

Fermilab Natural Areas as a Restoring Force?

Earth Day 2011

Ryan E. Campbell



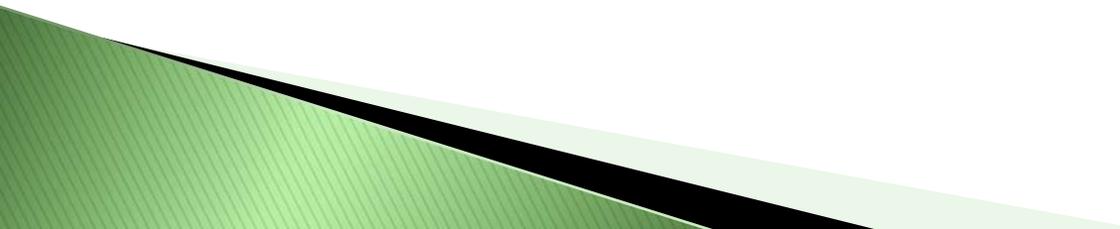
Physics and Ecology

Restoring Force

tends to bring any perturbed system back to its equilibrium state

Balance of Nature

ecosystems tend toward equilibrium

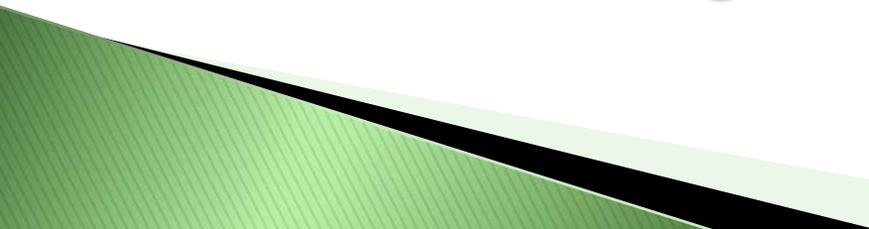


Restoration Ecology

We are not restoring nature to its equilibrium state.

We are recreating habitat, reintroducing species, reestablishing services, restoring disturbance, reviewing our work and reviving a relationship.

Overall, our goal is biological diversity



BIODIVERSITY

Species Richness and Abundance

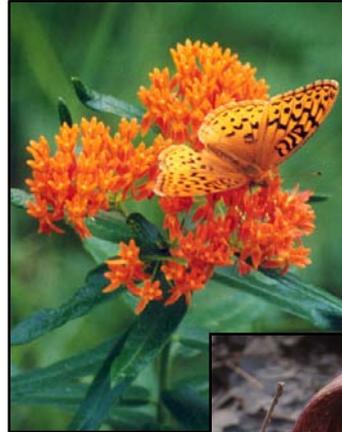
Ecosystem Complexity

Genetic Variation



Secondary Goals

- ▶ Water Quality
- ▶ Carbon Storage
- ▶ Soil Conservation
- ▶ Species Protection
- ▶ Pollinator Conservation



Recreating Habitat



Recreating Habitat

~ 1000 Acres of Tallgrass Prairie Since 1975



M. Valenzuela



G. Oleynik



M. Becker

Recreating Habitat

New Brush Grinder for Savannas and Woodlands



M. Becker

“These [non-native] shrubs form dense thickets, prevent herbaceous plants from growing beneath them, and cause a loss of native plant biodiversity”

- Site 29 Management Plan



Recreating Habitat

Nepese Marsh

1999



2010



“This [marsh] has been fairly productive of late with Soras being heard there on every visit in the past four weeks and today there were American Coots and a Shoveler hiding in among the sedges.”

- P. Kasper, Fermilab Bird Monitor

Reintroducing Species



Reintroducing Species

Turtlehead & Baltimore Checkerspot Butterfly



R. Hahn



“Fermilab is one of the few places that have the native wetland plants needed to sustain the non-migratory species.”

-FermiToday Article

Reintroducing Species

Conservation of Rare Plants

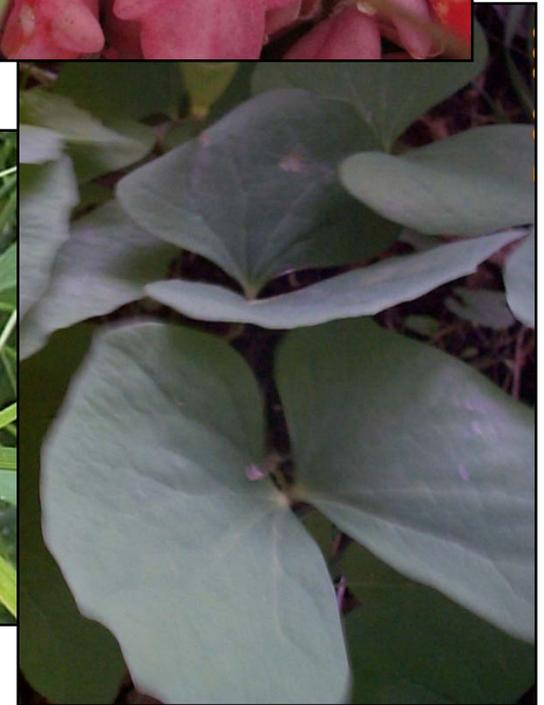
Eastern Wahoo



Pointed Tick Trefoil



Prairie Lily



Twinleaf

Reintroducing Species

Threatened and Endangered Species: Barn Owl



“We chose Fermilab for the high-quality habitat and the abundance of open grassland.”
- DuPage Co. Ecologist

A screenshot of a YouTube video player. The video title is "Fermilab re-introduces barn owls on site" and the channel is "fermilabvms". The video shows a close-up of a barn owl's face, which is white with a large, dark, heart-shaped facial disc. The owl is perched on a red wooden surface. The video player interface includes a search bar, a "Search" button, and a "Browse" button. Below the video, there are controls for play, volume, and a progress bar showing 2:12 / 4:08. There are also buttons for "Like", "Add to", "Share", and "Embed". The video has 7,010 views and 14 likes, 0 dislikes. The upload date is September 17, 2008.

Re-establishing Services



Re-establishing Services

Groundwater Quality: Wetland Mitigation



We have seen Bronze Coppers and Dion Skippers, both wetland butterflies, in the sedge meadows, [indicating] the wetland mitigation project is a success.

Fermilab Today Article

Re-establishing Services

Nutrient Cycling & Pollination: Bison Savanna



Unique species in savanna
understory

Currently: ~15 plant species
Goal: >142 appropriate species



Restoring Disturbance



Restoring Disturbance

Intermediate Disturbance Hypothesis

Not enough = loss in biodiversity as highly competitive species take over

Too much = loss in biodiversity as not many species can tolerate the frequency

Examples of Disturbance:



G. Oleynik



Flooding: Tevatron shutdown may lead to more natural flood pulses & increase shorebird habitat

Moderate Grazing: Critical to grassland diversity by controlling warm-season grasses, mitigate with parasitic plants and seed enrichment

Others: Emerald Ash Borer, Tornado, Treefall

Restoring Disturbance

30+ Years of Prescribed Fire



“When you burn,
then the prairie
grasses come
down hard on
those weeds.”

- Dr. Betz



Restoring Disturbance

Invasive Species Life Cycles



Invasive Plants

Targeted:

2009: 4 spp.

2010: 10 spp.

Species with GPS:

2009: 1 spp.

2010: 5 spp.



Reviewing Our Work

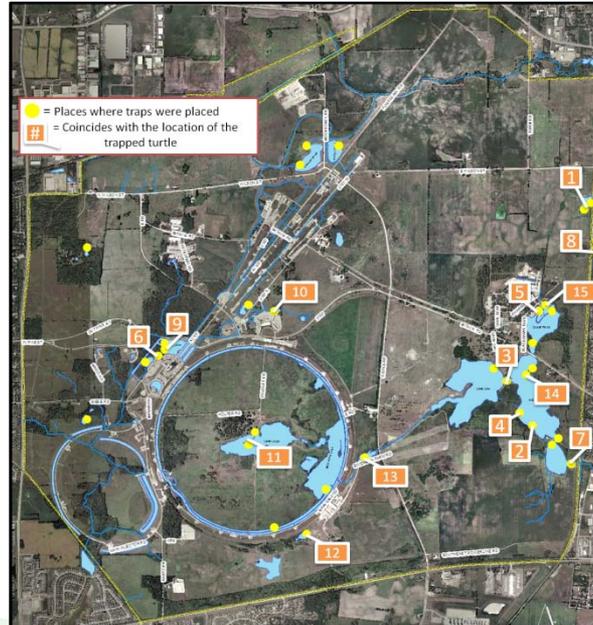


Reviewing Our Work

Surveying: Critical for Conservation



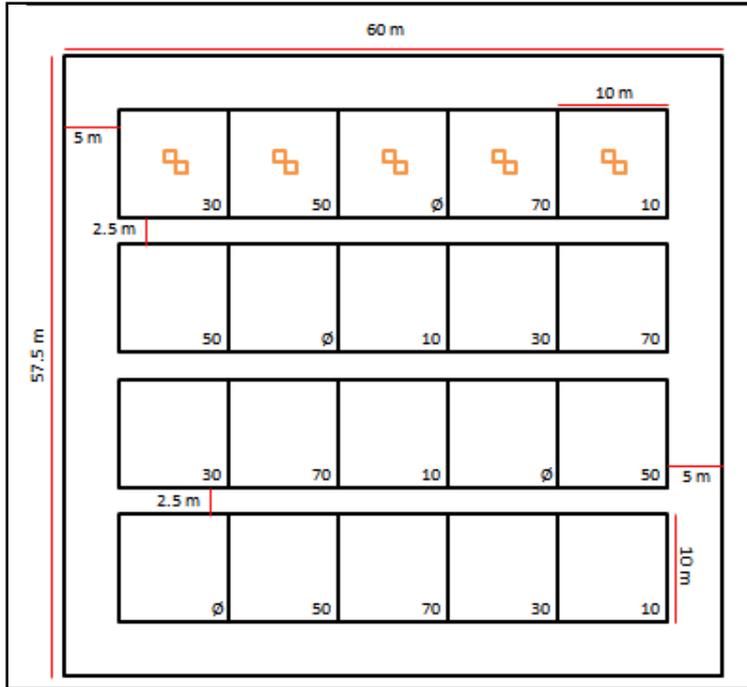
Blanding's Turtle



BIOBLITZ ?

Reviewing Our Work

Science: Answering Ecological Questions



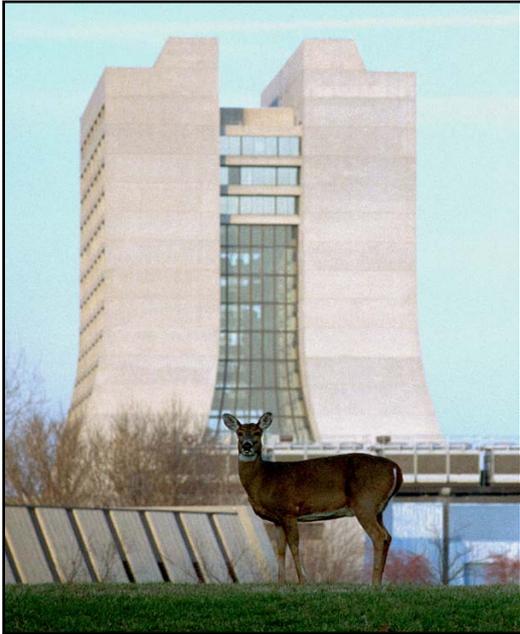
117 Species

0 lbs/acre
10 lbs/acre
30 lbs/acre
50 lbs/acre
70 lbs/acre



Reviewing Our Work

White-tailed Deer Management



R. Hahn



“results indicate that reducing deer density alone is not sufficient for maintaining a diverse forest understory, nor for fostering replacement of the overstory canopy”

- V. Nuzzo, Principal Investigator

Reviving a Relationship

“I don't believe people are looking for the meaning of life as much as they are looking for the experience of being alive.”

- Joseph Campbell



Reviving a Relationship

Robert F. Betz Internship

“I have learned quite a bit so far and look forward to more exciting projects in the coming weeks!”
- J. Meyers, 2010



Reviving a Relationship

3rd Saturday and Seed Harvests



The ritual of restoration
is as important as the
technical - W. Jordan III

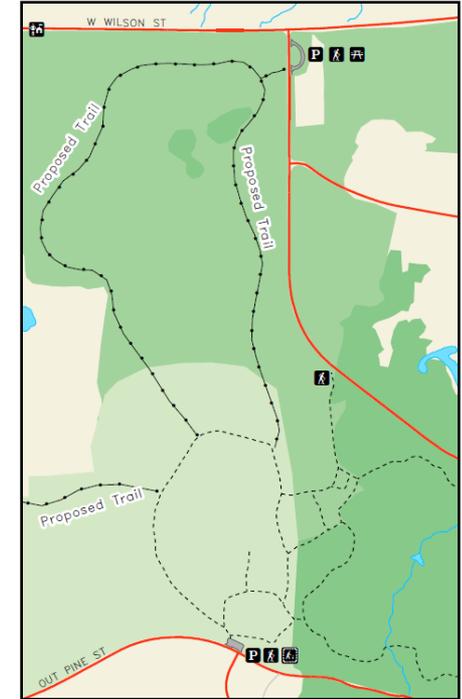


Reviving a Relationship

Prairie Rangers, Guided Walks, and Trails



R. Lootens



P. Lambertz



Thank you

- ▶ FNA Members & Volunteers
- ▶ Fermi Research Alliance
- ▶ Department of Energy
- ▶ Roads & Grounds
- ▶ Ecological Land Management Committee
- ▶ Stewardship Volunteers
- ▶ Fermilab Science Education Office & Friends
- ▶ Boeing and Other Funders



Questions?



M. Becker

 **Fermilab**

 **Fermilab
Natural
Areas**