Adaptive Management Consultation for Grasslands

Strategies to Support Native Plants and Discourage Weeds
in Prairie Remnants and Restored Prairies

Morris Wetland Management District
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General Notes

- We moved rapidly through each step in the structured decision making process; many of the decisions made by the group will need refinement and these notes should be considered a draft of our team's ideas and plans.
- Group agrees to focus objectives on remnant prairie plant community. Remnant prairie is defined as land that hasn't been plowed.

Define the Problem

1) Assign a simple adaptive management framework for grassland management, using existing resources
2) Provide ground work for a larger project (RCRP)

Goals

1) Secure the future of high quality remnant prairie ecosystems
2) Provide waterfowl and other migratory bird nesting habitat
3) Preserve rare species or ecosystems

Objectives

Assumption: Meeting the below objectives will address goals 3 and 4 even if we do not explicitly monitor those (i.e., maintaining quality prairie will provide waterfowl habitat and will preserve rare species)

1) Maintain or increase the percent cover of native prairie vegetation (forbs and grasses)
2) Minimize/reduce/decrease the percent cover of specific invasive/exotic species (e.g., *Bromus inermis*, *Poa pratensis*, *Cirsium arvense*, woody vegetation)
3) Maintain the structural diversity of native grassland ecosystems
4) Increase native species diversity

Treatment Alternatives

We brainstormed a comprehensive list of grassland management tools commonly used in MN, then discussed how to trim down to a manageable list. In the end, fire, grazing, fire + grazing, and rest were chosen as the key treatments, and that we would consider these at low and high intensity levels. I left the more comprehensive list because it was such a significant part of our conversation, but the "menu" below is what we plan to use.

Common grassland management tools

1) Treatment options most likely to use
   a) Grazing
      i) Spring graze
      ii) Pre-frost graze
   b) Fire
      i) Late spring burn (post 3 leaf/pre flowering of exotics)
      ii) Pre-frost burn (e.g., August-September)
      iii) Dormant burn (Early Spring/Fall [after first frost])
   c) Mechanical (mow, hay)
      i) Summer hay (post-nesting season)
   d) Rest
   e) Grazing + Fire Combinations (obviously there are endless combinations of the above treatment options, but specific combinations currently in use are listed here)
      i) Dormant burn + spring graze
      ii) Patch-burn grazing
2) Extreme measures used for restoration (we're uncertain about the thresholds that trigger these actions)
   a) Chemical
   b) Interseeding

Final treatment options menu

Treatment regimes, using three year cycle (e.g., 1/3 = once in three year period)

Treatment Options	Disturbance Level	
	Low	High
Burn	1/3	2/3 +
Graze	1/3	3/3
Burn and Graze	n/a	2/3 +
Patch-burn graze	n/a	n/a
Rest	n/a	n/a

Miscellaneous

See Melinda's photos for the relationships/value charts that we drew for the various metrics. Generally, the trends were:

1. Average Litter Depth – value high for a few cm then declines with too much litter
2. Number of Sensitive Species – value shows linear increase then plateaus
3. Plant groups –
4. Variation in VOR and Height – value for both of these have linear increases then plateau

Uncertainties

Identifying the uncertainties that limit your ability to make informed management decisions is an important step in the adaptive management cycle. Nailing these down helps groups like ours to be more explicit about what we want to get out of a project.

1. Relationship between state variables (see below) and treatments
2. Treatments

3. Influence of state values
4. Sequencing of treatment options
5. Frequency of treatments
6. Seasons of treatments (e.g., dormant vs. spring burn)
7. Trees

<u>State Variables</u>

1. Precipitation gradient
2. Soils
3. Upland vs. Lowland prairie
4. Initial degradation (species and level)
5. Site history (e.g., overgrazed, over rested)

Possibly keep separate spreadsheet to record state variables in our data collection – would not be included in our model but could tease out the more subtle influences later.

Try doing a statistical comparison (either independent of or in addition to the AM modeling) to assess the redundancy between the VOR and height metrics, and also to consider the potential for sub-sampling all three structural metrics (Clint may be able to help with this).

Having fewer metrics is good in two ways:

1. Time saved in the field = more transects and/or more sites monitored
2. Fewer metrics mean allow for simpler models

Will have to work out the cross-walk issue with the Dakota grassland team (esp. issue of two vs. three groups for level of invasion).

MN Team will do a field check day where we run some of each other's transects, ensure standardized robel poles

MN Team needs to address potential for sharing field technicians

With a group like this we can not only have the temporal replication that is inherent in AM, but we will also provide spatial replication. All the better if we can overlay good study design features like randomized treatments.

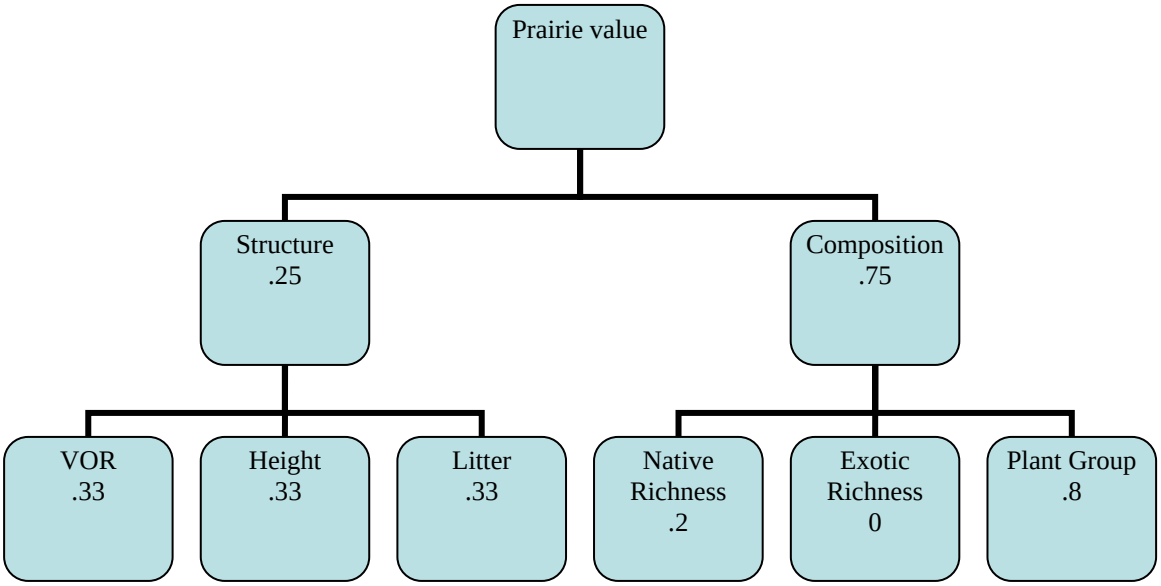
Sara and Meredith will coordinate with the MN group to determine how to move forward. Melinda will develop flow chart to identify needed decisions and steps. Eric will work on the model spreadsheets. Terry et al waiting to hear on RCRP. Groups are going to have to decide on all the correct numbers to have on the model spreadsheets (expected outcomes, probabilities of those outcomes, model weights, etc.)

Each site will have their own spreadsheet so they can differentially inform the overall model decisions. Spreadsheets will have the same structure.

Annual monitoring? Year effects could be huge. Stagger when you start new sites.

Possible difference between MN and SD/ND prairies is this transition between brome and bluegrass dominated plant communities (Dakota team has observed this, MN has not) – Clint suggests dealing with this as two parallel systems if needed. Chart demonstrating this idea is in Melinda's photos. Generally, we expect the grassland state to move from native to intermediate to invaded, with transitions between and within each state. There is also a transition available between the smooth brome invaded and KY bluegrass invaded states.

First crack at valuing objectives/metrics; layout is group opinion but the associated values were Eric's guess.



Example model that Eric and Clint showed at the end:

		Model					
Trtmt	Response Metric	High Disturbance			Low Disturbance		
GGG	Litter	0	2	4	0	2	4
		50%	30%	20%	20%	30%	50%
	Plant	15	0	-15	15	0	-15
		70%	20%	10%	50%	30%	20%
GRR	Litter	0	2	4	0	2	4
		20%	30%	50%	50%	30%	20%
	Plant	15	0	-15	15	0	-15
		50%	30%	20%	70%	20%	10%