

Roadside Vegetation Presentation

Department of Geographical and Sustainability Sciences



Class Led by Dr. Heather Sander

Daniel Bissel

Robert Caudill

Qilu Chen

Sarah Gardner

Elizabeth Gronert

Mimi Lam

Emily Seiple



CITY OF IOWA CITY

A PROGRAM OF



Office of
**Outreach &
Engagement**



OUTREACH.UIOWA.EDU

outreach-engagement@uiowa.edu · 319-335-0684

This project was supported by the Iowa Initiative for Sustainable Communities (IISC), a program of the Provost's Office of Outreach and Engagement at the University of Iowa that partners with rural and urban communities across the state to develop projects that university students and faculty complete through research and coursework. Through supporting these projects, the IISC pursues a dual mission of enhancing quality of life in Iowa while transforming teaching and learning at the University of Iowa.

Research conducted by faculty, staff, and students of The University of Iowa exists in the public domain. When referencing, implementing, or otherwise making use of the contents in this report, the following citation style is recommended:
[Student names], led by [Professor's name]. [Year]. [Title of report]. Research report produced through the Iowa Initiative for Sustainable Communities at the University of Iowa.

This publication may be available in alternative formats upon request.

Iowa Initiative for Sustainable Communities

Provost's Office of Outreach & Engagement

The University of Iowa

111 Jessup Hall

Iowa City, IA, 52241

Email: iisc@uiowa.edu

Website: <http://iisc.uiowa.edu/>

The University of Iowa prohibits discrimination in employment, educational programs, and activities on the basis of race, creed, color, religion, national origin, age, sex, pregnancy, disability, genetic information, status as a U.S. veteran, service in the U.S. military, sexual orientation, gender identity, associational preferences, or any other classification that deprives the person of consideration as an individual. The University also affirms its commitment to providing equal opportunities and equal access to University facilities. For additional information contact the Office of Equal Opportunity and Diversity, (319) 335-0705.

Prairie by Pavement:

A proposal for native roadside vegetation in Iowa City



You've probably noticed prairie plants along rural roadways already

- Iowa Department of Transportation Integrated Roadside Vegetation Management (IRVM) project
- Initiated in the 1970s
- More than 50,000 acres have been planted with native grasses and wildflowers along our Interstates, highways, and county roads



Research question: Could this work in a city?

IowaDOT has documented many benefits of using prairie plants, including:

- Low-maintenance weed control
- Reduced surface runoff and improved water infiltration
- Filtering and capture of herbicides, pesticides, and sediment
- Increased biodiversity
- Roadside beautification



With the right preparation,
yes it can!

Project scope: A segment of Highway 6 in the center of Iowa City

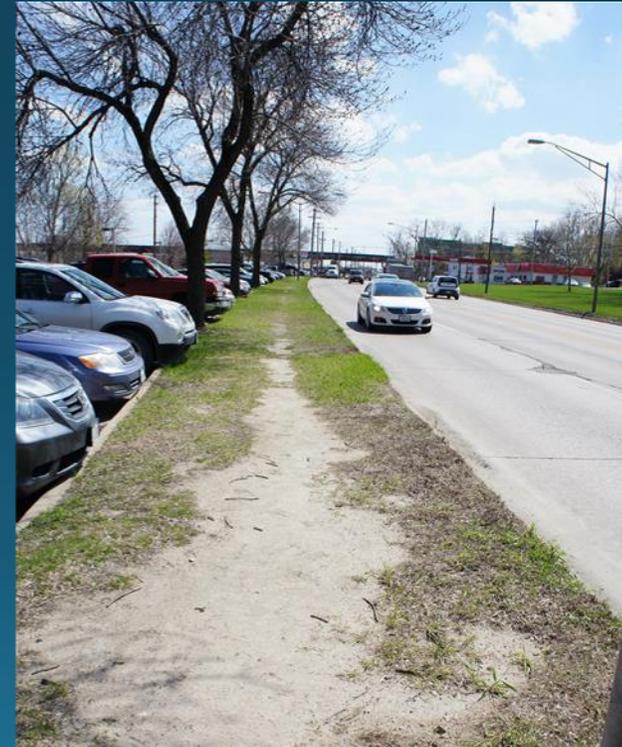
Investigation area:



What we found:

- Most of the areas we visited had a combination of turf grass, weeds, shrubby plants, and some trees
- Many were subject to regular maintenance such as mowing and chemical applications
- Indicators of erosion and salt damage were evident throughout the investigation area

Prairie could help



Data collection:

The study area was subdivided and visual inspections documented for each site

Notes were made about:

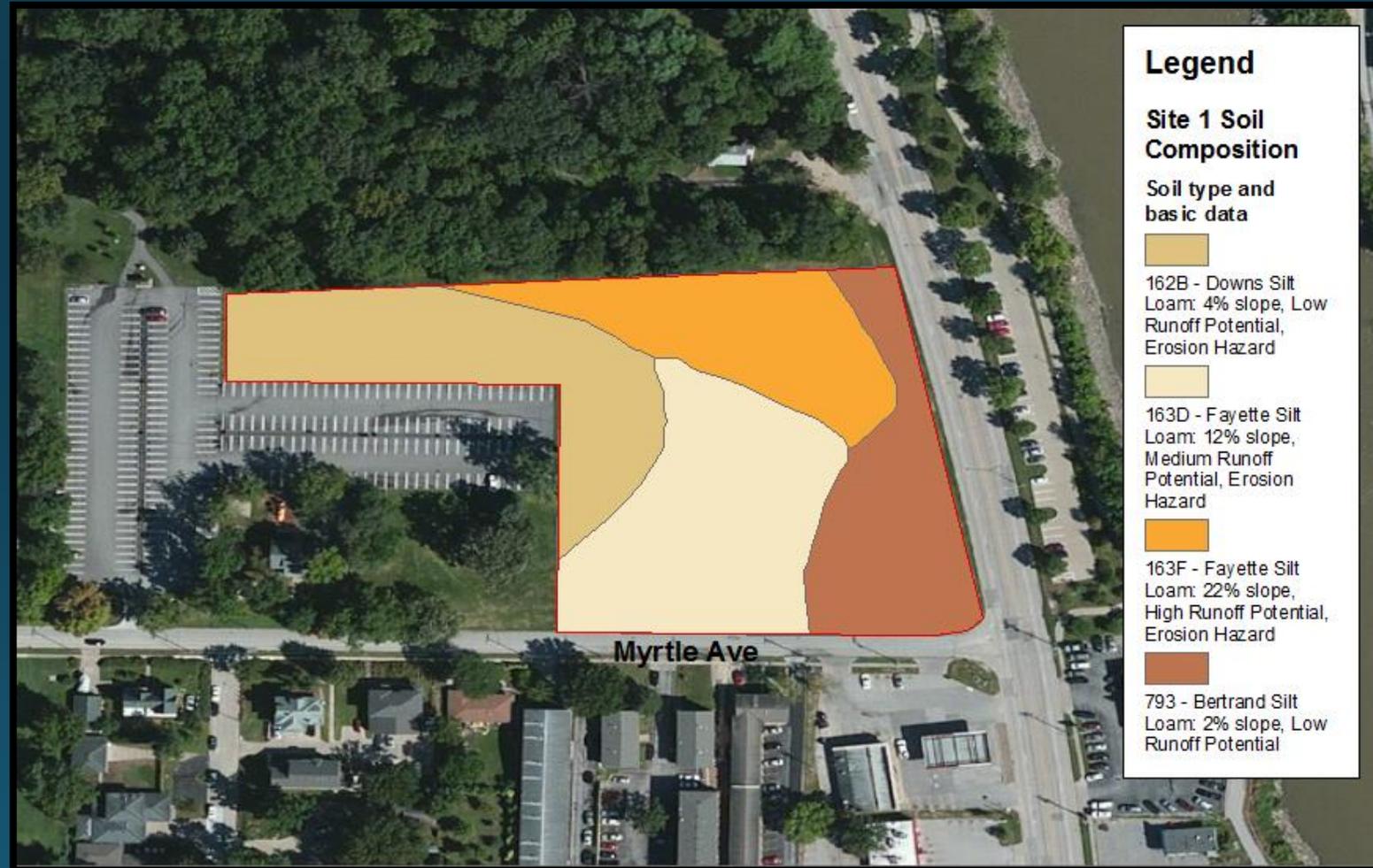
- Vegetative cover
- Turf maintenance
- Slope
- Indicators of erosion
- Litter
- Physical infrastructure on site
- Soil quality

Elementary root depth was also measured along a diagonal transect for each site



The average root depth was found to be 8 cm. In comparison, prairie plant roots can be 60-450 cm long!

Data collection also involved evaluating each site using GIS information

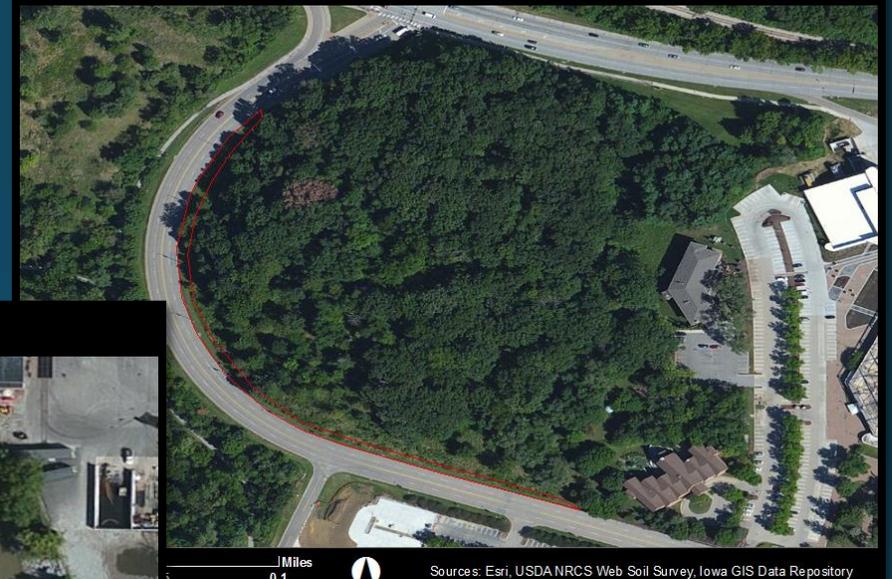


Following the initial assessments, three potential sites were selected:

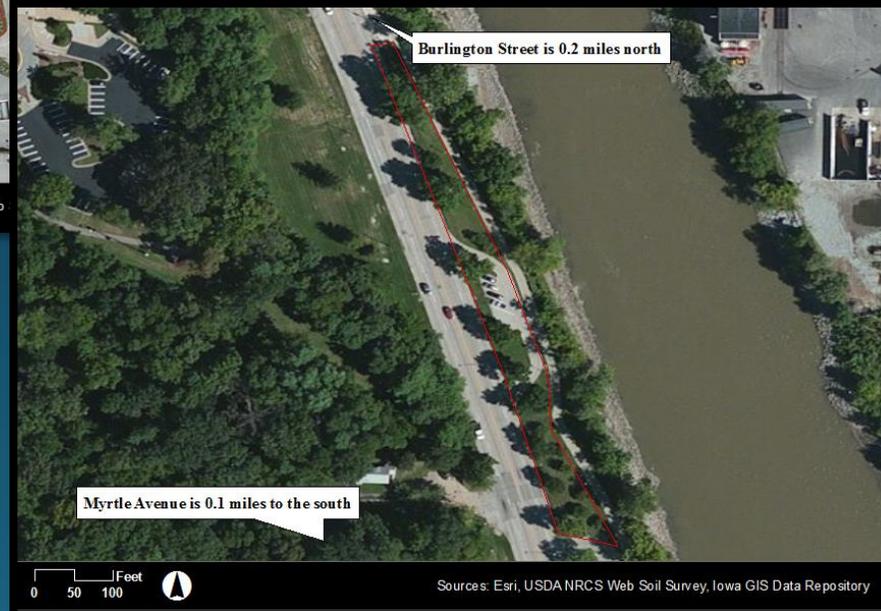
Site #1: Riverside Drive and Myrtle Avenue



Site #3: Hawkins Drive and Highway 6



Site #2: Parking Area Adjacent to Riverside Drive



Each site has unique opportunities and challenges for prairie plantings

Strengths

- Level sections near the road or at the top of the hill are good places to start
- Least amount of salt damage observed along the road
- **Prairie can slow water runoff from the hill, increase infiltration, and mitigate erosion observed on the hillside**
- Easy accessibility for maintenance
- **Reduced maintenance frequency, expense, and risk after establishing prairie**
- **High project visibility for pedestrians and traffic – good site for signage and other education elements**



Myrtle Hill

Challenges

- Slope will require more seed to establish a prairie, increasing expense
- May be difficult to burn due to proximity to roads and homes
- A number of trees exist on the hill that may eventually require removal
- Lots of creeping Charlie on site might infiltrate prairie during planting
- Initial complaints may arise about the aesthetics due to high visibility of the site

Strengths

- Good sun exposure
- Easy access for maintenance
- Level ground
- **Prairie can help address erosion and improve water filtration**
- **Proximity to river increases benefits to the waterway**
- Native plants can be integrated into current landscaping, increasing aesthetic value
- Good opportunity for public education
- **Prairie can replace the 13 ash trees that will likely need removal**



Riverside Parking Area

Challenges

- High pedestrian traffic
- Visibility concerns for automotive traffic
- Exposed on either side to vehicular traffic and road maintenance regimes
- Degraded soil quality
- Narrow plot

Strengths

- **Currently under construction – will need to be replanted**
- No trees to remove
- Relatively level
- Subject to no pedestrian traffic
- **Low risk to visibility for drivers**
- Sizable area with good sun
- Good maintenance access from behind Carver Arena
- **Can function as a buffer between the road and the oak savannah**



Hawkins Drive

Challenges

- Heavily compacted soil
- Artifacts from the construction work likely buried in the ground
- Exposure to traffic along a busy road
- Invasive species including garlic mustard, peppergrass, and yellow rocket present at site
- High amounts of litter
- Institutional neglect

Because of the unique characteristics of each site, we make different recommendations for each

For example:

- The Hawkins Drive location is near other prairie areas and, as such, is the best candidate for a fire-based maintenance regime
- Visibility concerns for the Riverside parking area suggest a short-grass prairie mix would be more ideally suited to the site
- Myrtle Hill is large enough that it could be planted in stages, perhaps starting at the top to allow the prairie to “walk” down the hill



Prairie Restoration Planning

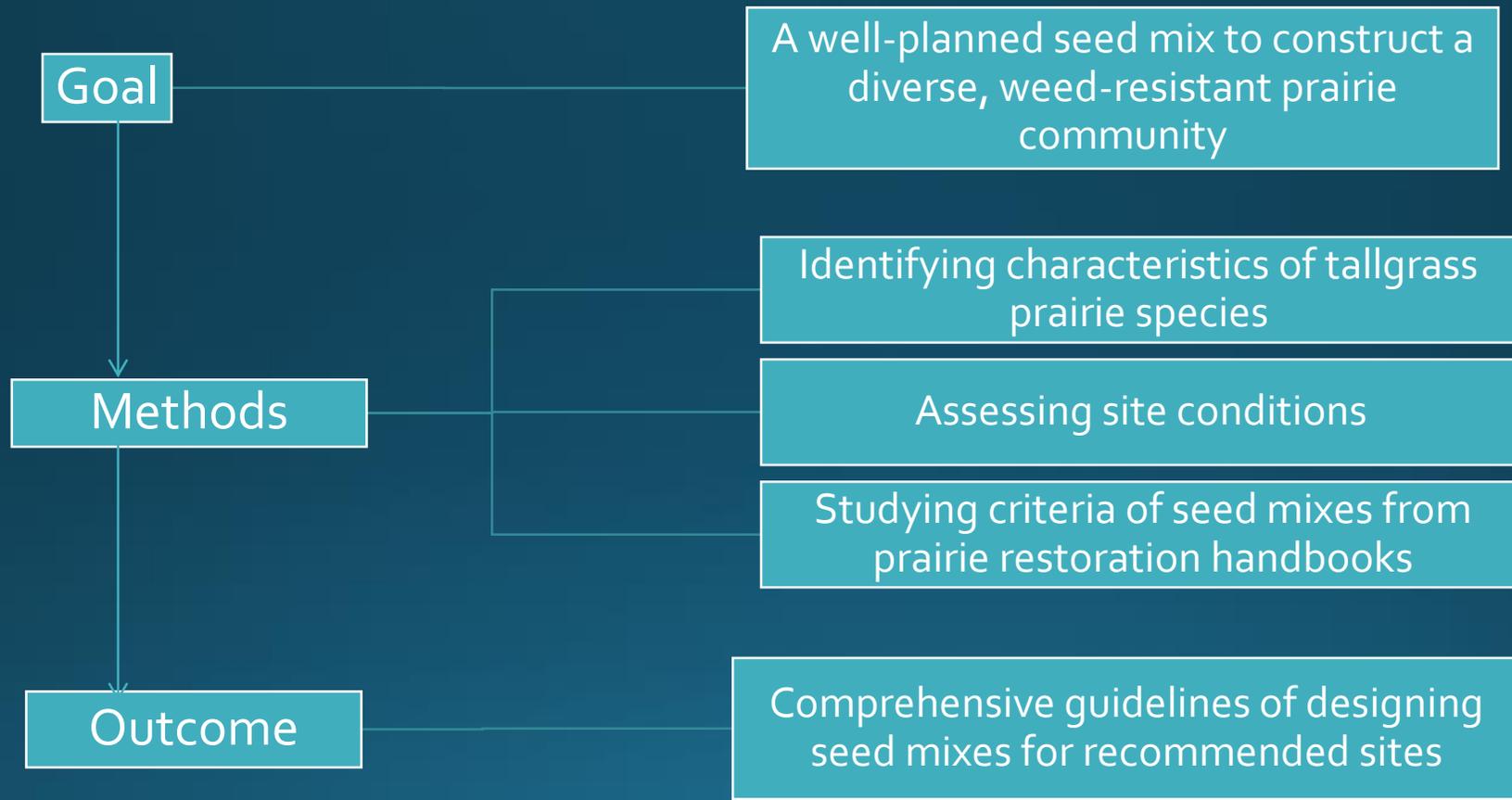
Site
Preparation

Seeding

First-Season
Management

Long-Term
Maintenance

Designing Seed Mixes



Seed Mixes Guidelines

Characteristics of Tallgrass Prairie :

- Grass, Forbs, and Sedges
- Cool-season & Warm-season Plants
- Annuals, Biennials, Perennials

Site Conditions:

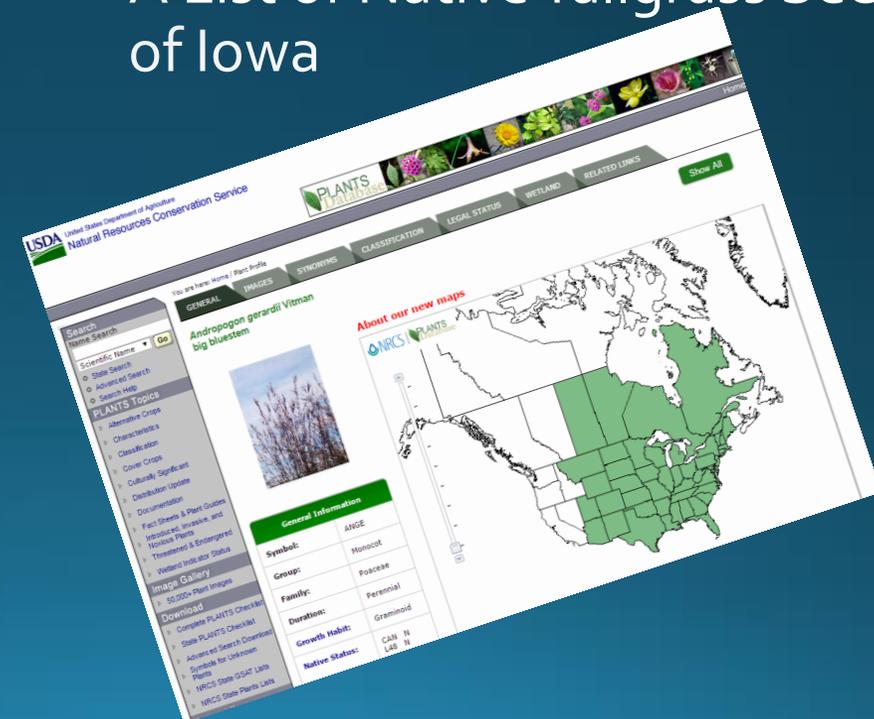
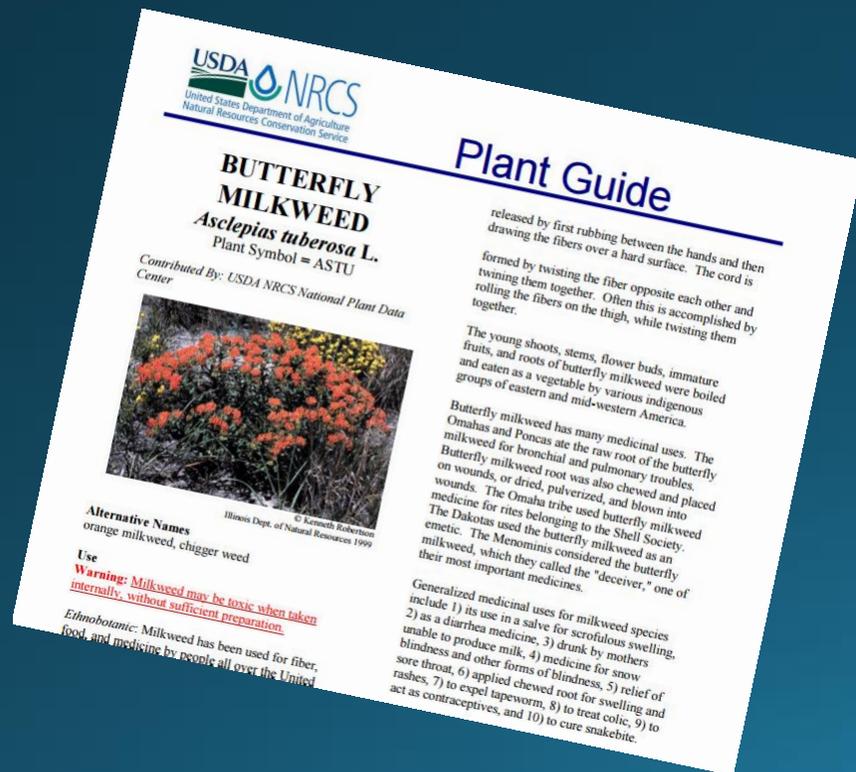
- Soil Moisture Type: Mesic
- Slope: 0-25 Percent
- Light Conditions: full, partial

Guidelines

- Select species native to the region
- Seed mixes should contain
 - grass, sedge and forb
 - Annual, biennial and perennial
- Species-diverse seed mixes
 - 6 grasses, 3 sedges, 25 forbs species
 - At least a 50:50 ratio of grass seed to forb seed
- Plant seeds with a minimum of 40 seeds per square foot
- Estimate cost of seed with seed calculator programs

Reputable Sources for Seed Mixes

- USDA NRCS PLANTS Website
 - Information of Tallgrass Species
 - Plant Guideline
- Iowa Natural Resources Conservation Service
 - Seed Mixes Calculator
 - A List of Native Tallgrass Seeds of Iowa



Benefits and Costs

- The University of Iowa maintains **493 acres**, of which **74% is turf grass**
- The average maintenance costs are **\$3049 per acre**
- Prairie seed mixes that meet our criteria cost between **\$400 and \$1959 per acre**, compared to turf grass seed mixes, which average **\$830 per acre**
- Initial costs for prairie are higher, though **maintenance costs are lower in the long term**



Image source: yardcare.toro.com

Costs depend on what seeds are in the mix...

	Location	Acreage	Cost of Re-seeding Turf	Cost of Seeding New Turf	Estimated Annual Maintenance Costs	Estimated Cost of Prairie Seeding
Site 1	Myrtle Hill	3.6	\$1,764	NA	\$10,976	\$1,440
Site 1 Phase 1	Hilltop - Downs Silt Soil	1.1	\$539	NA	\$3,354	\$440
Site 2	Riverside Parking Area	0.5	\$245	NA	\$1,525	\$750
Site 3	Hawkins Drive	0.6	\$294	\$588.06	\$1,829	\$498
Site 2: based on our own estimates of cost of UI short grass mix from United Seeds						
Site 3: based on quoted estimate from United Seed representative for DOT IA mix						
Site 1: Basic Prairie Mix from Shooting Star Native Seeds						

... as well as the availability of seeds based on demand and the prior prairie harvest.

Keys to Success: Site Preparation

Different methods have different outcomes:

- Combination method
- Mechanical cultivation without herbicides
- No-till method
- Cover crop



Image source: Travis Audubon Society <http://www.travisaudubon.org>

Keys to Success: Maintenance During the First Three Years

1st year:

- Use flail mower to mow the weeds to 6 inches tall
- Prevent pulling of weeds
- Disperse the vegetation and prevent clustering



2nd year:

- Limit mowing to 1-2 times
- Keep weeds to 12 inches tall
- Avoid disturbing the soil



3rd year:

- Apply fire for burning
- Fertilize the prairie

Keys to Success: Long-term Maintenance



- Prescribed burns
- Mowing and raking
 - Done where burning may be restricted
- Weed control
 - Must be vigilant, especially if not doing prescribed burning
- Interseeding
 - To maintain or increase species biodiversity

Controlled Burns

- Currently used around Mormon Handcart Trail and six other locations
- Equipment: Drip torches, 100 gallon spray backpacks, 500 gallon tow-behind, hand tools
- Entire area not burned
- Integral to prairie ecosystems
- Strict permitting - weather conditions, fire control plans, specific vegetation, topography



©Window On The Prairie
Source: windowontheprairie.com

Establishing prairie plants at these sites will require coordination between several stakeholders

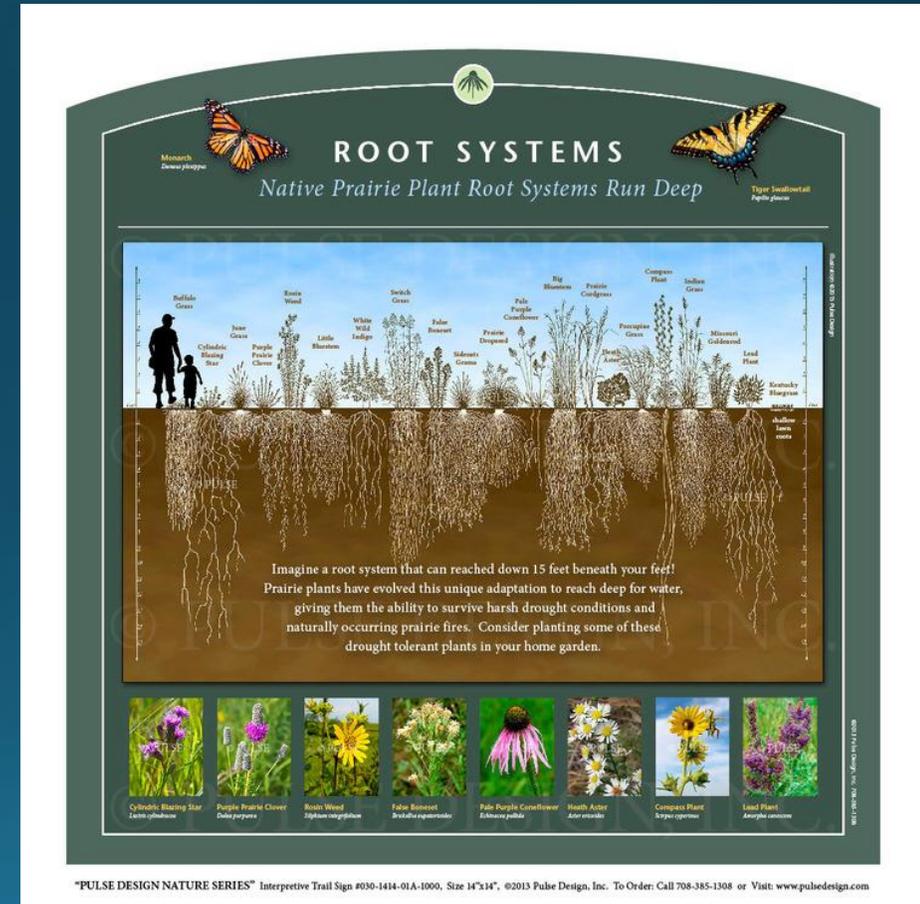


- All three sites are owned and maintained by **the University of Iowa**
- The **Iowa Department of Transportation** has a 10 foot right-of-way along both sides of the road
- Some sites are located in areas targeted for streetscape improvement by **Iowa City**

It helps to bring the public on board, too

A few well-placed signs can help:

- Reduce foot traffic through planting areas
- Reduce complaints about areas looking “weedy” or unmaintained
- Help generate interest and enthusiasm for future prairie plantings





**Prairie restoration and
reconciliation projects
are an investment**

**With many ecosystem
services as benefits**



Data Sources:

- Iowa Department of Transportation
 - USDA Natural Resources Conservation Service
 - Iowa Natural Resources Conservation Service
 - United Seeds
 - Shooting Star Native Seeds
 - *The Tallgrass Prairie Center Guide to Prairie Restoration in the Upper Midwest* by Daryl Smith, Dave Williams, Greg Houseal and Kirk Henderson
 - The USDA NRCS web soil survey
 - *Going Native: A Prairie Restoration Handbook for Minnesota Landowners* by the Minnesota Department of Natural Resources
 - *Urban Ecology: An Introduction* by Ian Douglas and Philip James
 - “Five Steps to Successful Prairie Meadow Establishment” by Neil Diboll
-
- Unless otherwise attributed, photos were taken by members of the research team
 - Special thanks to University of Iowa staff members Andy Dahl, Scott Gritsch, and Liz Christiansen. Thanks also to Iowa City staff member Zac Hall.