
Native Lawn
Established at
Cornell Botanic Gardens
2008-2009-2010-2011 …..

Learning Objectives

1. To demonstrate, the establishment of a lawn, in a landscape setting, using locally native species of grasses and forbs.

2. To explain the installation process using slides and text. These are arranged in chronological order. This is accomplished within a one year cycle from planning to implementing.

3. Key learning points include: plant ecology, species selection, site preparation, seed collection and cleaning. Site design, maintenance, interpretation and evaluation.




American Lawns

- 30 million acres of lawn
- 750 million a year on grass seeds
- 100 million tons of fertilizer
- 80 million pounds of pesticides
- 40 hours / year mowing a lawn
- 1 quart of gas / hour
- 25%- 40% of landfill space is grass clippings
- Per hour of operation, small gas powered engines used for lawn care emit more hydrocarbon than a typical automobile
- 10,000 sq.ft. of turf requires 10,000 gallons of water per summer to stay green.
- 30% of the water consumed on the East Coast goes to watering lawns

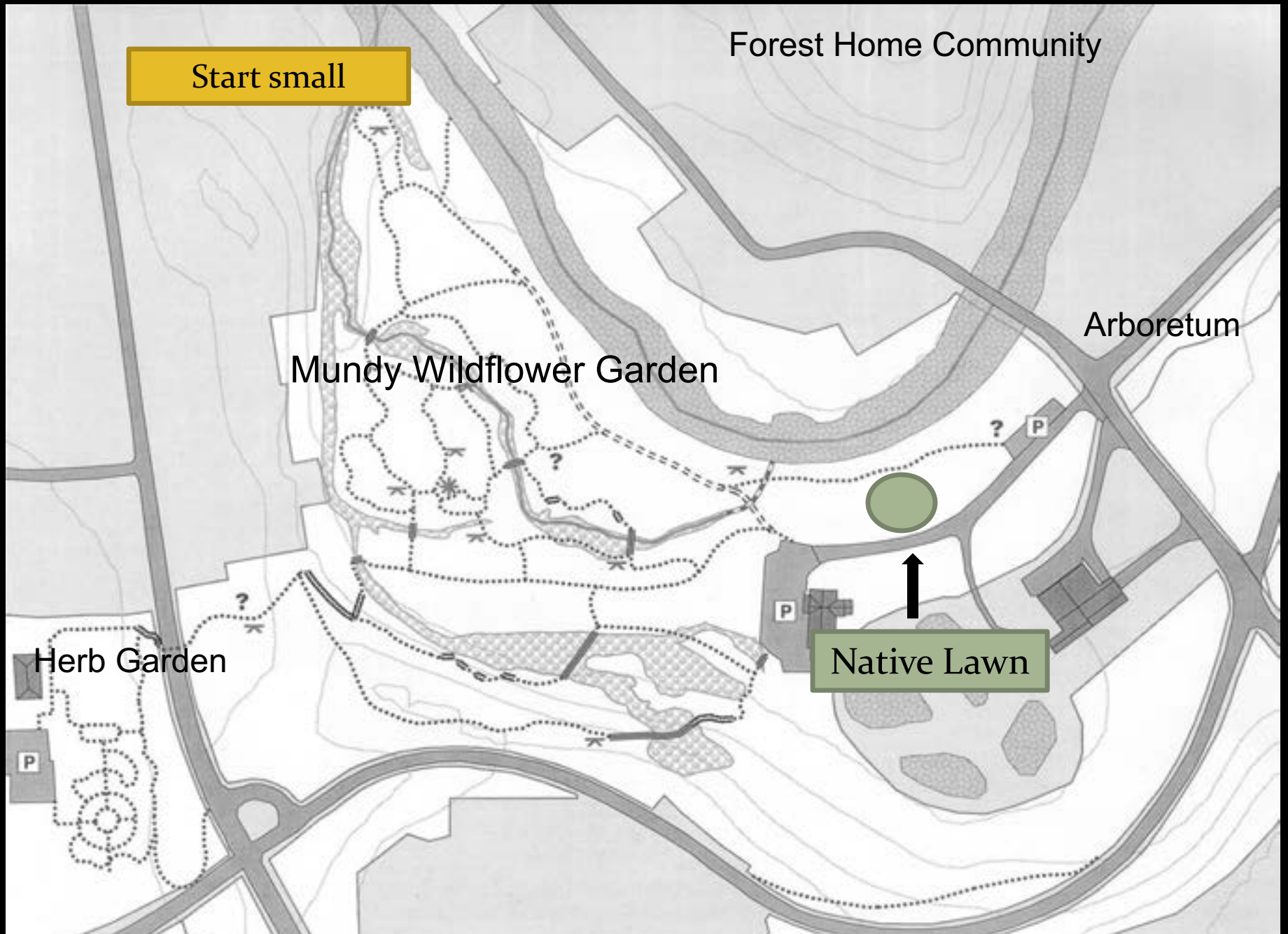
Native Plants for Wildlife Habitat and Conservation Landscaping
Chesapeake Bay Watershed

Native Lawn Project Goal

Convert non-native grass & weed lawn to

low-maintenance,
low energy input,
high biodiversity,
sustainable

native lawn.


Start small
Forest Home Community
Arboretum
Mundy Wildflower Garden
Herb Garden
Native Lawn
P
P
P
?
?
?

Objectives for the Lawn

- Provide acceptable aesthetics

- Require:
  - ❖ minimal watering
  - ❖ no fertilizer
  - ❖ no pesticides*
  - ❖ minimal hand weeding *
  - ❖ minimal (1-2/yr) to no mowing

- Incorporate public education and interpretation

- Measure and quantify goals by 3rd year

Methods

- Measure aesthetics by opinion poll

- Monitor per cent cover:
  - total
  - native vs alien species
- Test different conditions:
  - seeding rate
  - moisture
  - light

Work Plan

2008

- Remove TURF near the Horticultural Center.
- Develop a short grass/forb mix.
- Collect seeds for sowing and propagating plugs.
- Plan for paths and shrub plantings.
- Create new trails within the entrance garden & guide pedestrians away from driveway.

2009

- Grow native lawn and evaluate

2010- 2011-2012

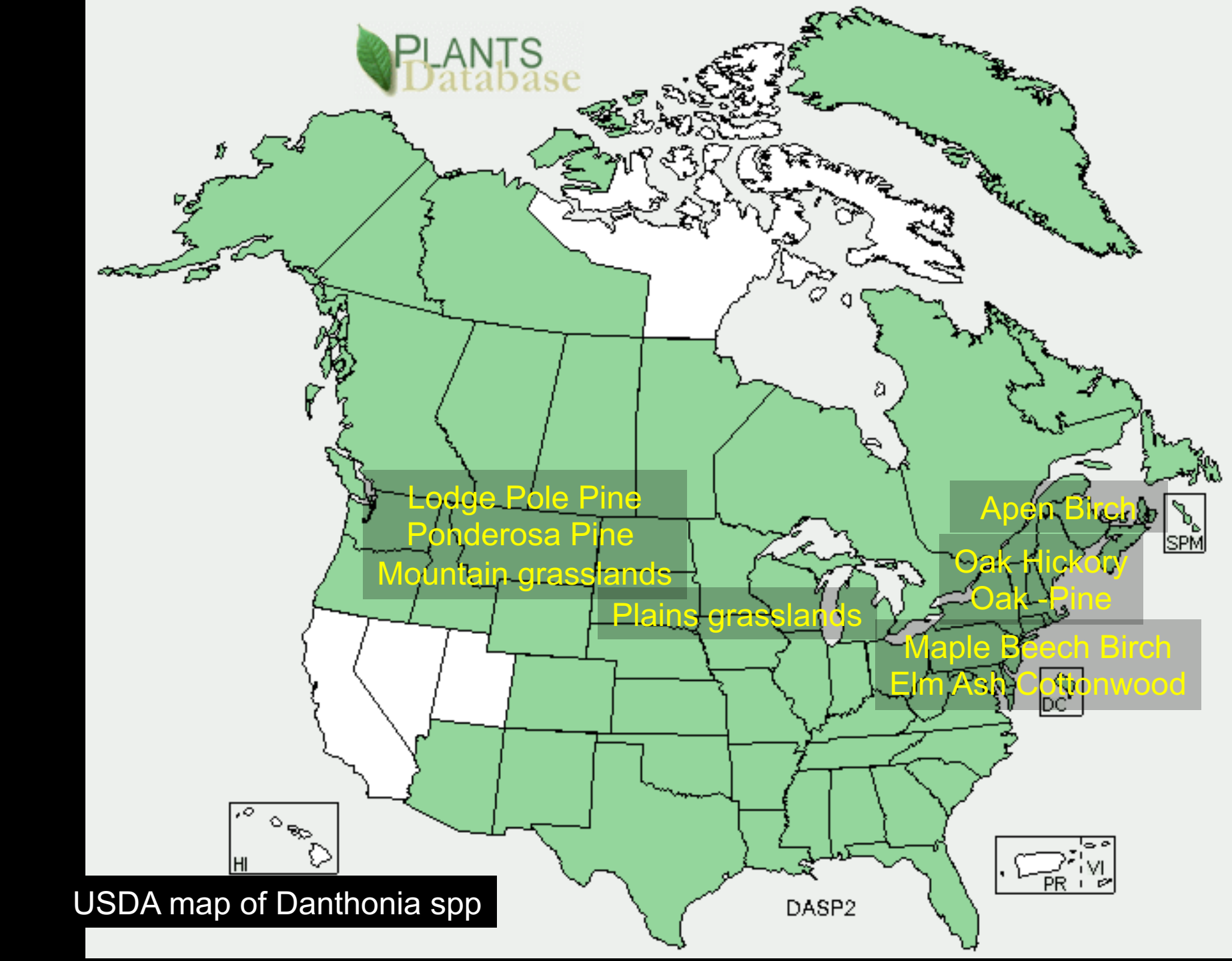
- Evaluate, reseed, enlarge area *


Inspired by *Danthonia* (Poverty Oat Grass) on power line cuts.
Project planting list developed around *Danthonia* as dominant species.

Danthonia spicata

Mature plants 20-30 cm
at the base


Danthonia compressa



USDA map of Danthonia spp

Faunal Associations: Various insects feed on the foliage of Poverty Oat Grass. These include *Hesperia leonardus* (Leonard's Skipper), *Hesperia sassacus* (Indian Skipper), *Chortophaga viridifasciata* (Green-Striped Grasshopper), *Orphulella speciosa* (Slantfaced Pasture Grasshopper), and the leafhopper *Laevicephalus melsheimerii*.

Grasses in general as Host Plants for Butterflies

White Grass (*Leersia virginica*) - Northern Pearly-eye

Bearded Shorthusk Grass (*Brachyelytrum erectum*) - Northern Pearly-eye

Plumegrass (*Erianthus*) - Northern Pearly-eye

River Oats (*Chasmanthium[Unifola] latifolia*) - Northern Pearly-eye

Bottlebrush Grass (*Elymus hystrix*) - Northern Pearly-eye

Alta Fescue Grass (*Festuca arundinacea*) - Northern Pearly-eye

False Melic Grass (*Schizachne purpurascens*) - Northern Pearly-eye

Panic Grasses (*Panicum*) – Northern Pearly-eye, Hobomok Skipper, Indian Skipper, Tawny-edged Skipper,possibly Leonard's SkipperSmall-fruited Panic grass (*P. microcarpon*) - Tawny-edged Skipper, Hobomok Skipper

Deertongue (*Panicum cladestinum*) – a large panic grass – Northern Broken-Dash, possibly Hobomok Skipper

Switchgrass (*Panicum virgatum*) – Leonard's Skipper, Northern Broken-Dash, Delaware Skipper

Grasses as Host Plants for Butterflies continued:

Maidencane (*P. hemitomon*) – Delaware Skipper

Redtop Panicum (*P. rigidulum*) – Delaware Skipper, possibly Common Wood-Nymph

Orchard Grass (*Dactylis glomerata*) – Little Wood-Satyr, European Skipper, Hobomok

Kentucky Bluegrass (*Poa pratensis*)- Little Wood-Satyr, Common Ringlet, Common Wood-Nymph, Peck's Skipper, Pepper and Salt Skipper, Common Roadside- Skipper

Centipeded Grass (*Eremochloa ophiuroides*) - Little Wood-Satyr

St. Augustine Grass (*Stenotaphrum secundatum*) – Little Wood-Satyr, Fiery Skipper

Needlegrass (*Stipa sp.*) - Common Ringlet

Purpletop (*Tridens flavus*) – Hobomok Skipper, Little Glassywing, Common Wood-Nymph, Crossline Skipper

[Purpletop can be invasive in moist, fertile soil]

Poverty Oat Grass (*Danthonia spicata*) – Common Wood-Nymph, Indian Skipper, Leonard's Skipper, possibly Hobomok Skipper

Native Lawn Species list

Forbs

Penstemon hirsutus	hairy beard– tongue	sun
Aquilegia Canadensis	columbine	sun/Shade
Opuntia species	prickly pear	sun
Phlox subulata	creeping phlox	sun
Antennaria plantaginifolia	pussy toes	sun
Tiarella cordifolia	foam flower	shade
Geranium maculatum	wild geranium	part shade
Anemone virginiana	anemone	part sun
Carex species	sedge	sun shade wet dry
Sisyrynchium angustifolium	blue--eyed grass	sun shade wet dry
Iris versicolor	blue flag iris	sun wet
Mitella diphylla	miterwort	shade
Hedyotis caerulea	bluets	moist sun

Grasses

Danthonia spicata	poverty oat grass	sun
D. compressa	poverty oat grass	sun
Elymus hystrix	wild rye	sun shade moist
Bromus altissimus	broome grass	sun shade moist
Agrostis hyemalis	tickle grass	sun moist
Poa alsodes	grove blue grass	shade

Danthonia seeds were collected locally by staff and volunteers.

Seeds were cleaned using the brush machine & Clipper Cleaner to remove awns.

Site Prep 2008

Early Fall-- herbicide spray

Late Fall – sod removal

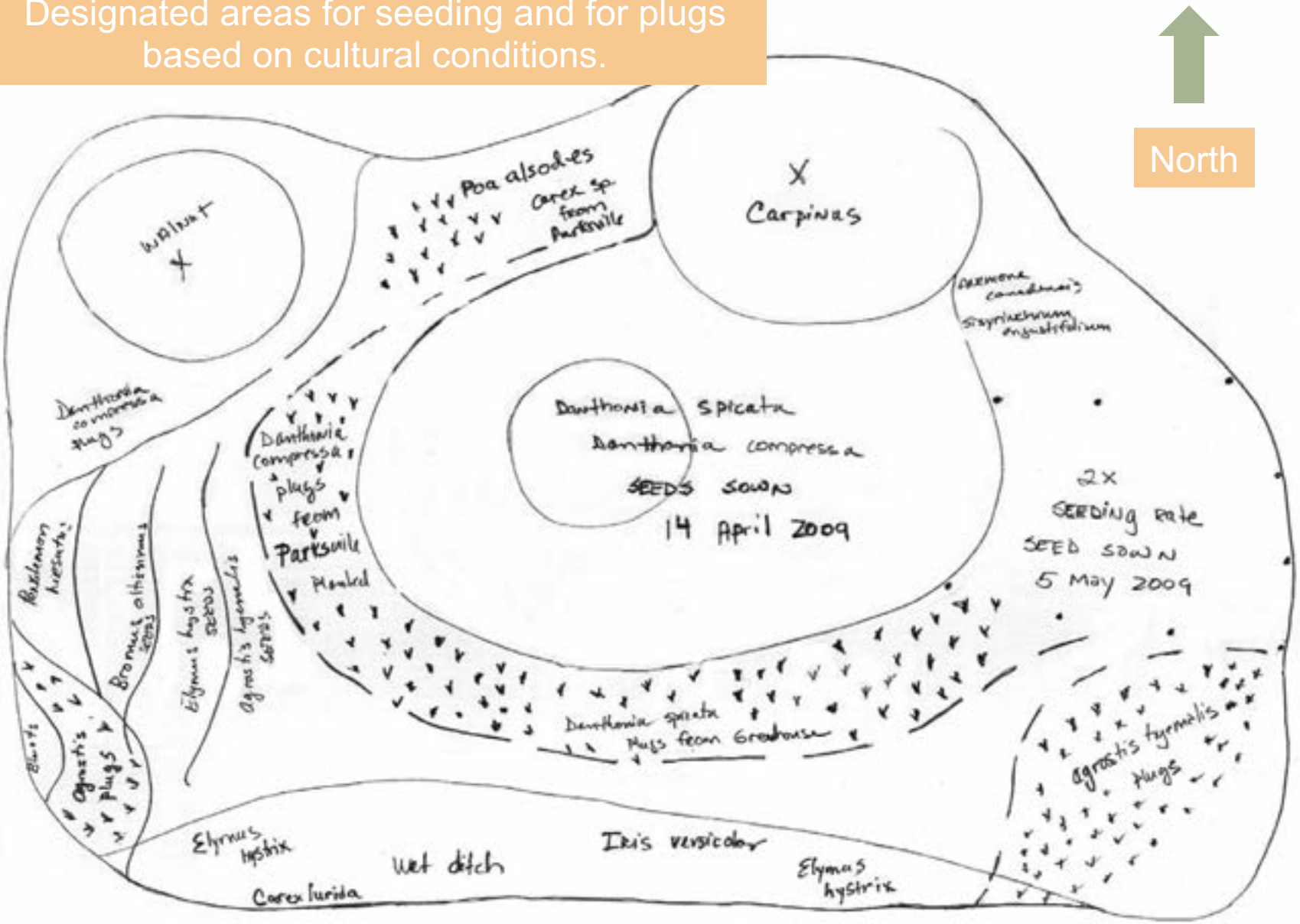

Recycled Sand

Sand raked out to a depth of approx. 2 inches

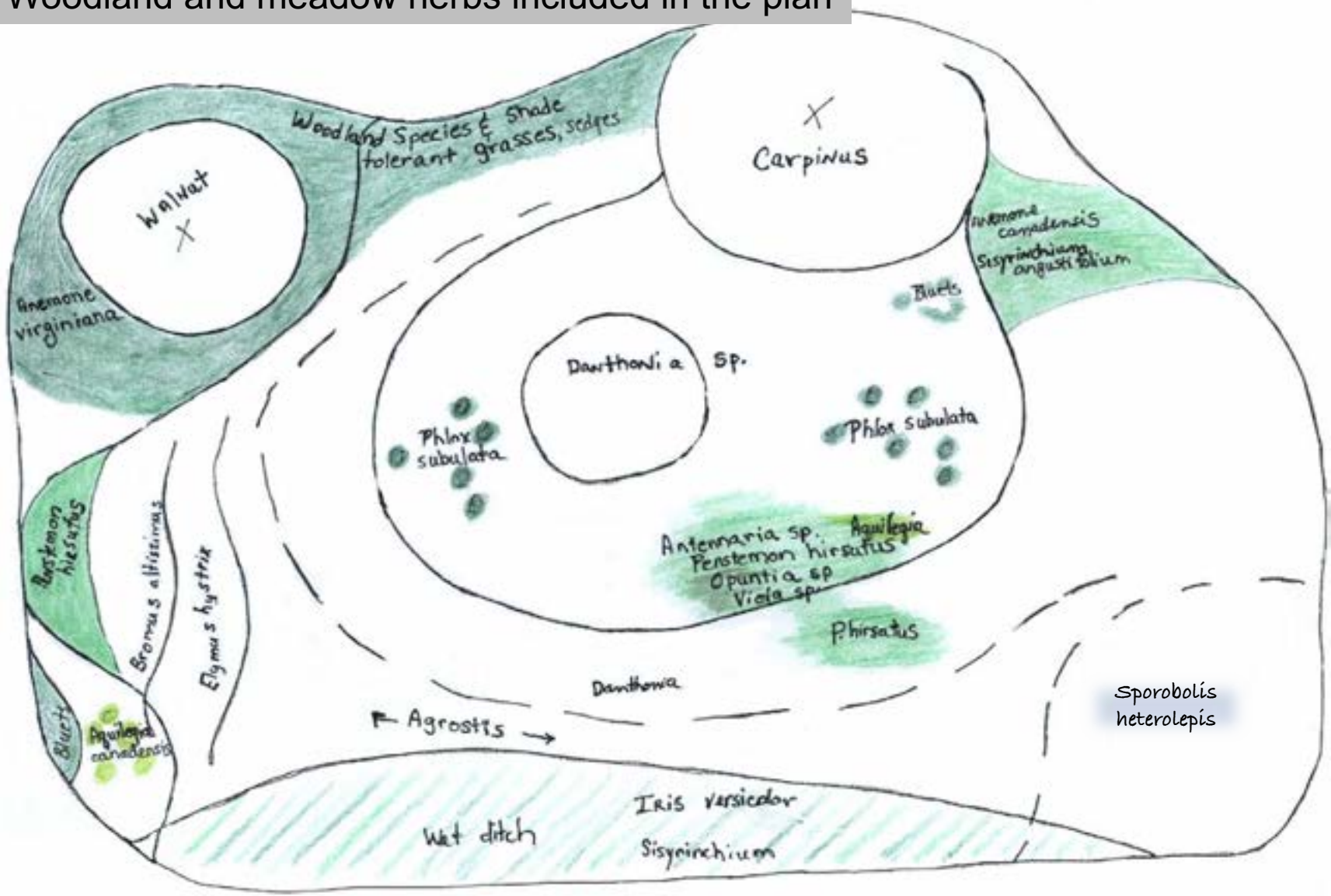
February

•Seeds are sown in the greenhouse
• Stored moist/cold @ 40 degrees for 60 days
• This treatment achieves the best germination rate possible

Designated areas for seeding and for plugs based on cultural conditions.



Woodland and meadow herbs included in the plan



This project was greatly helped by *Danthonia* researchers freely sharing their experience:

Dr. Nadia E Naverette – Tindall
Lincoln University (Missouri)

Dr. Scott E. Warnke
US National Arboretum (Maryland)

Evaluating Poverty Grass (*Danthonia spicata*) for Golf Courses in the Midwest

Nadia E. Navarrete-Tindall and J. W. Van Sambeek

Conclusions:

Because poverty grass does not compete well with fast growing volunteer vegetation in rich soils, it is recommended to establish it in stands with poor, dry, and rocky soils. Poverty grass could be grown in roughs or other areas in golf courses where taller grasses can offer challenges to golfers. Poverty grass' natural appearance, especially in the winter, can help to beautify golf courses. The addition of pussytoes, birdfoot violet, and other short forbs, will provide a pleasant environment to golfers and habitat for desirable wildlife such as native pollinators. The Native Plants Program at Lincoln University will continue evaluating long term management practices in stands of poor soil in golf courses and lawns and its tolerance to shaded environments for use in golf courses or other natural or maintained environments

About *Danthonia* seeds:

Rates vary widely, from 80 lb/acre (wild) to 146 lb/acre (in plots-weeds completely controlled).

The best seed treatment for me was either seed scarification or 20 days exposure to moist stratification (66% and 59% germination, respectively)

- Nadia Naverette- Tindale

Highest seeding rate (2080 g/1000 sq. ft) or 1830 seeds /sq. ft. looked the best.

- Scott Warnke

seeding rates
recommended at either 1000/ 2000/ 3000 seeds /sqft

Total weight of clean seeds = 217grams
Seeds per gram = 880
I have 203,808 seeds to sow from two collection sites
150 grams- Danthonia compressa
81 grams – Danthonia spicata

First sowing , mid – April, appox. 200 sqft
150 grams
150g x 880 spg =132,000 seeds/200sqft = 660 PLS / sqft

Second sowing , First week of May, approx. 50 sqft
81 grams
880 x 81=71280 seeds/50sqft =1425.6 PLS/ sqft


2009 mid-April seeds were sown and watered in

germinating seedlings
Aprox. 2 weeks

Exactly 2 months later

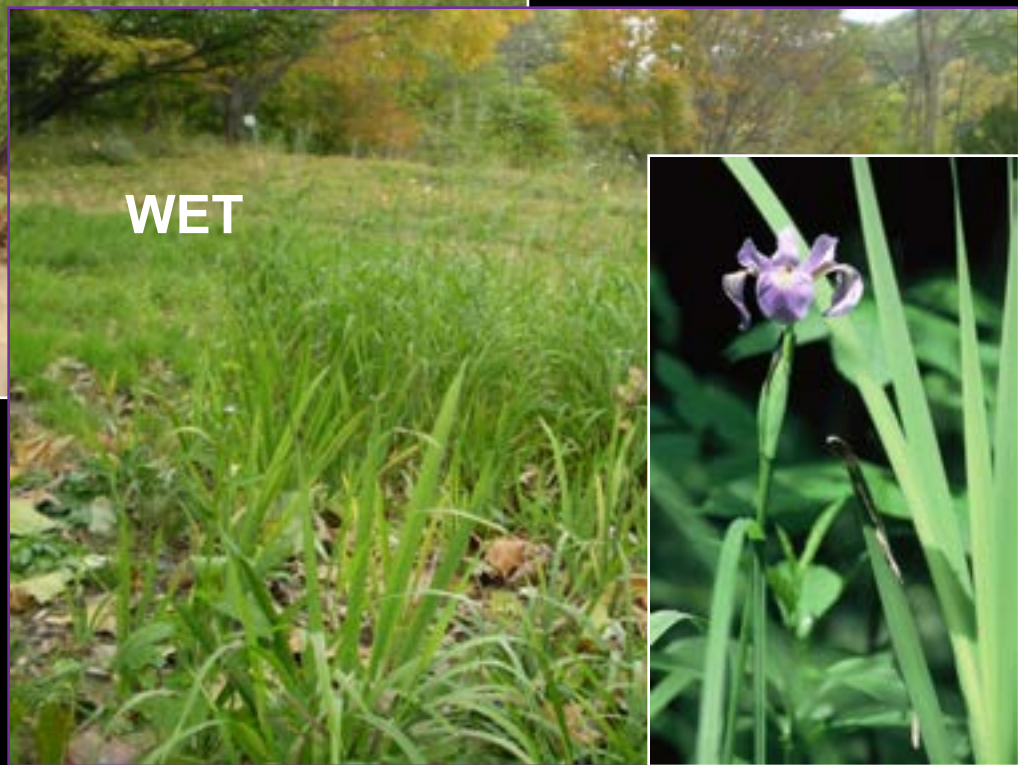
By May seedlings started in the greenhouse are ready to transplant

Danthonia compressa and *Penstemon hirsutus*

Cultural Conditions

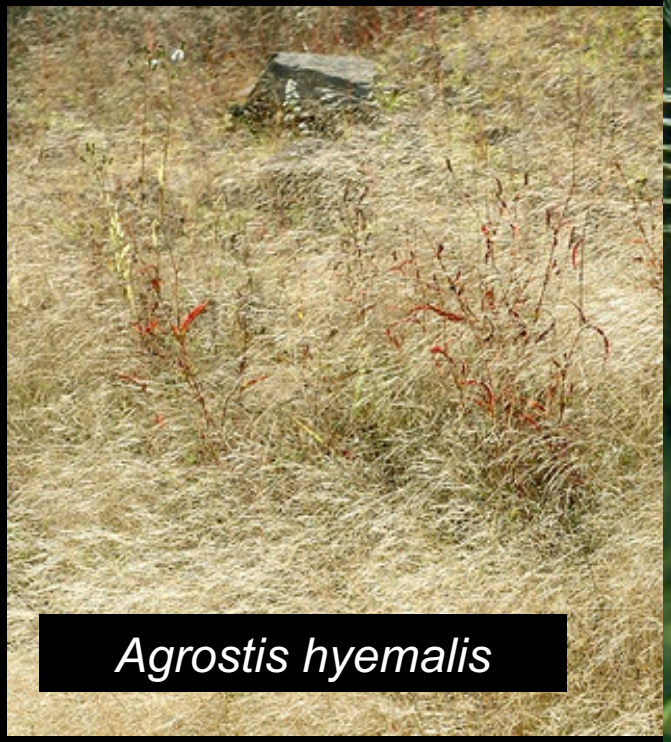
DRY

WET



Opuntia sp., *Phlox subulata* and *Antennaria plantaginafolia* are three of the sun loving, dry site, forbs added to the lawn for their aesthetic value and usefulness as ground covers.

Other native grasses, such as *Agrostis hyemalis, Elymus hystrix* and *Bromus altissimus,* are used as place holders while *Danthonia spicata* increases each year.



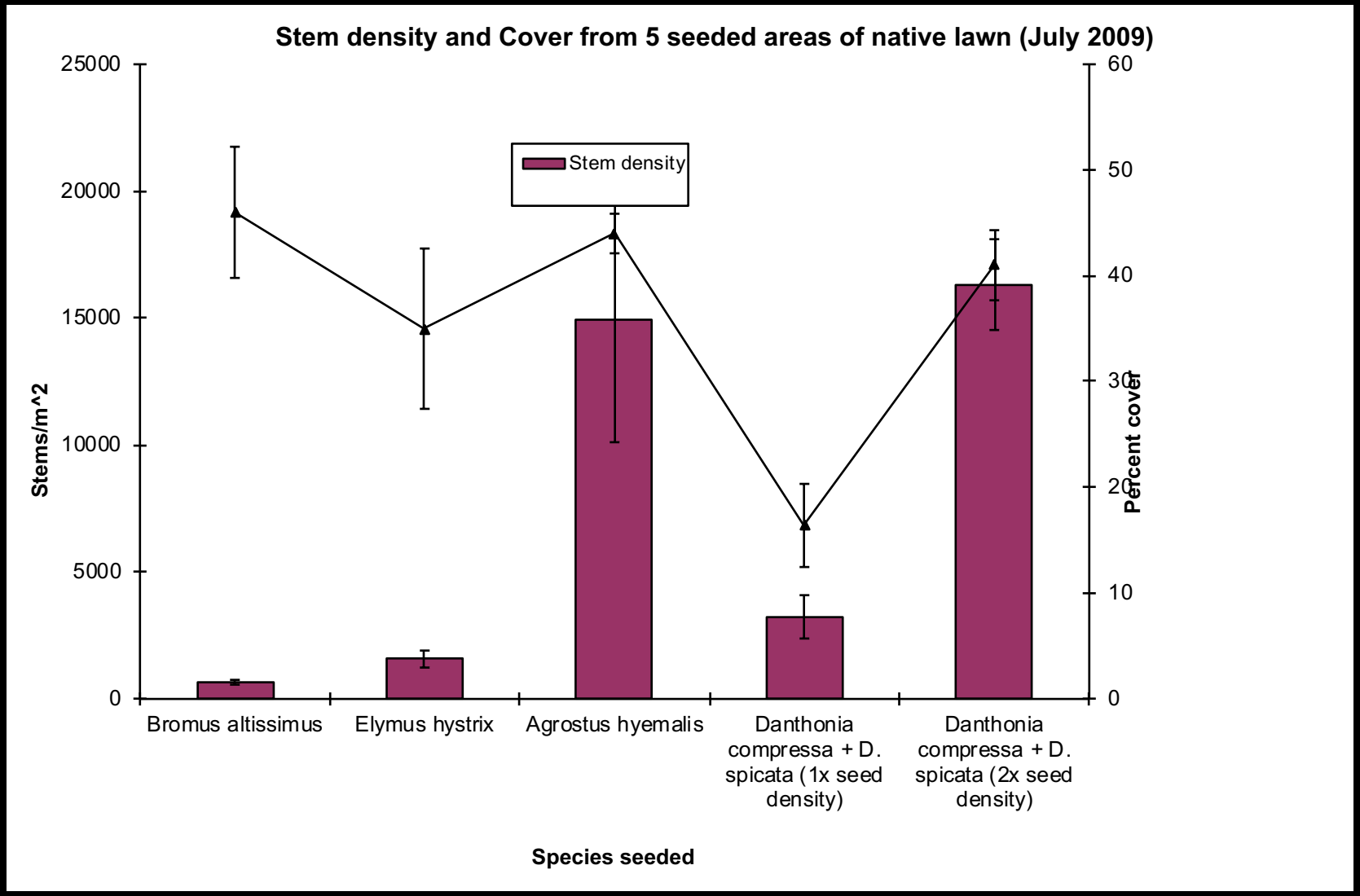
Agrostis hyemalis

Elymus hystrix

Bromus altissimus

All of the species chosen as long term members of the sunny lawn community are low growing forbs and grasses.

Bluets, *Hedyotis caerulea* are an exciting addition to the mix.


Stem density and Cover from 5 seeded areas of native lawn (July 2009)
Stem density
Stems/m^2
Percent cover
25000
20000
15000
10000
5000
0
60
50
40
30
20
10
0
Bromus altissimus
Elymus hystrix
Agrostus hyemalis
Danthonia compressa + D. spicata (1x seed density)
Danthonia compressa + D. spicata (2x seed density)
Species seeded


Circa 2007
BEFORE


August 2009
AFTER

2009 Journal entry

September October and November
Collecting Seeds from the *Danthonia* throughout the month of September -- expect this to continue through October. Lawn established. Outstanding fall color. Houstonia still blooming late November.

February 2010

2010 Successes and Pitfalls
Spring Summer and Fall

- April- Is it possible? Too early to tell…..
- May and June- Spring promises ☺

  Talk about these areas:
  - ✓Woodland edge
  - ✓Wet ditch

- July and August- Disease problems ☹
- October and November**-** I think it will make it!
- Interpretation goals met- A new sign to help visitors


April 2010
Mix of native grasses used as place holders.
Early Spring


April 2010


April 2010
High density seeding area
Other grasses and flowering plants


May 2010
spring promises


May 2010
High density seeding area
Other Grasses and flowering plants


June 2010
Danthonia compressa
Pentemon hirsutus


June promises
High density seeding area


The woodland edge features grasses, sedges and forbs
Poa alsodes
Mature Walnut


June 2010
shaded edge habitat
Poa alsodes
Tiarella cordifolia
Geranium maculatum


June 2010 edge
Senecio aureus
Poa alsodes
Mitella dyphylla

June 2010
Full sun and moist
to dry shade

Penstemon hirsutus

Agrostis hyemalis

Houstonia cerulea

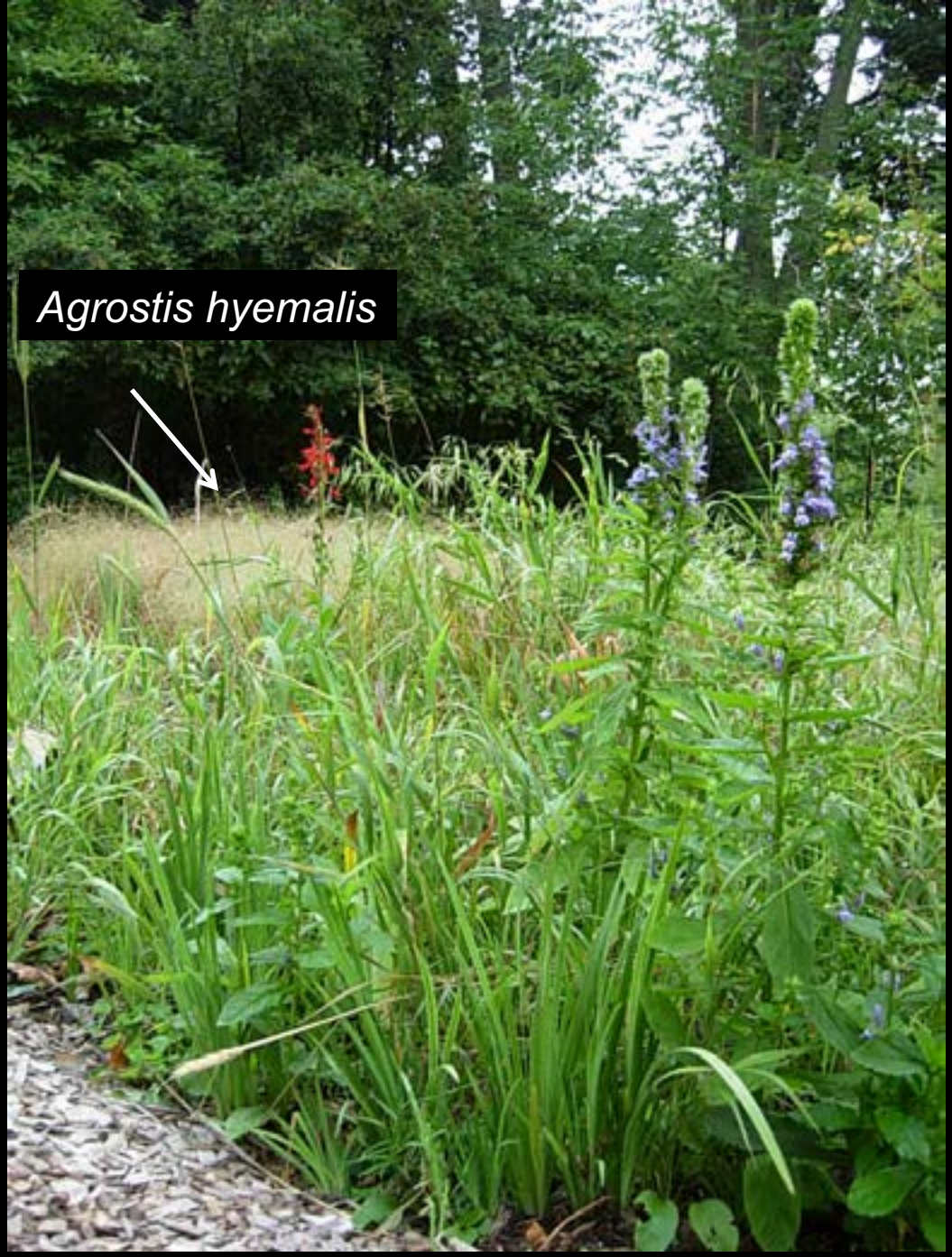

Bromus altissimus
Elymus virginicus


Elymus riparius

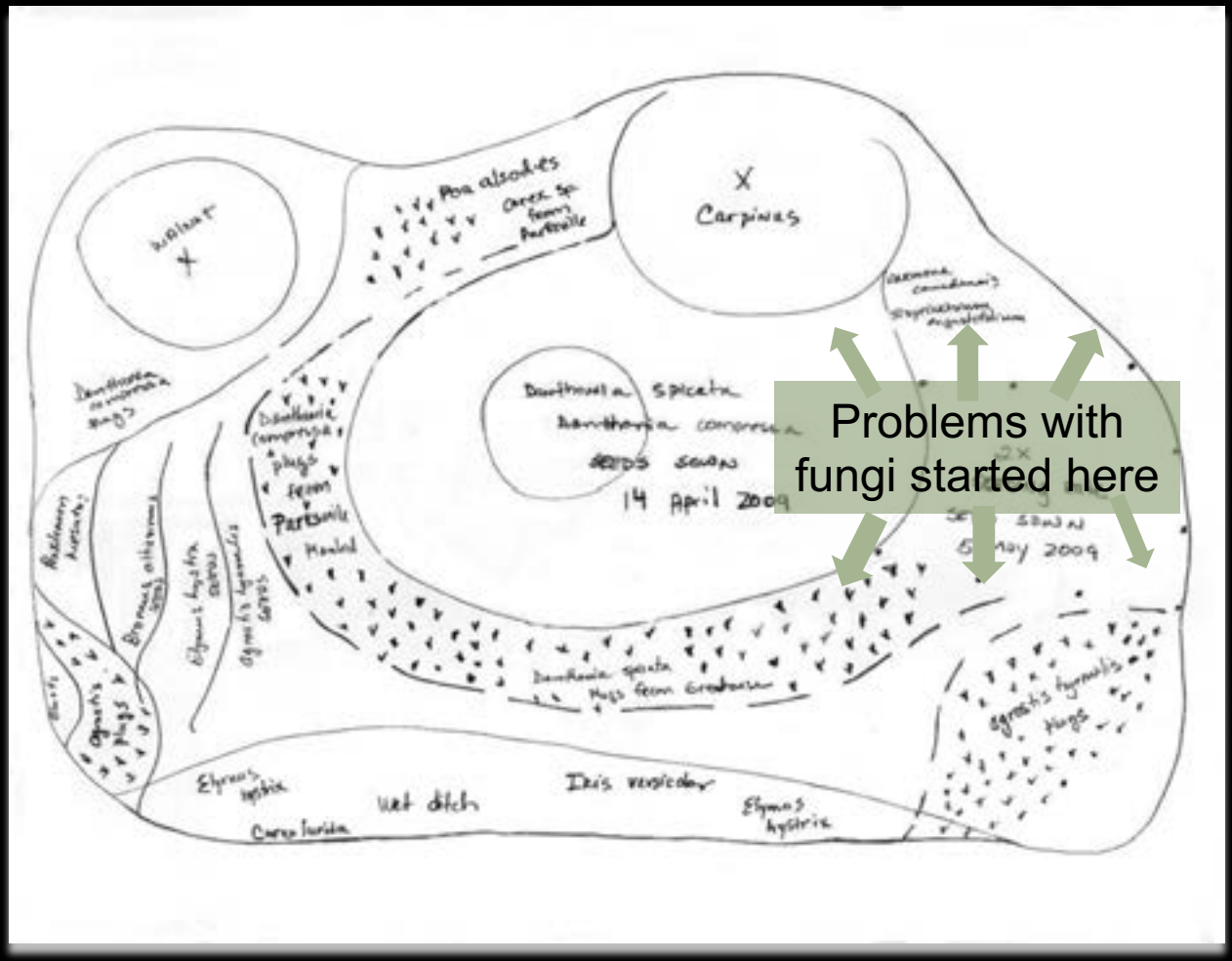

Elymus canadensis


Elymus hystrix

Late summer 2010
wet ditch area




June 2010
What is this?


Problems with fungi started here
Poa alsodes
Carex sp
Carpinus
Danthonia spicata
14 April 2009
Danthonia spicata
Elymus hystrix
wet ditch
Iris versicolor
Elymus hystrix
Carex lurida

July
Diagnostic report confirmed
fungus outbreak

2010 Growing Season Journal Entries

July 1st

Grass is not looking very good. The brown patch is getting bigger.

What is it? Consulted with Wisconsin researcher Nadia Navertte –Tindle --

Could be temperature and moisture related she said, "cool and dry conditions are best. "

David Kalb, Cornell Plant Pathologist said ,"seed mix may be too moisture retentive."

July 7th Diagnostic report --Confirmed for leaf spot crown and root rot

(*Bipolaris sorokiniana* Confirmed for anthracnose; C leaf spot (*Colletotrichum* sp./spp. *olletotrichum*

July 14th Consulted with Frank Rossi Turf specialist at Cornell University

Frank met us on site to take a look and discuss the possibilities, asked a few questions looked at the dying grass and Recommended Treatment with fungicide spray, Manicure Ultra

July 17th Danthonia spicata seeds were collected at South Hill swamp Natural Area

July 29th the lawn was sprayed with the fungicide Manicure Ultra , I felt defeated ,no entries throughout the rest of the summer.

November4th The lawn seems to have survived the attack of the bad fungi , the 1year old plants that remain are deeply rooted and there is excellent seedling recruitment with in the sites where the fungus was the worst. I am more hopeful than I have been since late June about the future of the Native Lawn.


Fall 2010

Seedling recruitment

Interpretive sign installed 2011

Plans for 2011

- Try something other than commercial fungicide.
- Why not use a biocontrol ?
  - ❖Trichoderma spp. Symbiotic fungi improve plant health and enhance disease resistance.
- Use adaptive management strategies to help sift out the problem areas.
  - ❖Send seeds to the diagnostic lab to be tested for the presence of fungi
  - ❖Sterilize a % of the seeds to be sown for plugs
  - ❖Frost seed a section of the bare soil in later winter (March)
  - ❖Moist stratify in small batches if fungi are found in some seeds

Native lawn in a flat 2011
a…take it anywhere demonstration

May 2011

2011 grasses and forbs- under the canopy - dry shade

Allowed the plants to mature and produce seeds for collecting

Woodland edge -mix of moist to dry shade species 2011


Seeds 2011
27June, 2011 seeds harvested from lawn:
:

Fall 2011

Fall 2011- phasing out placeholder grasses with weed barrier fabric.
Plan to use seeds of *Danthonia spicata* and *D. compressa* on bare ground late spring 2012 once temperatures are in the mid-80's.

June 2012


Fall 2012

Carex tonsa var. rugosperma

Antennaria sp.
Pussy Toes

December 2012 and The “Native Lawn” is still there!

Danthonia spicata is grown and sold by a local Nursery

Danthonia spicata (poverty oatgrass)

For a little plant few people know, this one arouses surprisingly deep affection among native plant lovers and grass afficionados. I use it in landscapes with dry, rocky and poor soils (hence the common name), where most people assume they can grow nothing--and it thrives. Common under pines and in drier oak/mixed woodlands, but almost always found where the soil is shallow and rocky, or where a light layer of duff overlays very shallow bedrock. Tight, petite rosettes of twisted and spun foliage give the plant a compact fine texture, especially in winter when the leaves turn beige but persist in exaggerated curlicues. In summer the foliage straightens out and tries to be larger but still only reaches 1' or less. Flowers are on 12" stalks and are attractive but the foliage is what makes Danthonia spicata special.

THE PLANTSMEN NURSERY

Hardiness Zone	4
Mature Height	12"
Mature Spread	12"
Geography	Native
Growth Rate	Moderate
Light	Sun, Sun/Part Shade
Special Features	Deer Resistant, Drought Tolerant
Plant Type	Perennial, Grass/Graminoid, Ground Cover
Moisture	Dry to Occasionally Moist, Needs Good Drainage

Thank you to the many supporters
of the native lawn and gardens
at the
Mundy Wildflower Garden
at
Cornell Botanic Gardens

Please be a part of the 2013 opinion poll:
Is it… or ……. isn't it a lawn?

Thank you to all who help create the native lawn and gardens

Janice Bretcher
Connie Thomas
Doug Murray
David Kiefer
Jean Gerow
Jackie Wildermuth
Robert Wesley
David Werier
Matt Moody
Shyanne Wheaton
Tammara Button
Jake Johnston
Rosemarie Parker
Susanne Lorbeer
Charlie Smith
Todd Bittner

Betsy Crispell
Marge
Linda Blossom
Jules Hynowski
Pat Pingle
Pete Spence
Liz Kushner
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