Cover it up! Using plants to control buckthorn

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Common Buckthorn
(*Rhamnus cathartica*)

- Introduced from Eurasia as a hedge plant
- Now in 34 States and 8 CA Provinces
  - All MN counties, most WI
- Invades ecosystems ranging from savannas to closed forests

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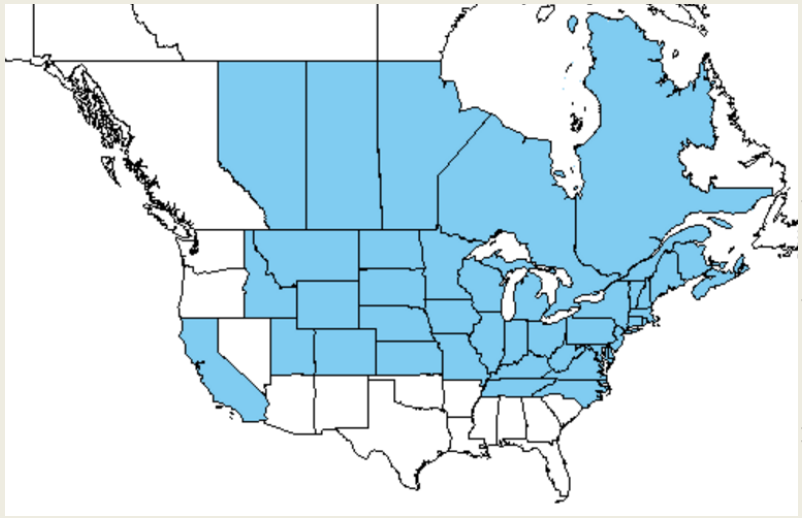


http://plants.us/da.gov/

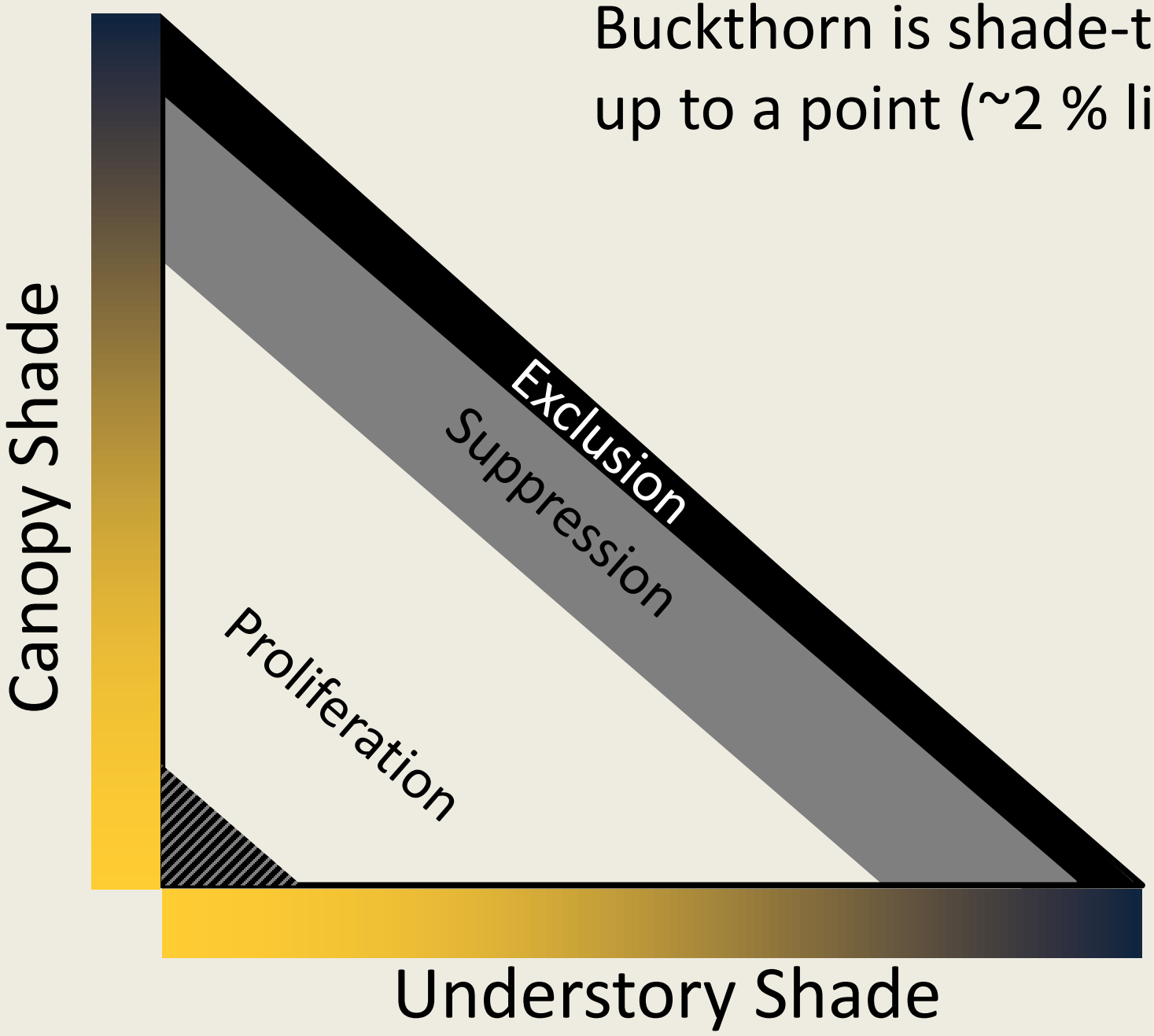
Buckthorn is an ecosystem engineer

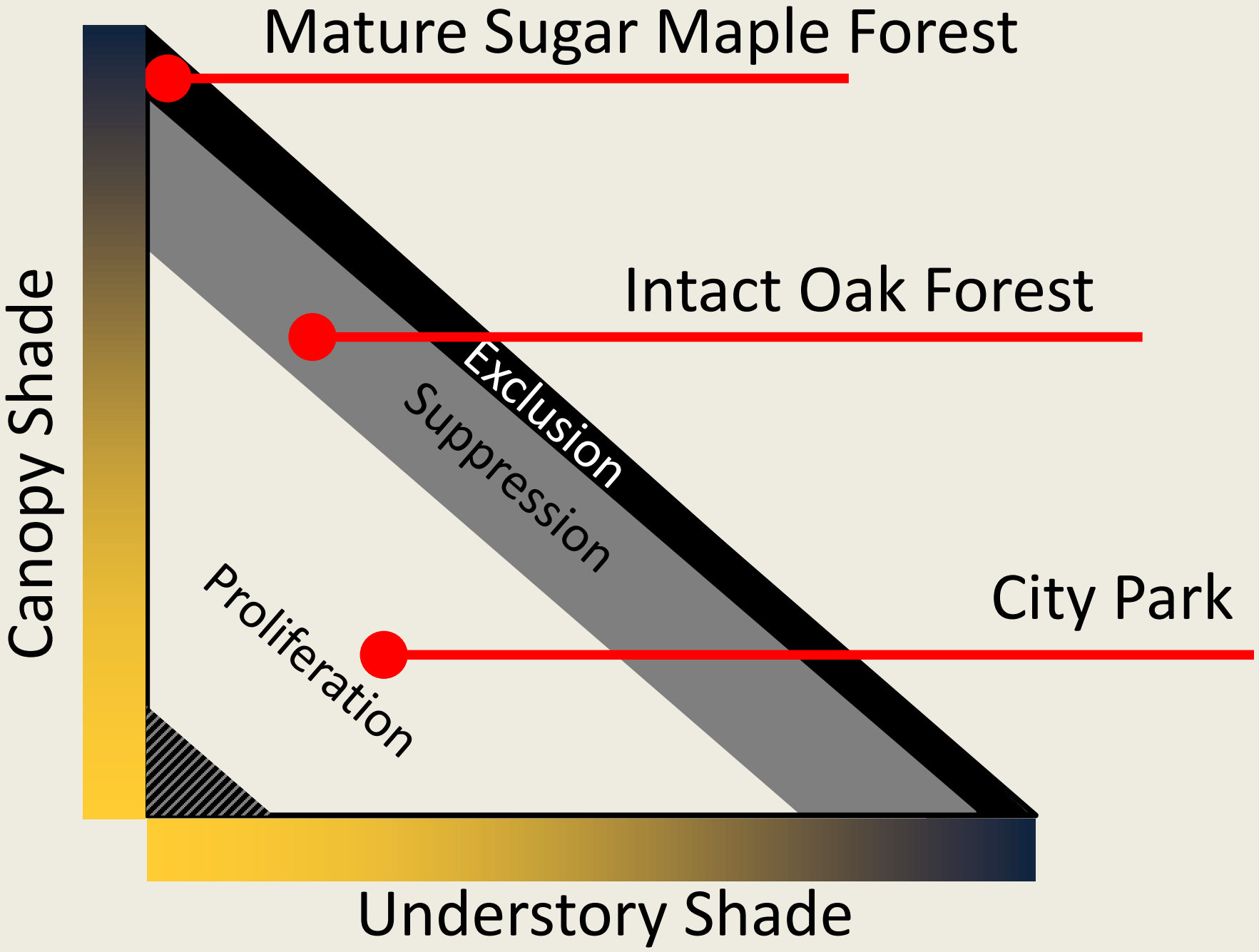
- Forms dense stands
- Decreases native diversity
  - Forest structure
  - Animal forage and habitat
  - Nutrient cycling
- Invasion meltdown with earthworms

Buckthorn Removal

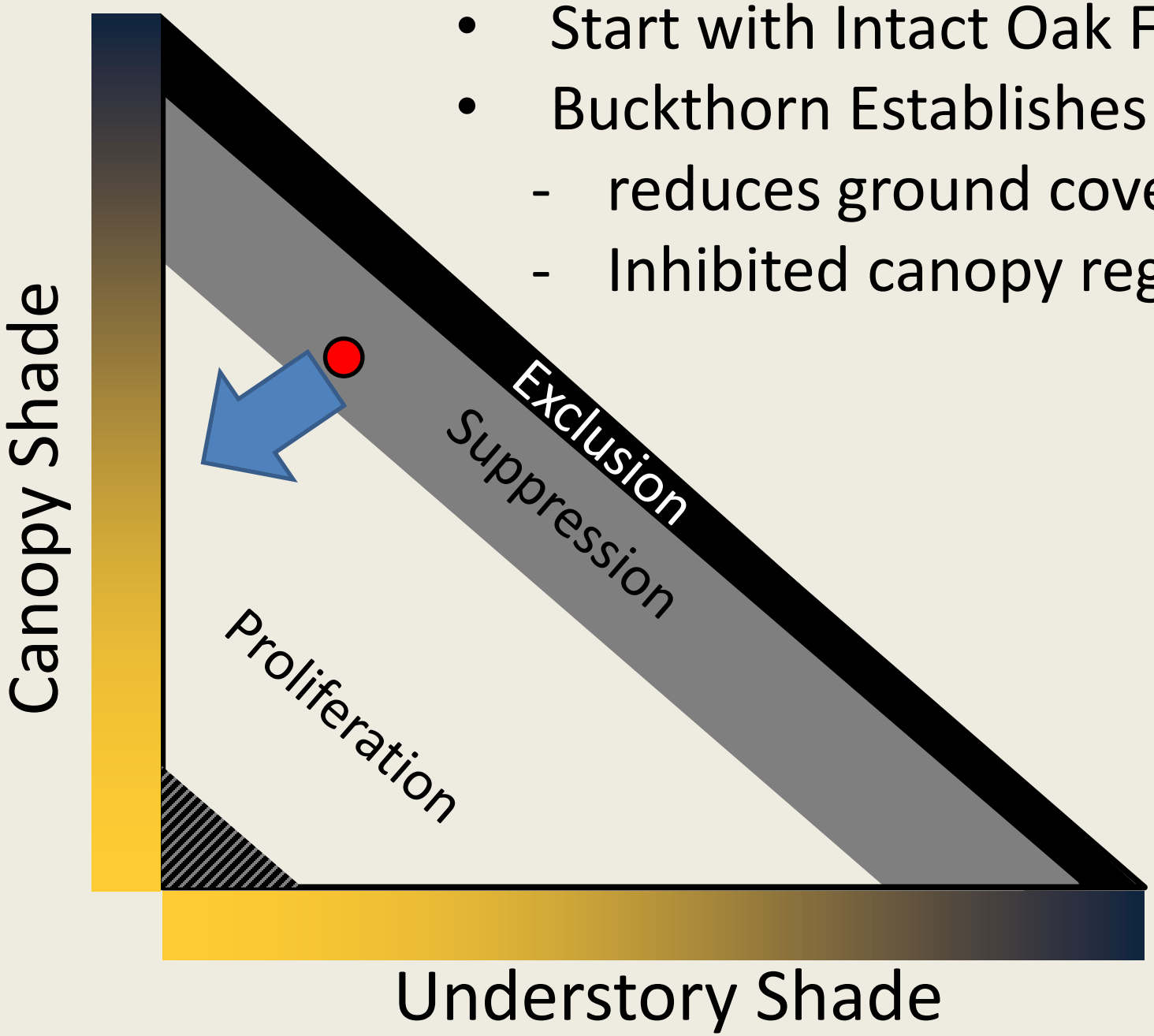
Challenges of Removal

Buckthorn is shade-tolerant, up to a point (~2 % light)

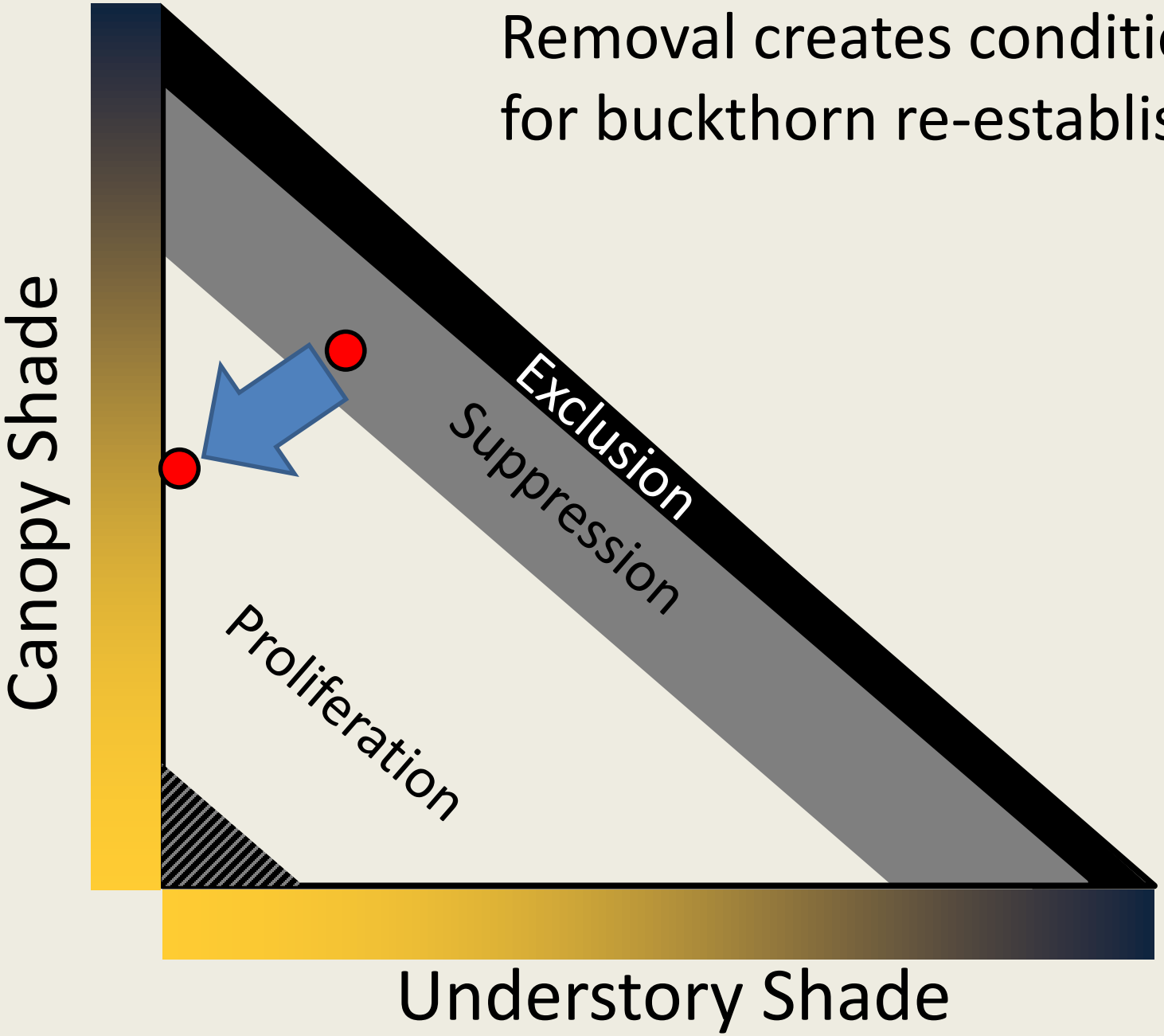


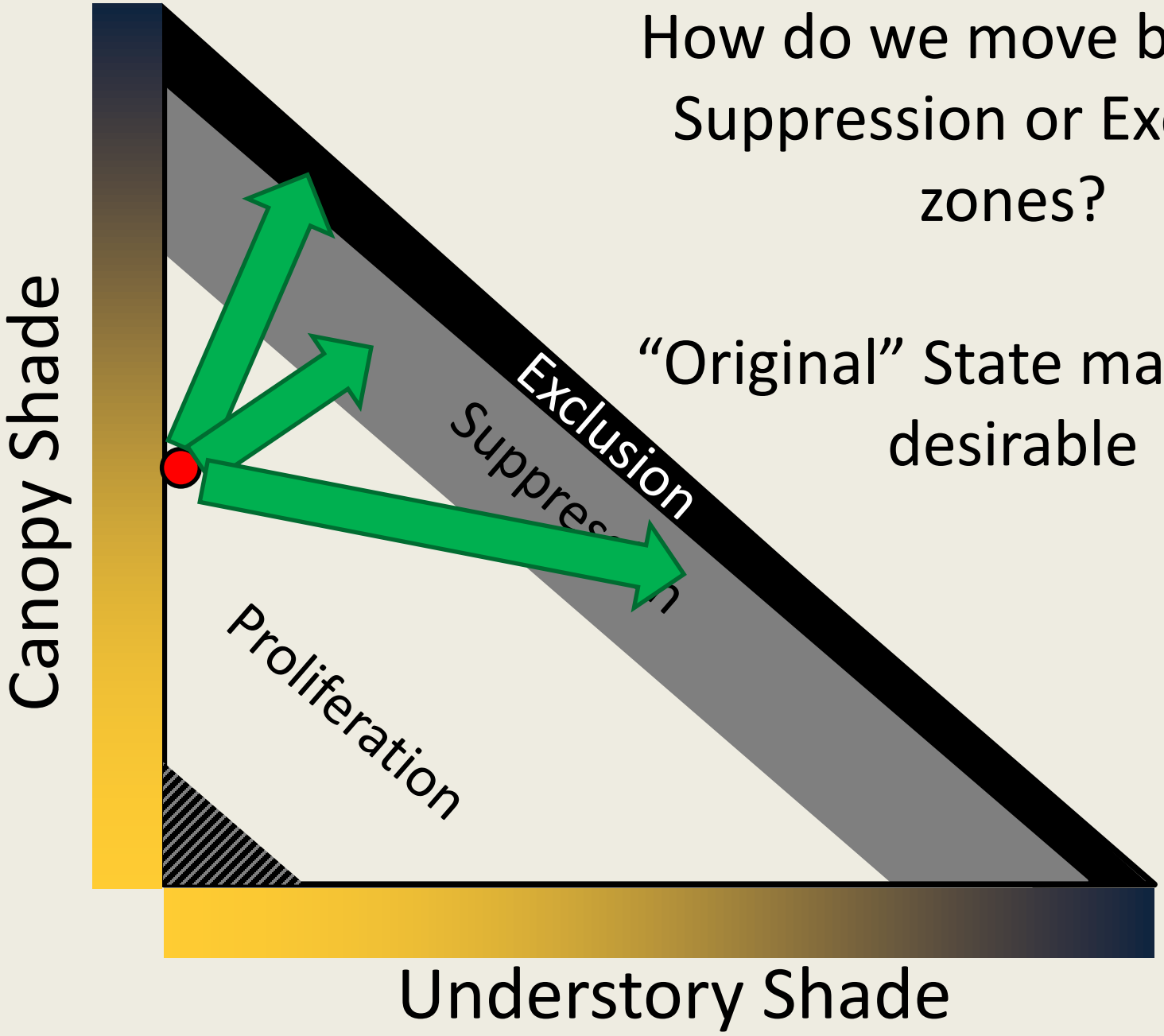

Mature Sugar Maple Forest
Intact Oak Forest
City Park
Exclusion
Suppression
Proliferation
Canopy Shade
Understory Shade

- Start with Intact Oak Forest
- Buckthorn Establishes
  - reduces ground cover
  - Inhibited canopy regeneration



Removal creates conditions ideal for buckthorn re-establishment





How do we move back into Suppression or Exclusion zones?

"Original" State may not be desirable

Shading out Buckthorn?

- Buckthorn does worse with:
  - Higher native plant diversity
  - Greater competition
  - Lower light
  - Frequent fire
  - Thick litter layers
  - Acidic soil

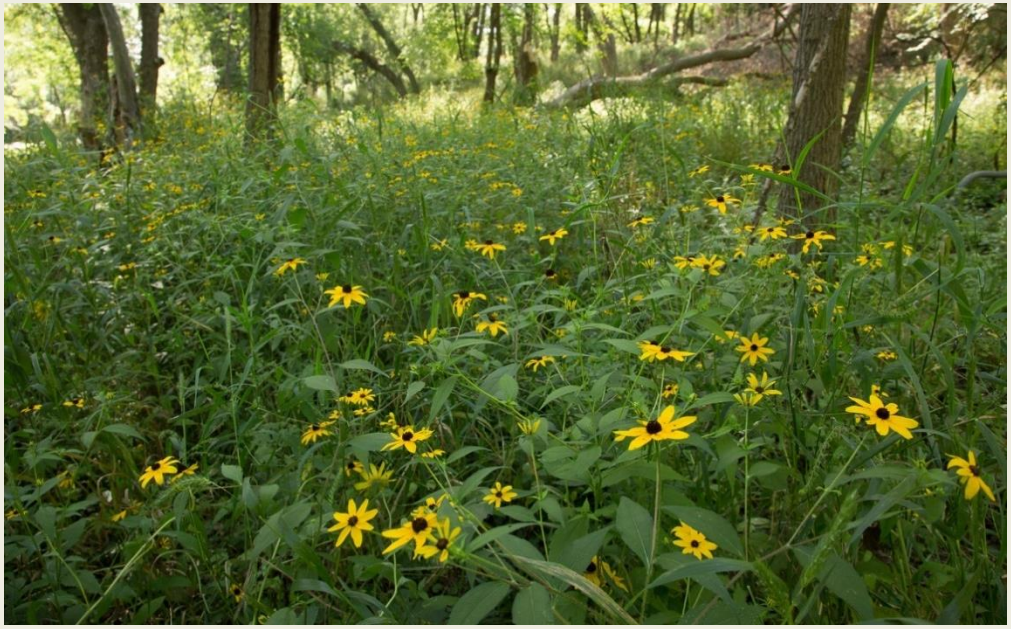
- Re-vegetation
  - Increase competition for light and other resources
  - Provide fuel for fire in some systems

Hypothesis:

Intense re-vegetation of woodlands following buckthorn removal reduces buckthorn germination and seedling growth rate, and increases buckthorn seedling mortality.

Seeding following buckthorn removal

- Not ubiquitous
- Erosion control, fuel generation, restoration of native diversity and composition are common goals
- Grasses, forbs, sedges
- Diversity and rate vary
- Effects on buckthorn unknown



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Research Questions

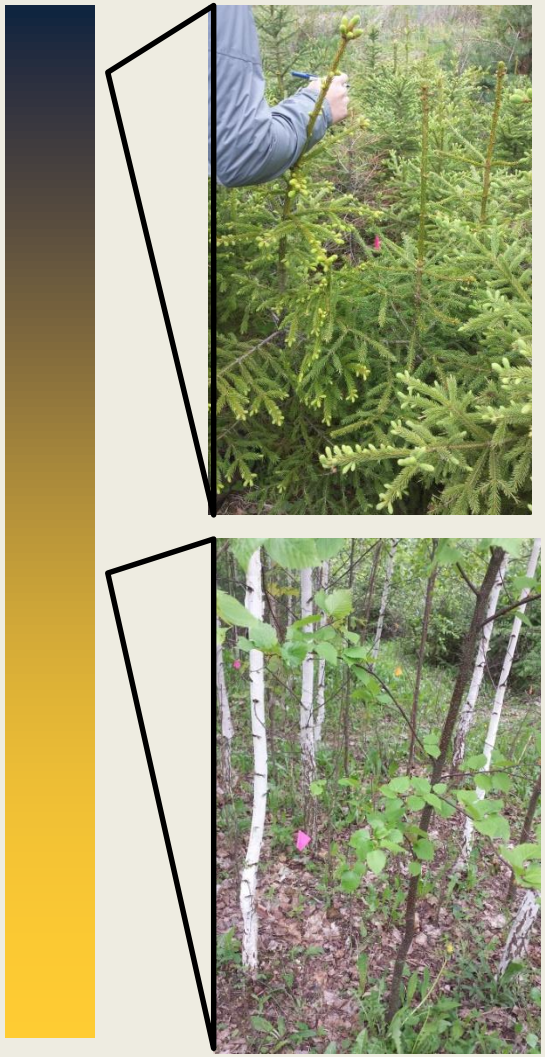
How do canopy species and associated understory light conditions influence buckthorn germination, growth, and survival?

IDENT Experiment

How do dense seeding of herbaceous species and planting of woody species affect buckthorn re-establishment?

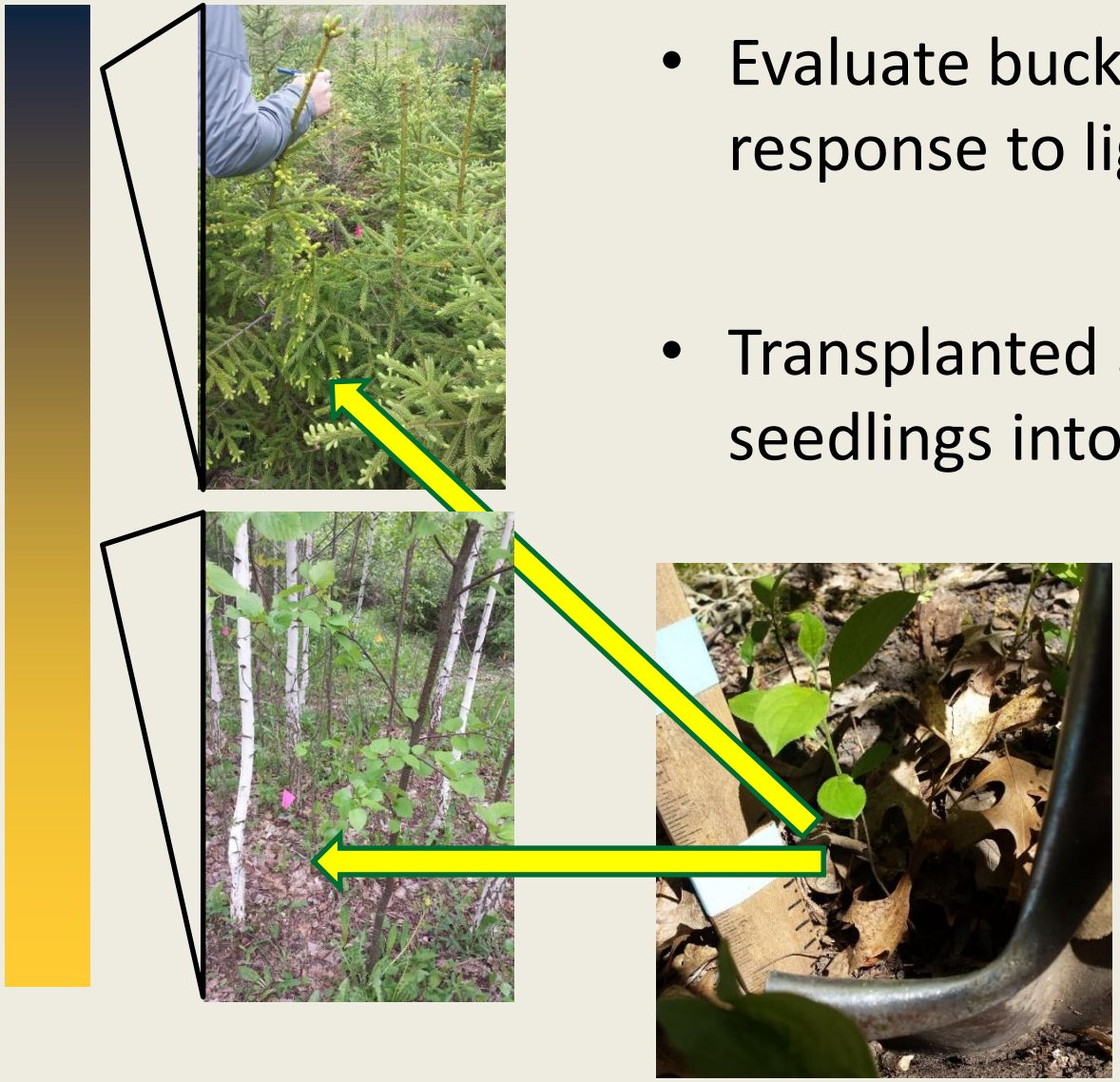
Re-vegetation Experiment

IDENT – Cloquet, MN



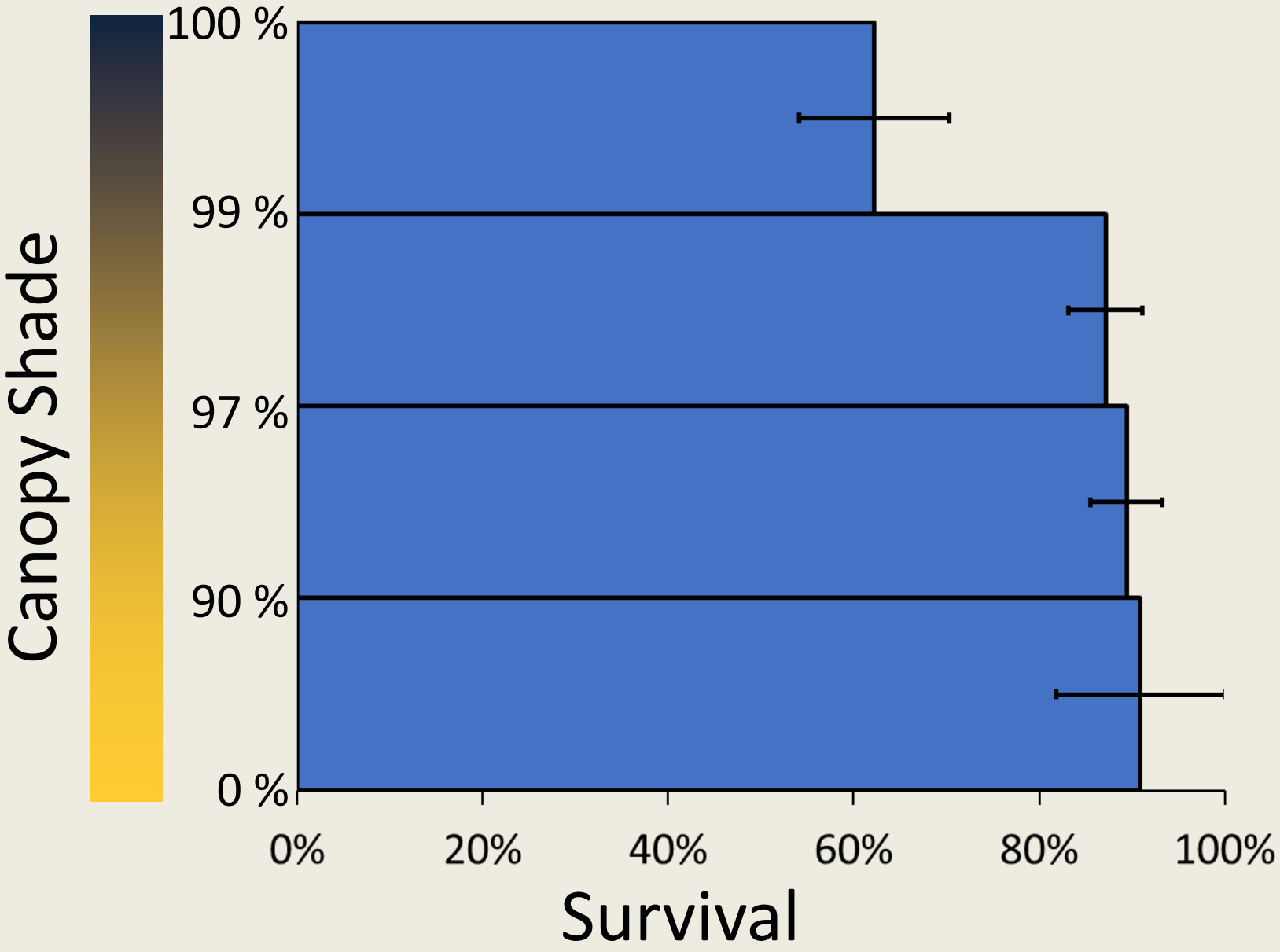
- Canopy species combinations create a light gradient

Buckthorn in IDENT



- Evaluate buckthorn growth in response to light
- Transplanted 3-5” buckthorn seedlings into 192 plots

Preliminary Results (mortality)



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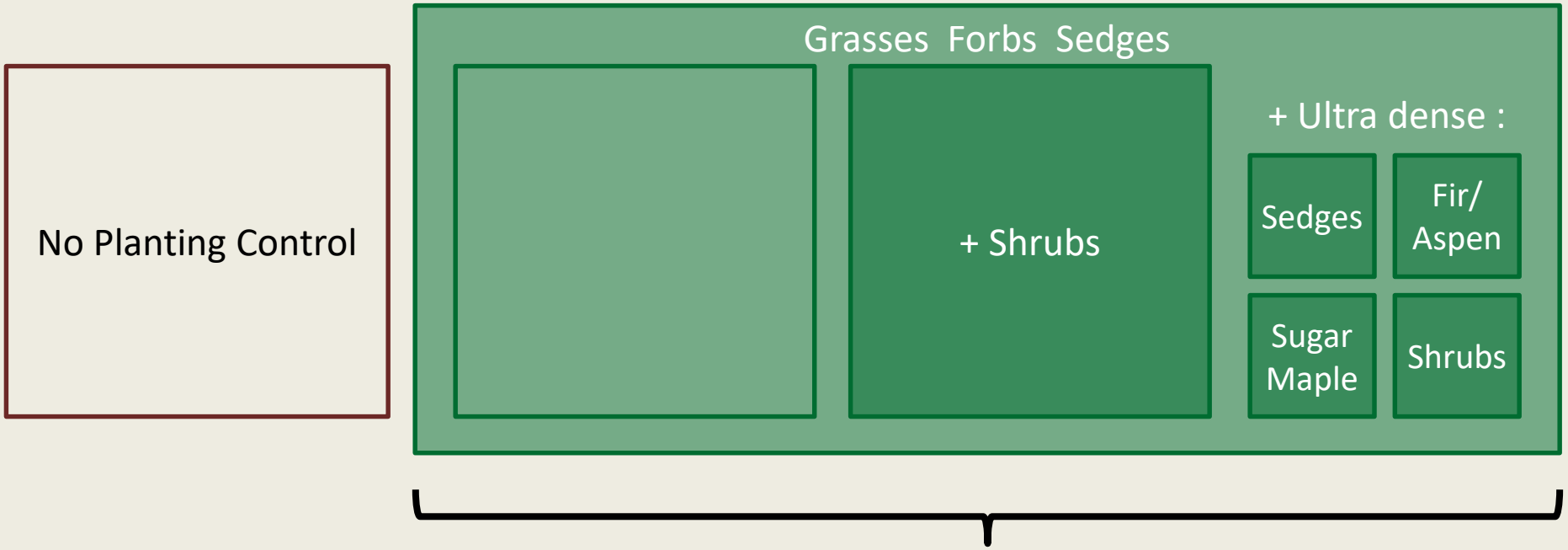
Re-vegetation Experiment

Re-vegetation experiment

Planting bare-root seedlings of
5 shrub, 2 tree species



Seeding 14 grass, 18 forb, 3 sedge species
(8.25 lbs/acre or 700 seeds/m^2)

Notable planting species

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Peter Wragg

Grasses:

Silky, Virginia, and Canada Wildrye
Bottlebrush Grass
Nodding Fescue

Forbs:

Brown-eyed Susan
Large-leaf Aster
Tall Meadow Rue

Sedges:

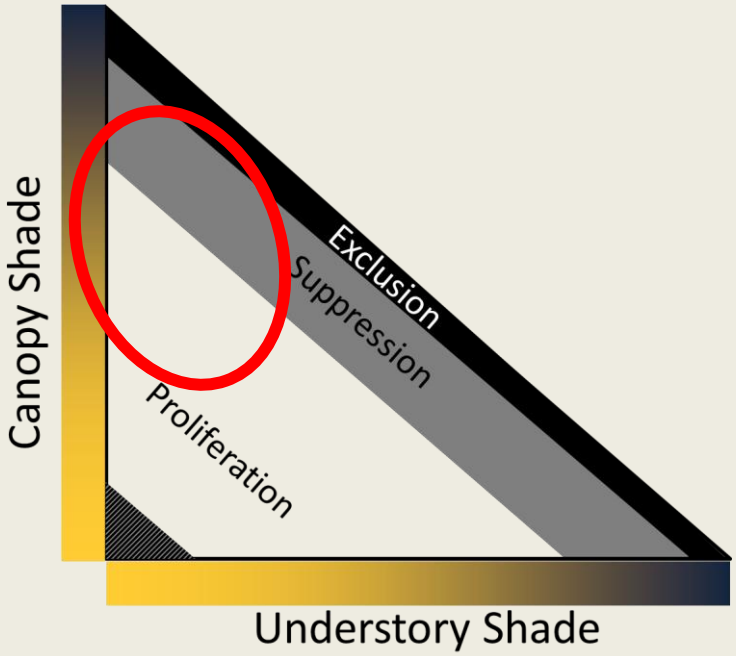
Long-beaked and Pennsylvania Sedge

Shrubs:

Chokecherry
Common and Red Berried Elder
Gray and Red-twig Dogwood

Replication across 4 sites

- Maple or Oak forests
  - St. Croix Watershed
  - Three Rivers Park District



Summary

Past: Re-vegetation is not a standard practice following buckthorn removals, but shows promise

Present: Low-light conditions have rapid impact on buckthorn seedling mortality

Future: test effectiveness of herb, shrub, and tree re-vegetation on buckthorn re-establishment in a robust, multi-site field experiment

Thank you

Minnesota Department of Natural Resources

St. Croix Watershed Research Station

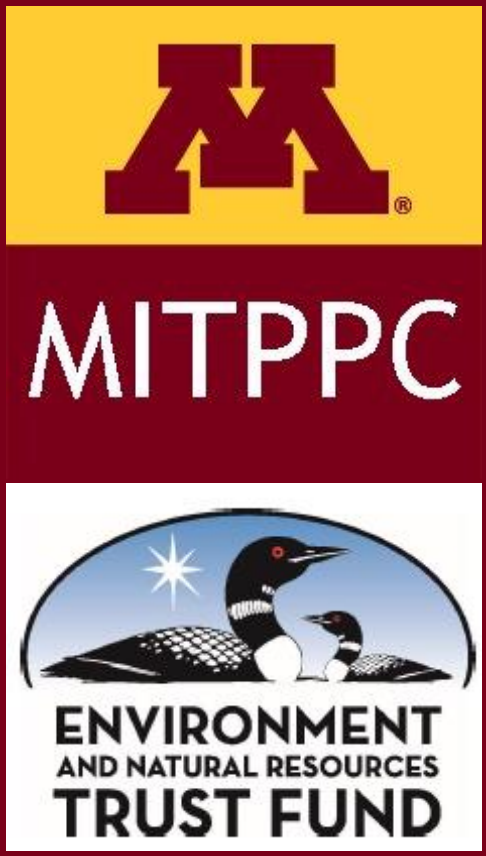
Stantec, Inc

Friends of the Mississippi River

Minnesota Invasive Terrestrial Plants and Pests Center

Legislative-Citizen Commission on Minnesota Resources

Three Rivers Park District



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6 replicate blocks per site

- Established **within 1 year** of buckthorn removal
- Control resprouts using **herbicide**