Drylands Agroecology Research
DAR Executive Research Report 2025

Executive Summary

2025 was a year defined by continuity. At Drylands Agroecology Research (DAR), the work centered on returning to the same landscapes, asking the same questions, and continuing to listen across four long-term research sites in Longmont, Colorado.

The strength of this work lies in its duration. Long-term ecological datasets remain rare in agroecological research, often constrained by short funding cycles. DAR's ability to collect data through uncertainty allows patterns to emerge beyond the typical three-to-five year research window — deepening our understanding of how management shapes soil, water, plants, insects, and microbial communities over time.

We extend sincere gratitude to the landowners, collaborators, volunteers, and supporters who made this work possible. Presence itself is an act of stewardship.

As Joanna Macy reminds us, "The heart that breaks open can contain the whole universe." Staying present to ecological change which includes stress, decline, and uncertainty, is part of building the resilience required for regeneration.

This report organizes DAR's findings through three linked concepts:

Action — the intentional land management practices implemented to support ecological regeneration, including agroforestry establishment, soil organic matter development, and adaptive grazing.

Indication — measurable signals such as soil water holding capacity and predator insect diversity that reveal how ecosystems respond to management over time.

Outcome — cumulative ecological responses including changes in insect richness, grassland conditions, and ecosystem stability that guide future adaptive management.

Together, this framework supports DAR's commitment to long-term learning and the development of resilient, climate-adaptive dryland agroecosystems.

Agroforestry Survival in Dryland Conditions

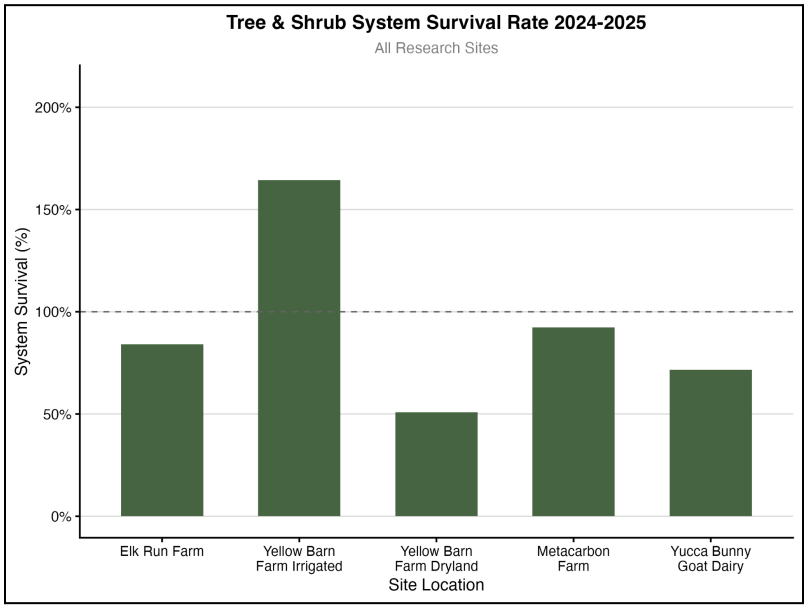
Tree and Shrub Census

DAR continues to track tree and shrub establishment across its long-term research sites. The most recent census shows a cumulative average survivability of **74.7%** across established sites, reflecting strong performance at Elk Run and Metacarbon farms, moderate survivability at Yucca Bunny Goat Dairy, and the most challenging conditions at Yellow Barn's dryland site. The Yellow Barn irrigated system was intentionally excluded from this average, as unusually high survivability reflects a 2025 planting rather than long-term establishment.

Action

DAR actively establishes trees and shrubs within dryland terrace systems to catalyze agroecosystem regeneration. This intervention introduces long-term perennial structure into the landscape, setting the conditions for trophic development, increased biodiversity, and ecological complexity. As these systems persist, they drive functional outcomes including canopy formation, improved soil health, greater water retention, and expanded wildlife habitat.

Location	Percent Survival 2024/2025
Elk Run Farm	84.09 %
Yellow Barn Farm Irrigated	164.42 %
Yellow Barn Farm Dryland	50.84 %
Metacarbon Farm	92.40 %
Yucca Bunny Goat Dairy	71.58 %



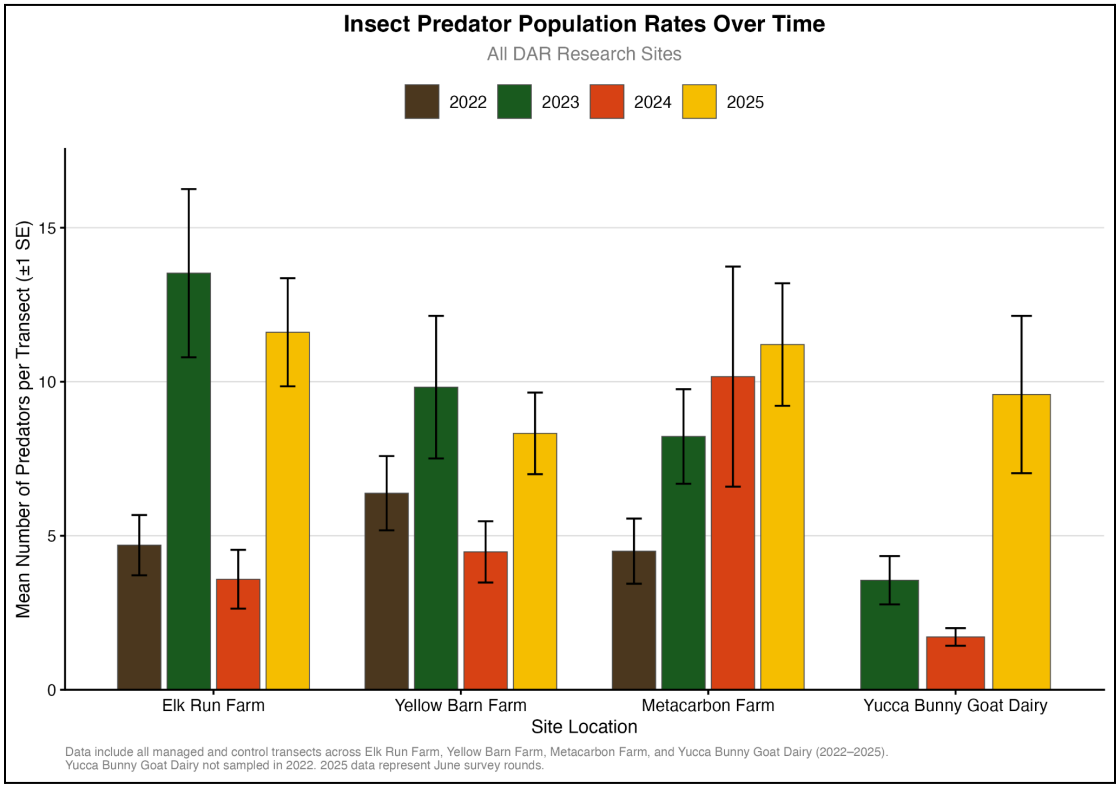
Predator Insect Diversity Survey

Predatory insects are among the first to signal whether an ecosystem is recovering or struggling. When wasps, ground beetles, and other beneficial predators return in numbers, it means the habitat beneath them, i.e. the plants, the prey, the soil, is rebuilding. DAR tracks predator diversity across all research sites as a living measure of ecological function.

Indication

Predator populations rebounded strongly in 2025 across all monitored farms. Following declines linked to the Stone Canyon Fires, counts increased markedly at all four farms which begin suggesting active recolonization rather than slow drift.

Rising predator numbers reflect a food web coming back online. Their return suggests that plant communities, prey populations, and habitat structure are recovering enough to support higher trophic levels.



Water In Movement

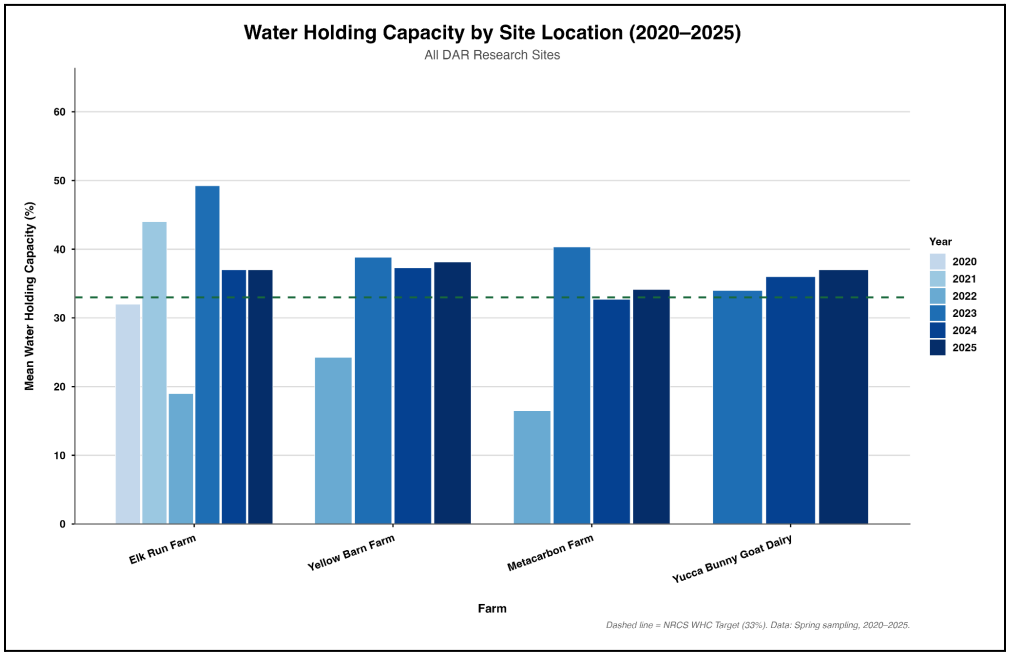
Soil Water Holding Capacity

Healthy soils act like a sponge by absorbing rainfall, holding it through dry periods, and releasing it slowly to support plant growth. Tracking water holding capacity (WHC) across DAR research sites reveals how management decisions are reshaping the soil's ability to store and retain moisture over time.

Outcome

Most sites met or exceeded the NRCS target range of 33–45% in 2025. Swale systems and irrigated silvopastures consistently showed the strongest performance, with several sites reaching WHC values above 40%. This reflects the cumulative benefit of water-harvesting infrastructure combined with rotational grazing management.

Livestock-crop integration and forest garden systems are building soil water storage. These management types showed the closest alignment with NRCS targets, suggesting that diverse, multi-functional land use supports not just productivity but also soil physical function.



Dryland pastures and recently disturbed sites remain below target. North Dryland Pastures at Yellow Barn Farm and South Top Area Pasture at Metacarbon Farm continue to show lower WHC, likely reflecting the combined effect of limited water inputs and soil structural recovery still underway following past disturbance.

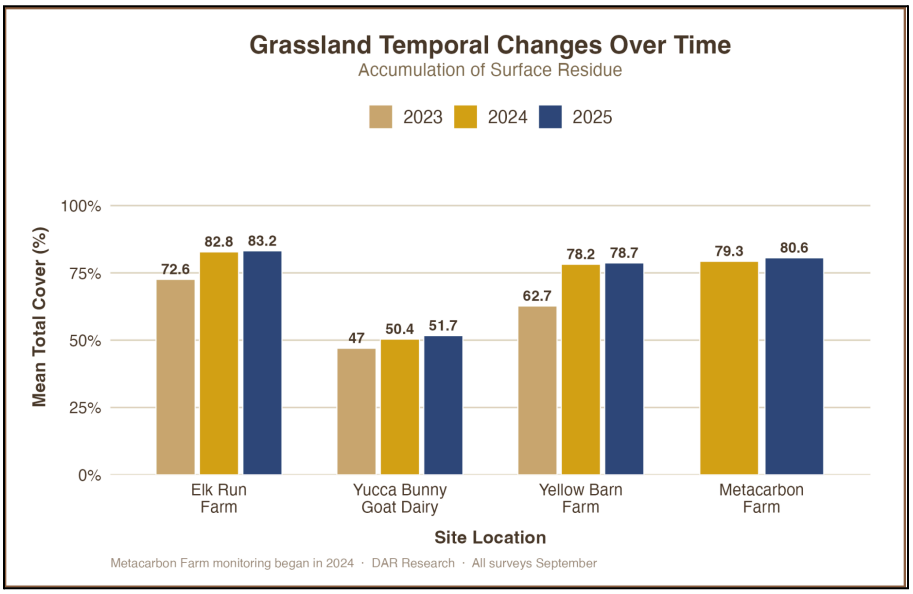
Grassland Agroecology

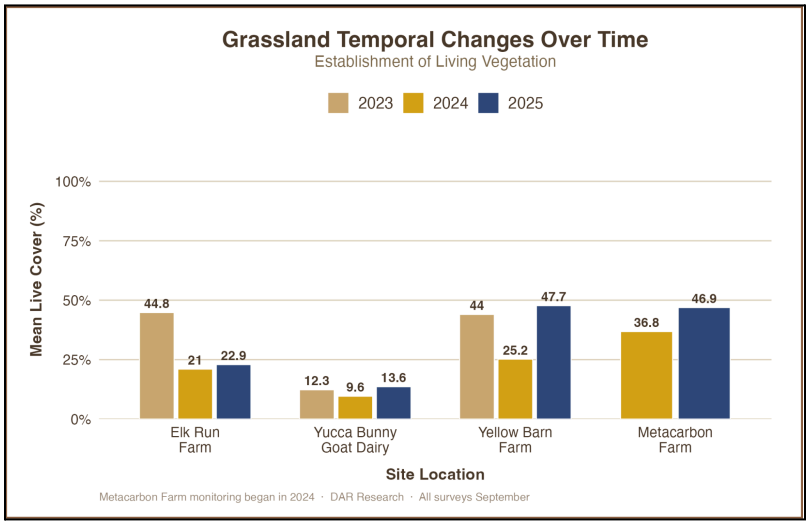
Grassland Health

Living plant cover increased across all four DAR research sites in 2025, continuing recovery from prior climate stress. Mean vegetation cover remained high at Elk Run Farm and Yellow Barn Farm, while Metacarbon and Britton farms showed incremental gains relative to 2024.

Outcome

Total cover remained stable or improved at every site. Surface residue accumulation is protecting soils from erosion and supporting moisture retention under dry conditions. These trends reflect the cumulative effect of adaptive grazing management building consistent ground cover year over year.





Living cover rebounded strongly at Yellow Barn Farm and Metacarbon. Elk Run and Britton farms show modest but consistent gains, reflecting active vegetation recovery supported by rotational grazing rest periods. Together these patterns suggest that managed grazing systems are maintaining and recovering living vegetation even under variable environmental pressure.

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