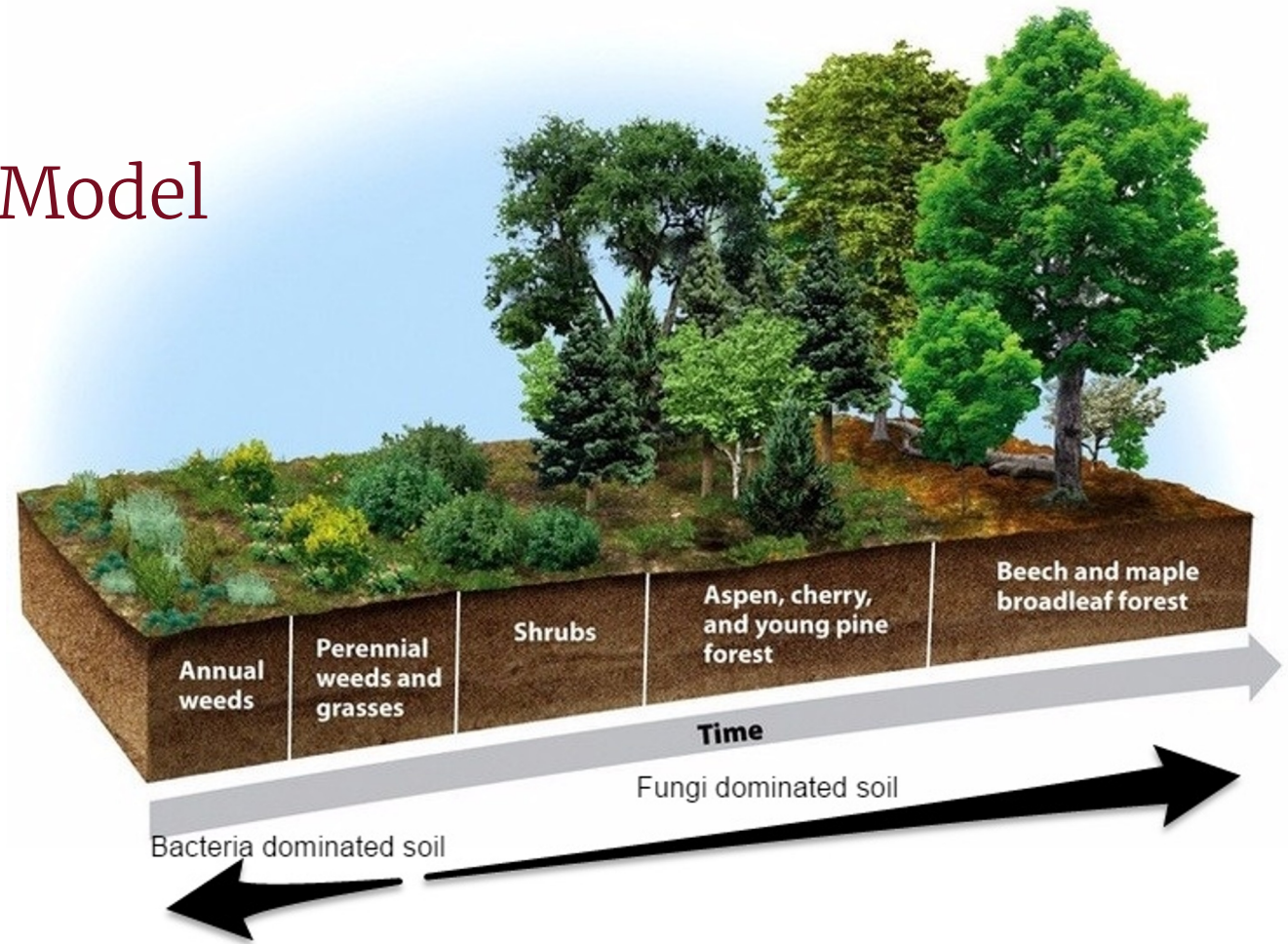
Broadscale Landscape Regeneration

Grounded In Water Management



Presented by Amy Scanes-Wolfe at the Annual Ecosystem Symposium, “It starts at the top: The intertwined fates of water and ecosystems in the climate crisis.” Boulder County Nature Association & Center for Sustainable Landscapes and Communities, Boulder, CO, 9/23/23.

Using Natural Ecosystems As a Model for Agriculture







The Loess Plateau:

Restoring an agricultural desert to an
agricultural and ecological oasis.

DAR's Pilot Project

ELK RUN FARM

Regenerating 14 Acres of Degraded Land





Integrated Livestock-Crop Management



Forest Gardening



Dryland Agroforestry

In arid and semi-arid climates, water is the limiting factor for how much carbon our landscapes can sequester, biodiversity they can support, and food they can produce.



Step 1: Our Earthworks Strategies Bring Water Back to the Land

Keyline Design

Terraforming earthworks slow, spread, and sink water, shifting its power from erosion to regeneration.



Contour Swales at Elk Run Farm



Dryland Agroforestry

950 Trees & Shrubs

4 Years

No Irrigation



Dryland Agroforestry

950 Trees & Shrubs

4 Years

No Irrigation

79% SURVIVAL



Native & Adapted Fruit Species

Nitrogen-Fixing Nurse Plants

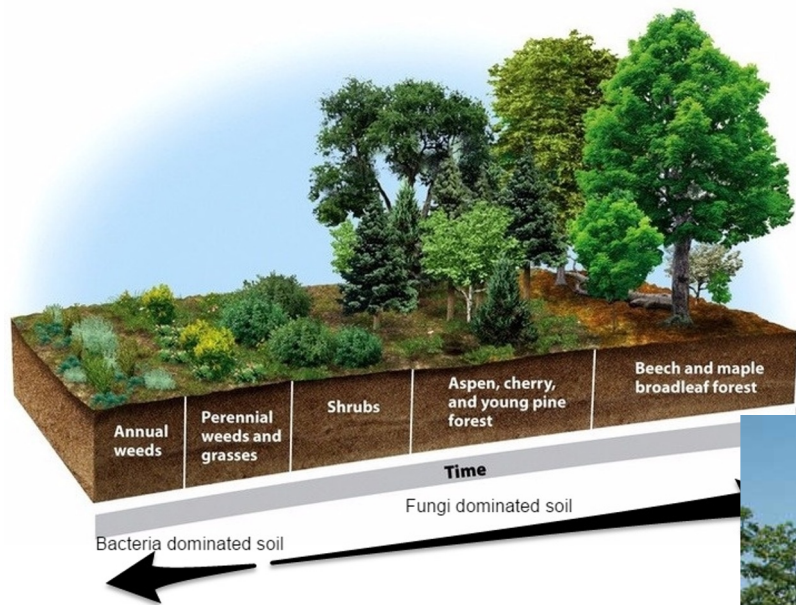


Total # By Species	
Antonovka Apple	215
Bartlett Pear	156
American Plum	68
Manchurian Apricot	22
Hazelnut	30
Golden Currant	13
Red Mulberry	30
Elderberry	13
Nanking Cherry	12
Siberian Pea Shrub	100
False Indigo	140
Honey Locust	25
Total	824



Regenerative Grazing

In Imitation of the Savannah Ecosystem



The Fire & Flood Cycle



Ecosystem Development: Humans as a Keystone Species



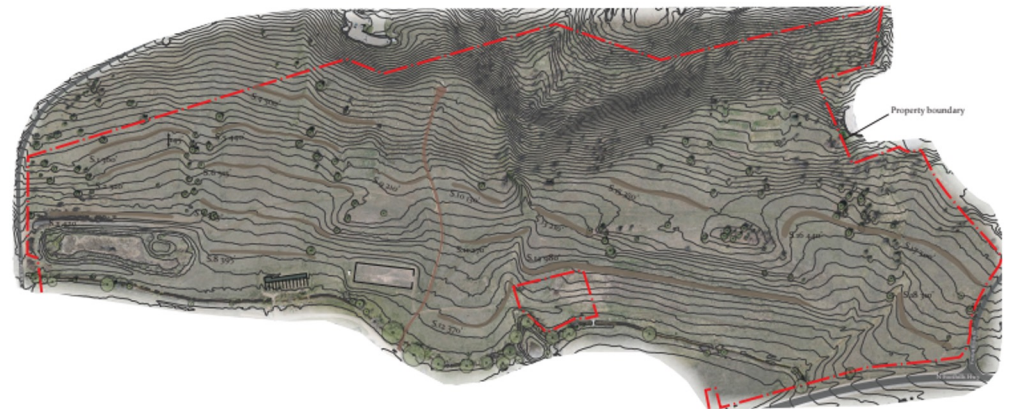
Growth by Partnership

5 Partners

12,000 Trees

22,000 Linear Ft of Swales

140 acres



Research

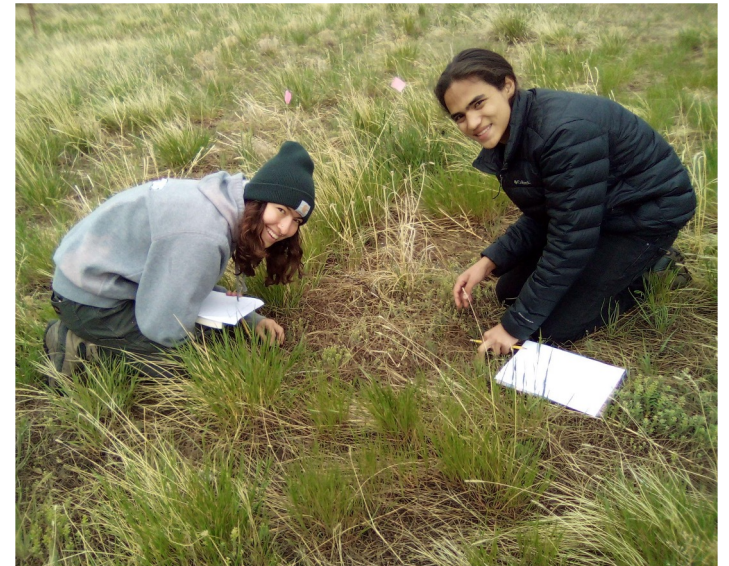
Our research program explores how effectively our landscapes function like healthy ecosystems by:

- **Retaining Moisture**
- **Sequestering Carbon**
- **Supporting Biodiversity**



Goals of Our Research Program

- **Holistic.** Giving us tools to understand complex ecosystems rather than attempting to isolate variables.
- **Informative.** The results help us become more effective landscape designers and stewards.
- **Accessible.** We are able to train our apprentices, land partners, and collaborators in these methods to give them the tools to become better land stewards.



What We Study

Soil Health

Soil Organic Matter
Bulk Density
Water Holding Capacity
Infiltration Rates
Macronutrients & Micronutrients
Microbiology: Ratio of Bacteria to Fungi

Insect Biodiversity

Functional Group Analysis

Grassland Biodiversity

% Soil Cover
% Living Soil Cover
Diversity of Dominant Grass Species
Diversity of Forbs

Tree & Shrub Census

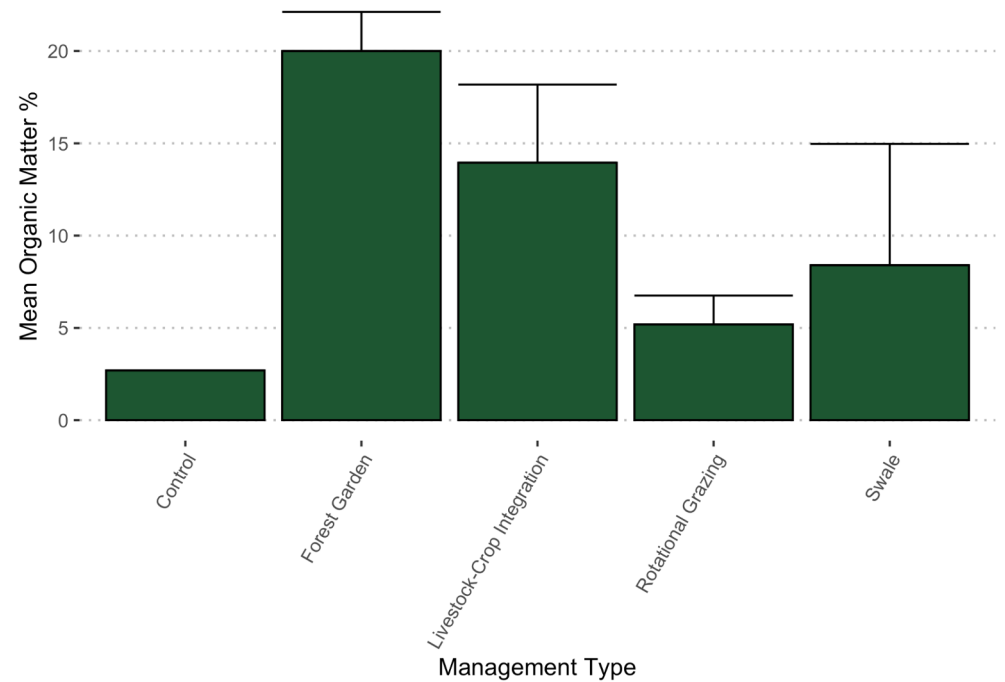
Survival Rate By Species & Location
Growth Rate By Species & Location

Soil Health



DARs strategies have increased organic matter in pastures by over 200% as compared to the control

Soil Organic Matter Percentages by Management Type 2022



Insect Biodiversity

2023 July Insect Biodiversity Data			
Location	Site	Native Bees	Predators
Elk Run Farm	Open Space Control	0	12
Elk Run Farm	Forest Garden Avg.	8	26
Elk Run Farm	Grain Field	1	7
Elk Run Farm	North Pasture	8	27
Elk Run Farm	South Pasture	0	2
Elk Run Farm	South Pasture Swales	0	4



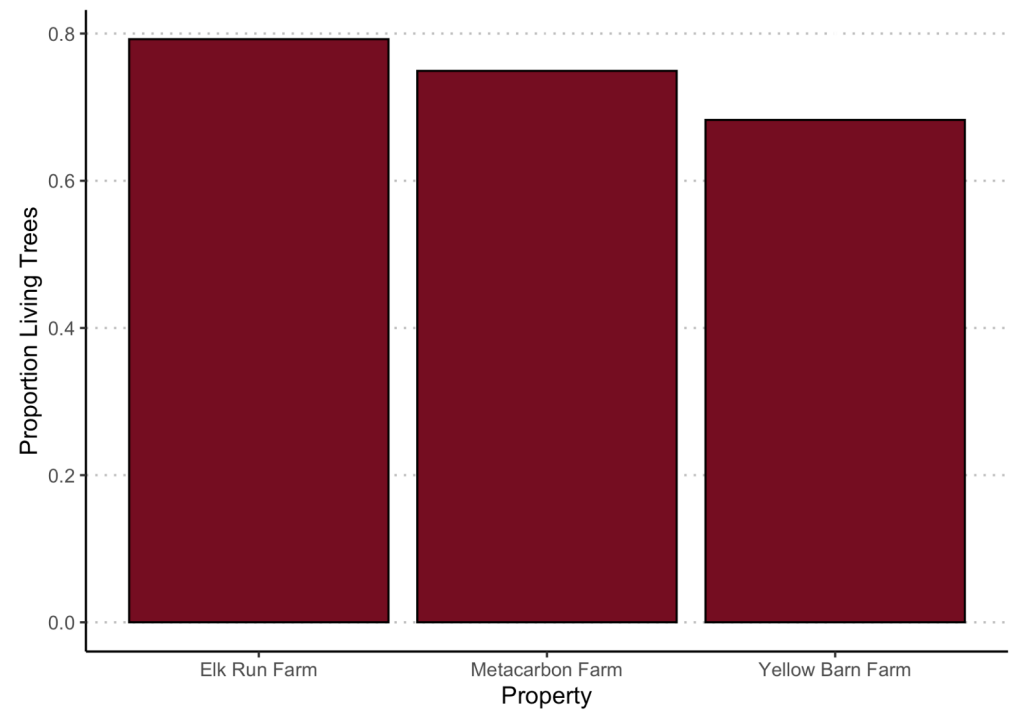
DAR's strategies have increased the complexity of insect communities as compared to the controls.

2023 July Insect Biodiversity Data			
Property	Site	Native Bees	Predators
Metacarbon Farm	Swale	74	10
Metacarbon Farm	Alleyways	3	10
Metacarbon Farm	Control	7	3

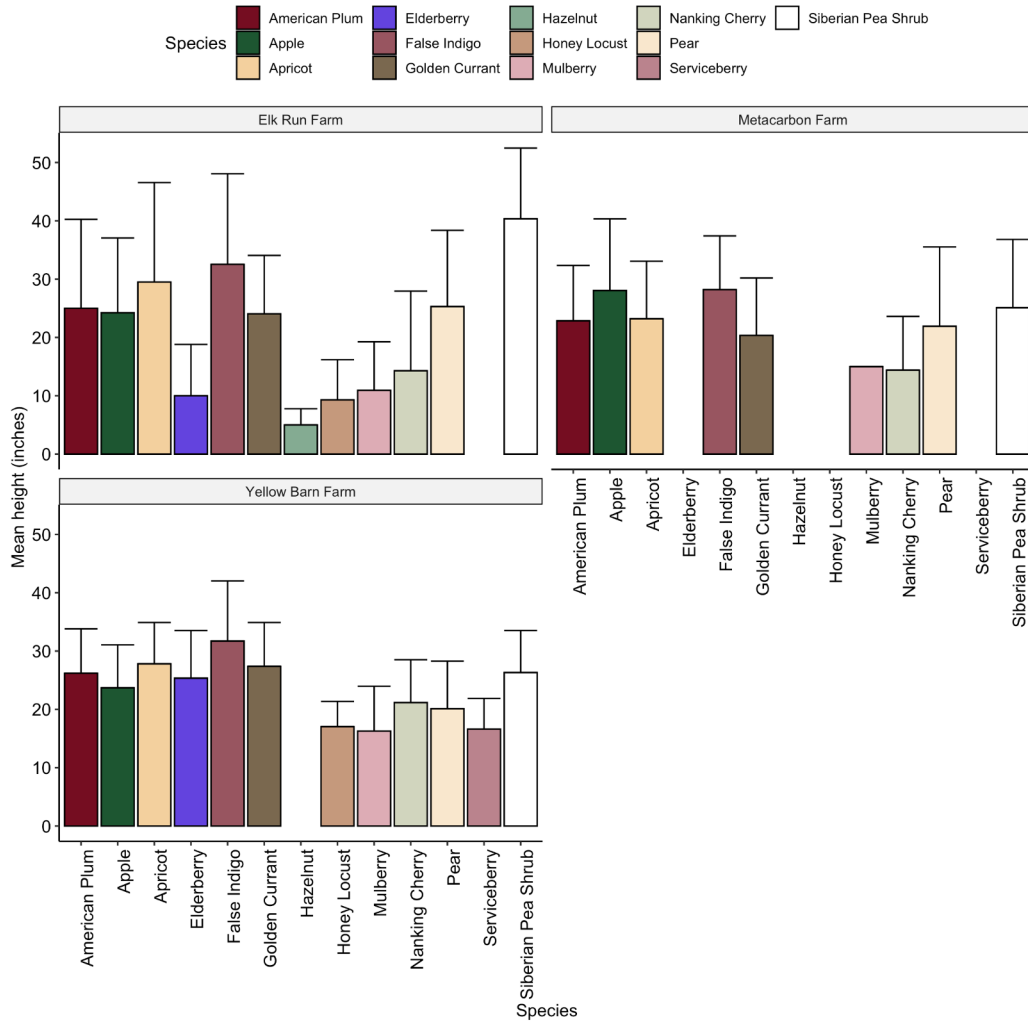
Tree & Shrub Census

DAR continues to see an average survival rate ranging from 67%-83% across its partner properties 1-3 years in.

Aggregate Tree & Shrub Survival Rates By Farm 2022



Tree & Shrub Heights by Location 2022



Apples, pears, and wild plums tend to thrive in all our landscapes, while hazelnuts and elderberries are least consistent.

A New Vision for Degraded Drylands



www.dar.eco