

Restoring Virginia Grasslands: progress, needs, & future directions

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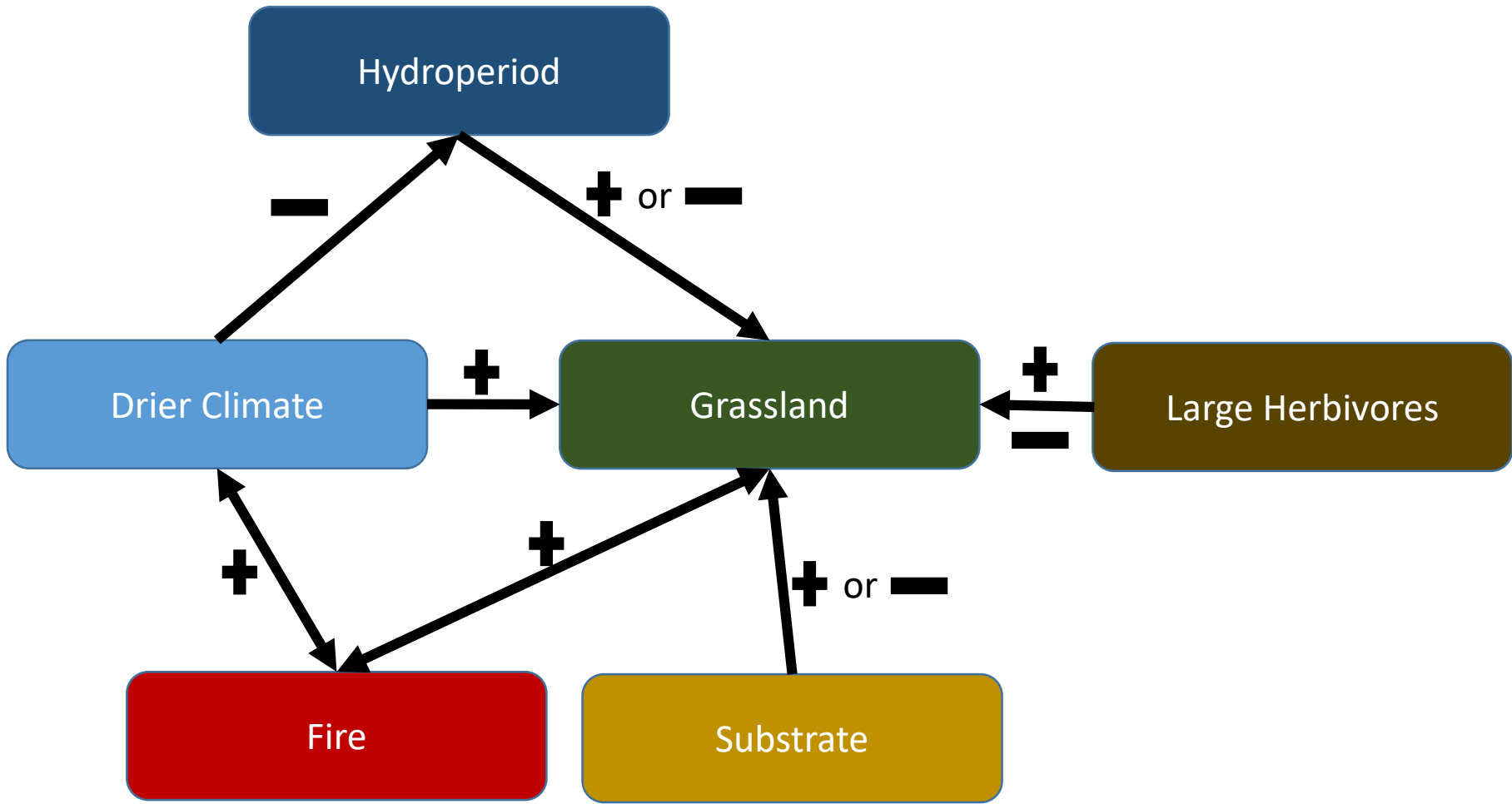
Grasslands of the Southeast



Painting of Pisgah Nation Forest, NC by P. Juras

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

Origin & maintenance of grasslands





Central Appalachian Shale Barren



Central Appalachian Xeric Chestnut Oak – VA Pine Woodland



©DCR-DNH, Gary P. Fleming

Catawba Mountain, Botetourt County

Ridge and Valley Dolomite Woodland



© DCR-DNH, Gary P. Fleming

Pedlar Hills Natural Area Preserve, Montgomery county

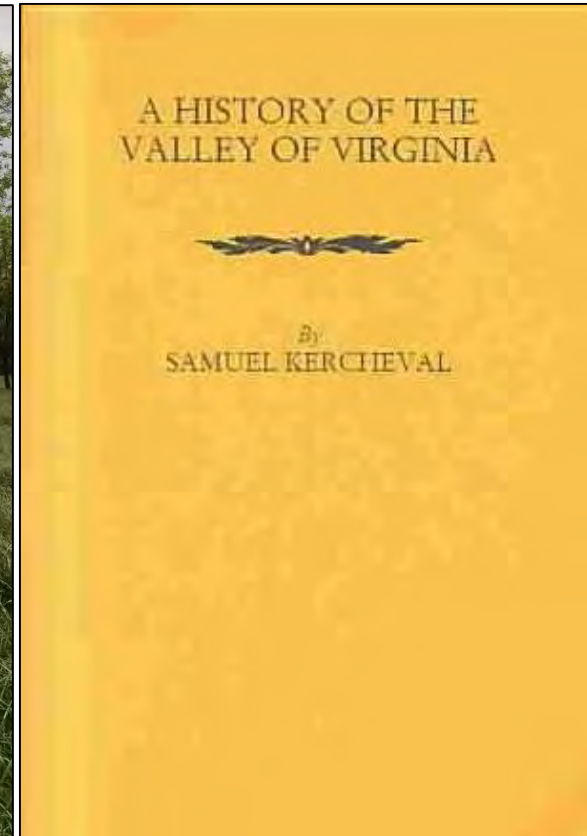
Central Appalachian Mafic/ Calcareous Barren



Shenandoah Valley Grasslands



Cowbane Prairie Natural Area Preserve



- “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

*Indicates non-native invasive plant species

Tallamy (2007)

Grassland and C cycling



- Burning promotes drought resistant plant communities
- Burning increases 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



Lake Shenandoah, DGIF

Working Group 2017 Field Day



Cowbane Prairie Natural Area Preserve

Biodiversity Enhancement of NWSG Planting

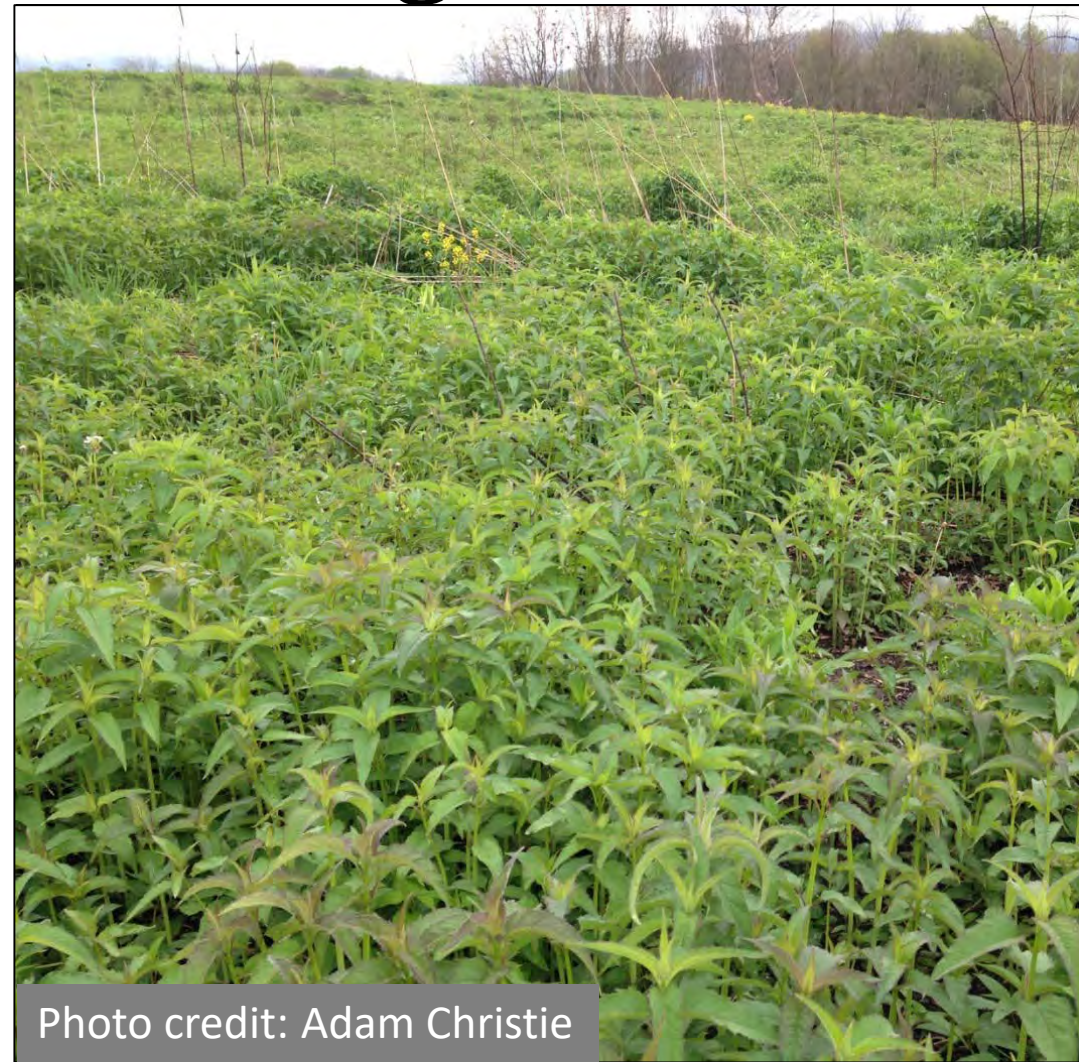


Photo credit: Adam Christie



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 all 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

- $\geq 60\%$ 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

