# Restoring Virginia Grasslands: progress, needs, & future directions

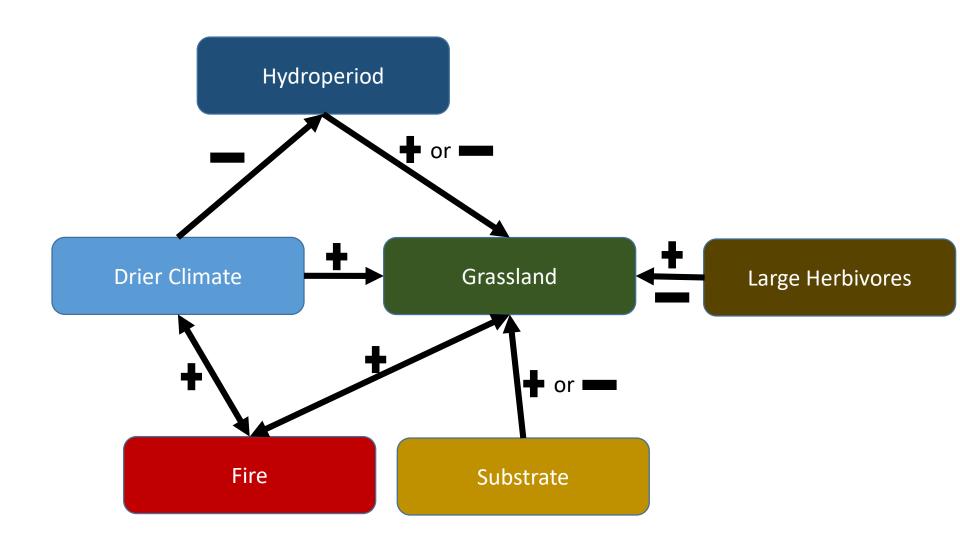
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#### Grasslands of the Southeast



- What is a grassland?
  - A community in which the grass layer, with its associated forbs, is the dominant layer in terms of either <u>total cover</u> or <u>biomass</u> or <u>both</u>.
    - Prairie
    - Savanna (Canopy 10 25%)
    - Woodlands (Canopy 25 60%)
    - Barrens
    - Glades

## Origin & maintenance of grasslands



## Central Appalachian Shale Barren



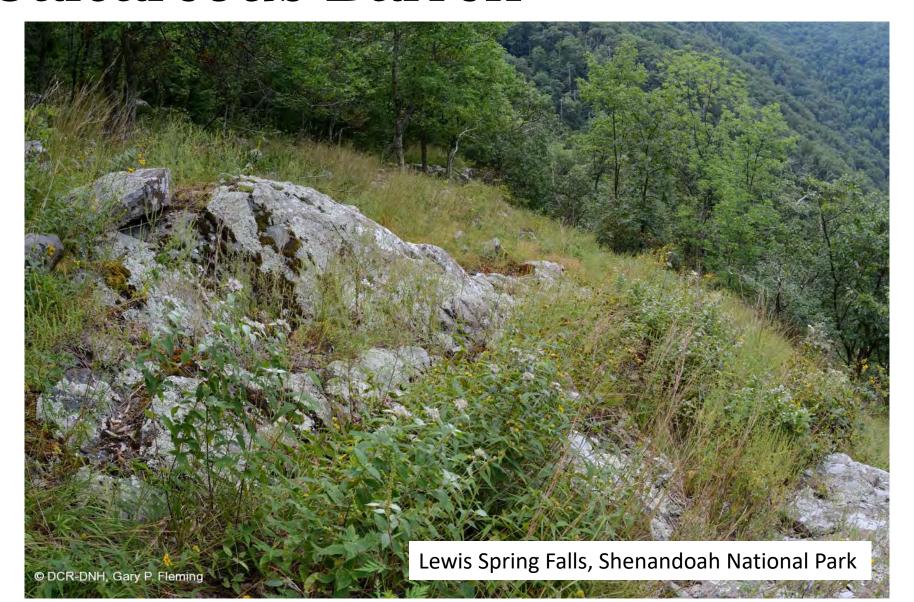
Central Appalachian Xeric Ch<u>estnut Oak – VA Pine Woodlan</u>d



# Ridge and Valley Dolomite Woodland



# Central Appalachian Mafic/ Calcareous Barren



# Shenandoah Valley Grasslands



• "Much of the country between Little North Mountain and the Shenandoah River was one vast prairie, and like the rich prairies of the west...abounded in buffalo, elk, deer, panther, wolf, fox, beaver, otter, and wild fowl" – S. Kercheval 1833

# Native grassland plants & biodiversity

Plant Genus/ Species	Exotic Lepidopteran Species Supported (No.)	Native Lepidopteran Species Supported (No.)
Helianthus	2	73
Solidago	3	115
Rudbeckia	0	17
Monarda	0	7
Little bluestem	0	6
Indiangrass	0	9
Sedges	0	36
Teasel*	1	0
Crown vetch*	1	3
Tall fescue*	0	0

<sup>\*</sup>Indicates non-native invasive plant species

# Grassland and C cycling



- Burning promotes drought resistant plant communities
- Burning <u>increases</u> aboveground net primary productivity
- Burning increases root biomass (Rice et al. 1998) & changes root chemistry (C:N ratio)
  - Roots decay more slowly
- Grasslands contain up to 190,000 kg C/ha (Schlesinger 1977, Lal 2004)
  - 2.4 kg C/gallon of gasoline (USEPA)

# Working Group 2017 Field Day



# Working Group 2017 Field Day



Biodiversity Enhancement of NWSG Planting



#### The Wildlife Seed Mix Calculator

#### NATIVE SEED MIX RECIPE and PRICE ESTIMATE

Diverse Wildflower Mix

Carlos	15.00.0	3.57	Wt per	% of	Approx.	Approx.	Total PLS Wt for	Est. seed price for
Common Name	Scientific Name	Туре	ac (PLS)*	Mix	Price/lb	Price/ac	project	project
Little Bluestem	Schizachyrium scoparium	Grass	0.85 lb	16%	\$16.50	\$14.03	3.91 lb	\$64.5
Indiangrass	Sorghastrum nutans	Grass	4 oz	3%	\$14.00	\$3.50	1.15 lb	\$16.1
Virginia Wildrye	Elymus virginicus	Grass	0.87 lb	6%	516.25	\$14.14	4 lb	\$65.0
Panicleleaf Ticktrefoil	Desmodium paniculatum	Legume	0.65 lb	9%	\$40.00	\$26.00	2.99 lb	\$119.6
Partridge Pea	Chamaecrista fasciculata	Legume	1 lb	5%	\$30.00	\$30.00	4.6 lb	\$138.0
New England Aster	Symphyotrichum novae-angliae	Wildflower		5%	\$625.00	\$39.06	4.6 oz	\$179.6
Spotted Bee Balm	Monarda punctata	Wildflower	0.7 oz	5%	\$312.50	\$13.67	3.22 oz	\$62.8
Wild Bergamot	Monarda fistulosa	Wildflower	0.8 oz	5%	\$312.50	\$15.63	3.68 oz	571.8
Lanceleaf Coreopsis	Coreopsis lanceolata	Wildflower	0.6 lb	9%	531.25	\$18.75	2.76 lb	\$86.2
Plains Coreopsis	Careapsis tinctoria	Wildflower	0.65 oz	9%	\$22.50	\$0.91	2.99 oz	\$4.2
Narrow-leaf Mountainmint	Pycnanthemum tenuifolium	Wildflower	0.35 oz	9%	\$515.00	\$11.27	1.61 oz	\$51.8
Evening Primrose	Oenothera biennis	Wildflower	1.5 oz	9%	\$162.50	\$15.23	6.9 oz	\$70.0
Narrow-leaf Sunflower	Helianthus angustifolius	Wildflower	4.15 oz	9%	\$60.00	\$15.56	1.19 lb	571.4
Total			4.79 lb	100%		\$217.75	22.04 lb	\$1,001.4

#### Seed collection sites



Forb seed collection at Cowbane Prairie NAP

- Multiple plantings have been completed
  - Mature perennial grasses & forbs
- Database for locations suitable for harvesting

#### Equipment Needs: Seed collection



- Seed stripper pulls behind UTV or ATV.
- Plastic bristles or metal fingers harvest grasses
   & forbs
- Approximate cost \$8000.00

# Equipment Needs: Seed drying, milling, & storage

- Drying seeds takes ~ 1
   week
- Dry seeds are milled to facilitate planting with equipment
  - Cost ~ \$10,000
- Seeds are stored ahead of fall, winter, or spring planting

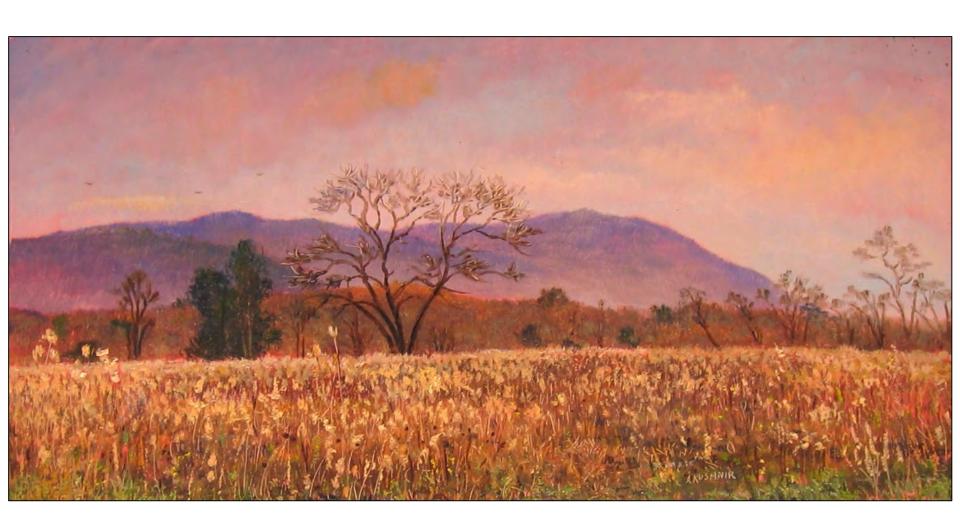


### Equipment needs: sowing seeds

- Pendulum broadcasting
  - Appropriate tool for plantings up to 30 acres.
- Cost ~\$2500

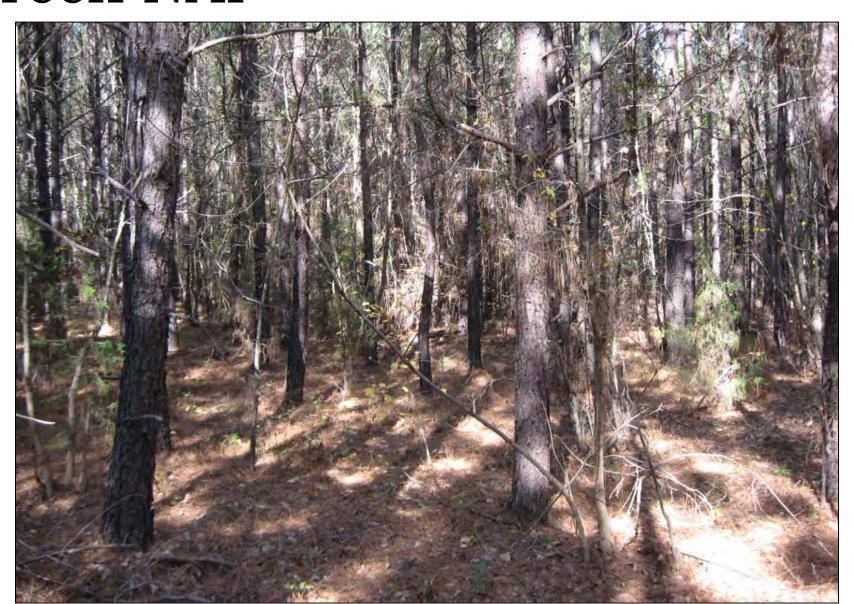


# Thank you



Cowbane Prairie Natural Area Preserve by Andrei Kushnir

# Piedmont Prairie at Difficult Creek NAP



# Thinning + prescribed fire



# Thinning + prescribed fire + targeted herbicide



# Seasonality of fire management

- Spring burns
  - Cool season grasses
     (e.g., Festuca spp.,
     Bromus spp, Phalaris
     arundinacea) are set
     back
  - Warm season grasses are stimulated
    - Faster growth, more tillering, increased reproduction



# Seasonality of fire management

- Fall burns
  - Best for increasing local biodiversity
    - Improves seed bed & early spring growing conditions
- Grazing also benefits forb diversity
  - Mowing is a surrogate



- What ecological role(s) do grasslands play in the central Apps (up in the mountains specifically).
- Which taxa are the main beneficiaries of native grasslands? Which of these are the most threatened? How/should we tailor project to those specific species?
- Should <u>all</u> grassland restoration be designed as "pollinator habitat" or are there other goals as well?
- How many forbs species are present at Cowbane vs how many "should" be present in a fully-diverse grassland system? Simply put, what fraction of biodiversity are we achieving with our efforts?
- What do "grasslands" look like in central Apps savannas and woodlands?

#### Grassland plant adaptations to fire

- ≥ 60% of plant biomass is belowground
  - N is retranslocated to roots in the fall
  - High water & nutrient absorption capacity
- Meristems at or below soil surface & protected by leaf sheaths



Origin & maintenance of grasslands in Virginia

