

December 7, 2016

Seventh Western
Native Plant
Conference

Revegetation with an emphasis on pollinator conservation: resources for practitioners

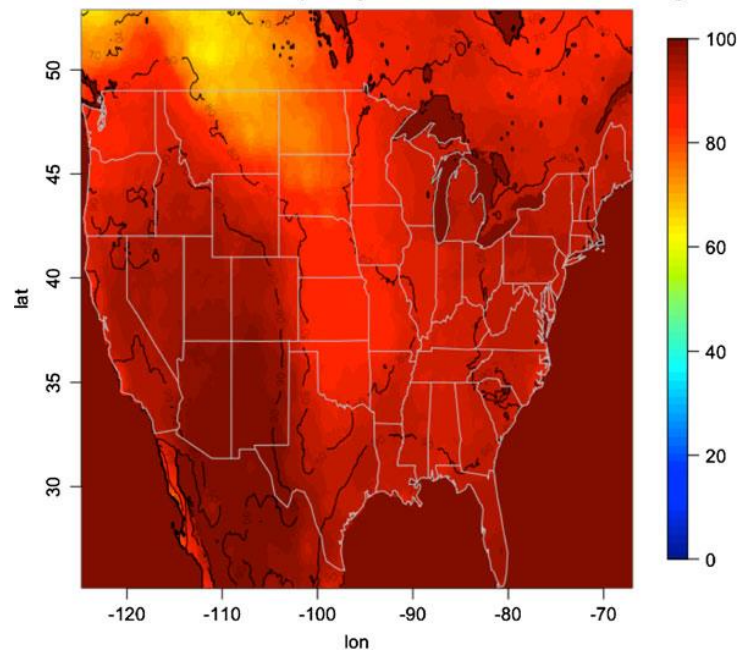
Lynda Moore and Matt Horning, US Forest Service



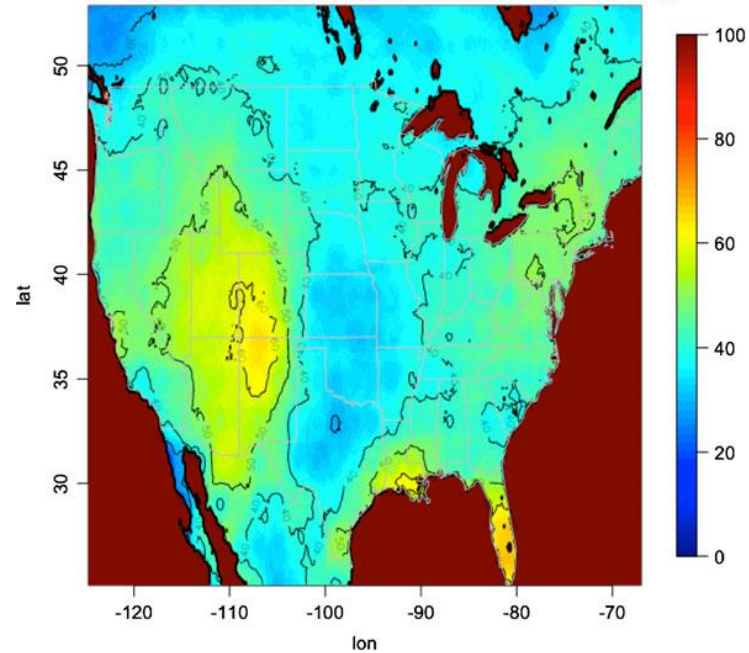
U.S. Department of Transportation
Federal Highway Administration

Increased frequency of previously rare extremes

annual mean extreme frequency 1950-1979 vs 2035-2064 Tavg

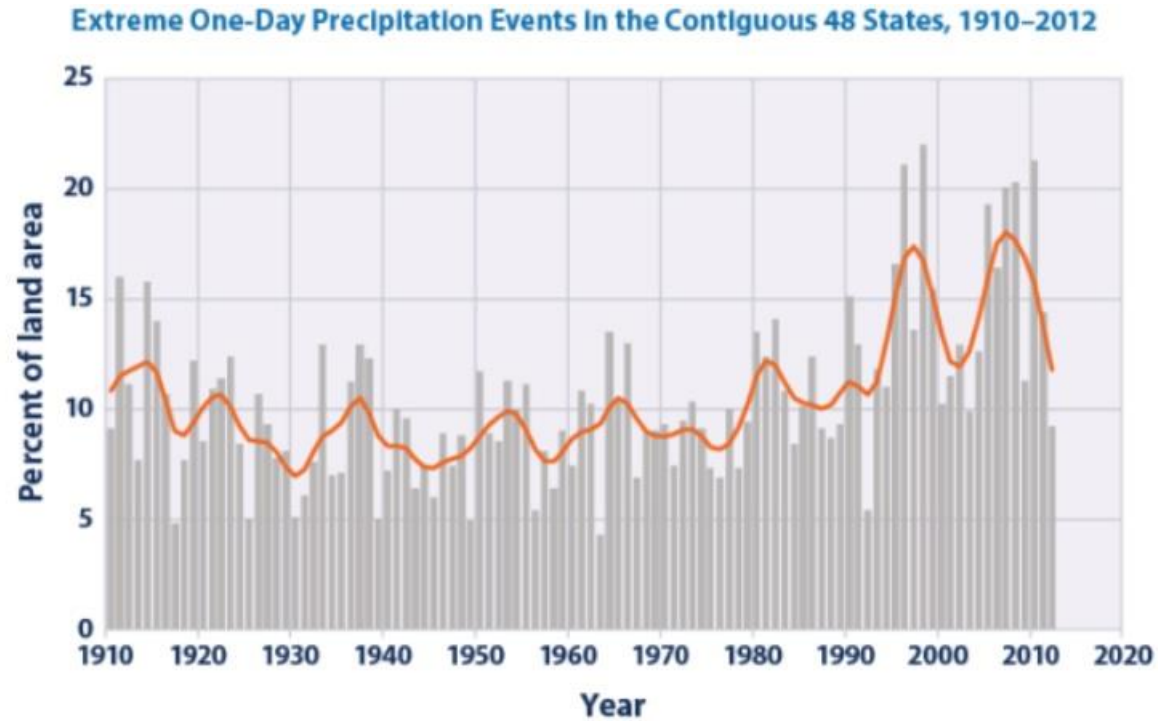


summer extreme frequency 1950-1979 vs 1995-2024 Tavg



Duffy and Tebaldi 2012. Climate change 111:487-495

Increased frequency of extreme precip events



Source: NOAA/EPA

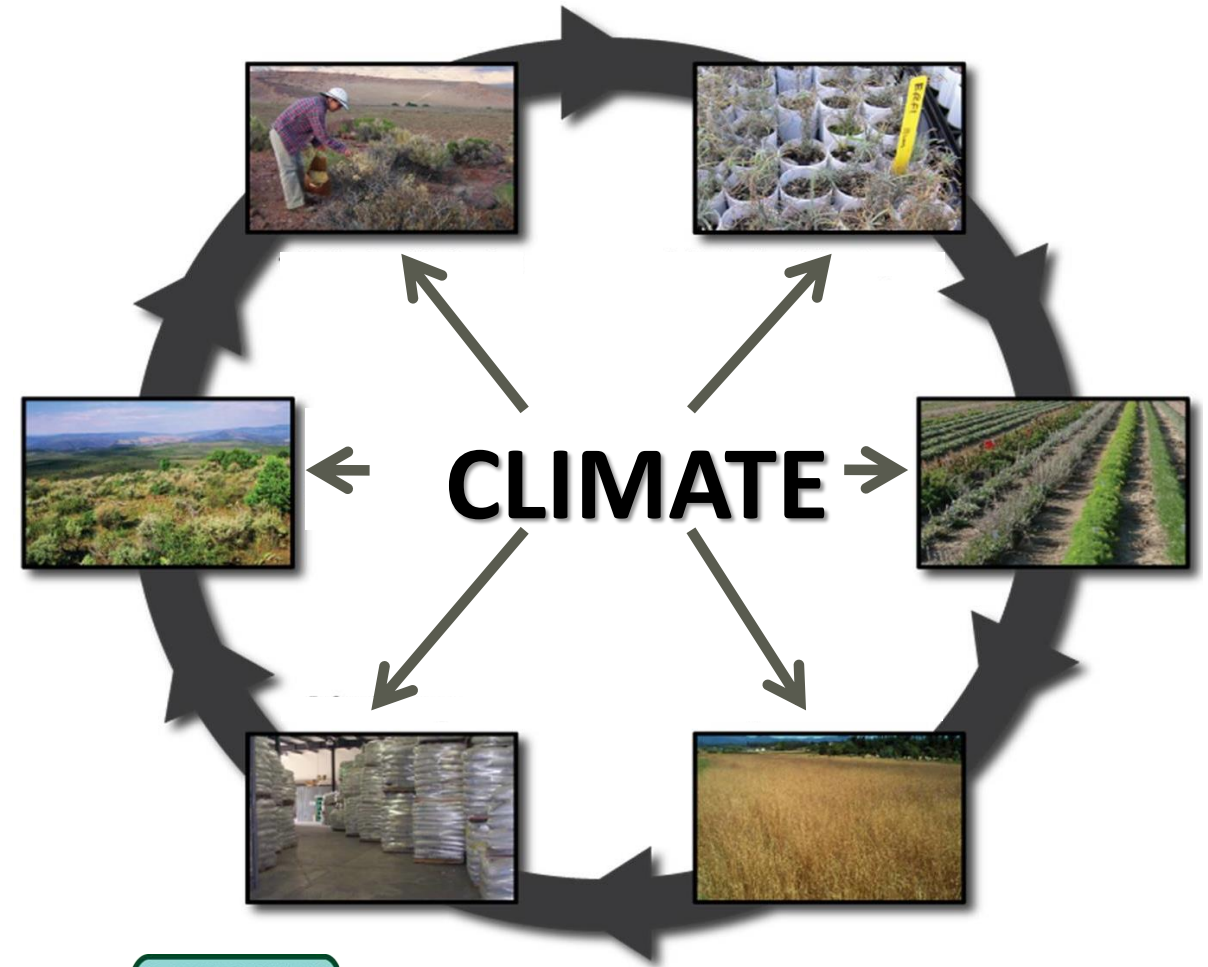
Implications for pollinators

- **Direct**
 - Thermoregulation
 - Altered physiology
- **Indirect**
 - Host plant species phenology (mismatch)
 - Nectar availability
- **Migration as a possible response**
 - Habitat and connectivity will be critical



Revegetation in a new context

- Seed sourcing
- Costs for farms and nurseries
- Out-planting windows
- Project design features



BLM Native Plants Materials Development Process

ROADSIDE REVEGETATION

An Integrated Approach to Establishing Native Plants and Pollinator Habitats

Pollinator health task force



Presidential memorandum “creating a federal strategy to promote the health of honey bees and other pollinators”

- June 2014

National strategy to promote the health of honey bees and other pollinators

- May 2015

Pollinator partnership action plan

- June 2016

“Restore or enhance 7 million acres of land for pollinators over the next 5 years.”



U.S. Forest Service Genetic Resource Management and Climate Change: Genetic Options for Adapting National Forests to Climate Change

- **Strategic Goal 1.1** Develop and deploy plant materials that will be resilient to climate change.
- **Strategic Goal 1.2** Manage for uncertainty and adaptation through natural selection by placing an increased emphasis on genetic diversity (species and seed sources)...



INTERAGENCY SEED STRATEGY

BLM NM930 / SEEDS OF SUCCESS / MIKE HOWARD



PHILLIP ADAMS / USGS

OR DEPT. OF FISH & WILDLIFE



BLM WY060 / SEEDS OF SUCCESS

VISION
The right seed in the right place at the right time.

MISSION
To ensure the availability of appropriate seed to provide healthy and productive plant communities in a changing climate.



United States Department of Agriculture

Agricultural Research Service
Forest Service
National Institute of Food and Agriculture
Natural Resources Conservation Service



GOAL 3

Develop tools that enable managers to make timely, informed seeding decisions for ecological restoration.



THE FOUR GOALS
of the "National Seed Strategy for Rehabilitation and Restoration"

GOAL 1
Identify seed needs, and ensure the reliable availability of genetically appropriate seed.

GOAL 2
Identify research needs and conduct research to provide genetically appropriate seed and to improve technology for native seed production and ecosystem restoration.

GOAL 3
Develop tools that enable managers to make timely, informed seeding decisions for ecological restoration.

GOAL 4
Develop strategies for internal and external communication.

NATIONAL SEED STRATEGY for Rehabilitation and Restoration | 2015–2020

Technical
resource:

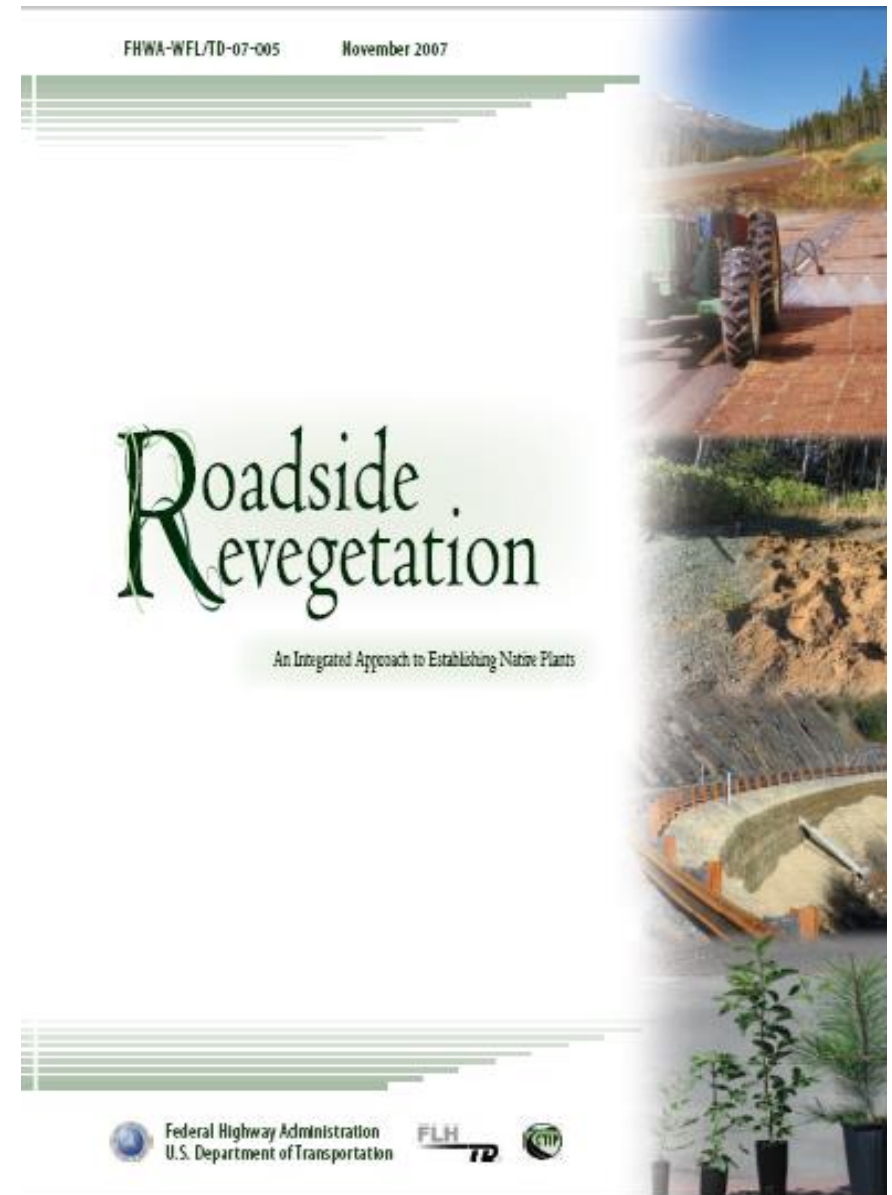
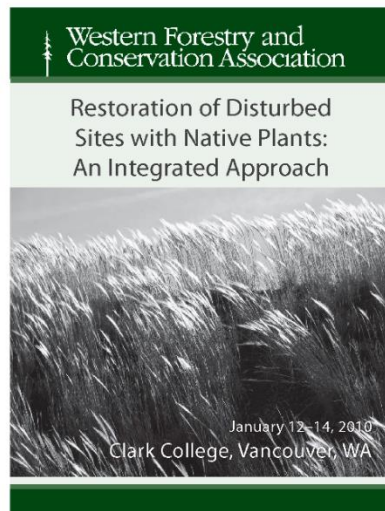
FHWA
revegetation
manual



The original manual

David Steinfeld, Scott Riley, Kim Wilkinson,
Thomas Landis, and Lee Riley

- Published 2007
- Western US-centric
- Applicable to any highly disturbed sites
- Powerful training resource

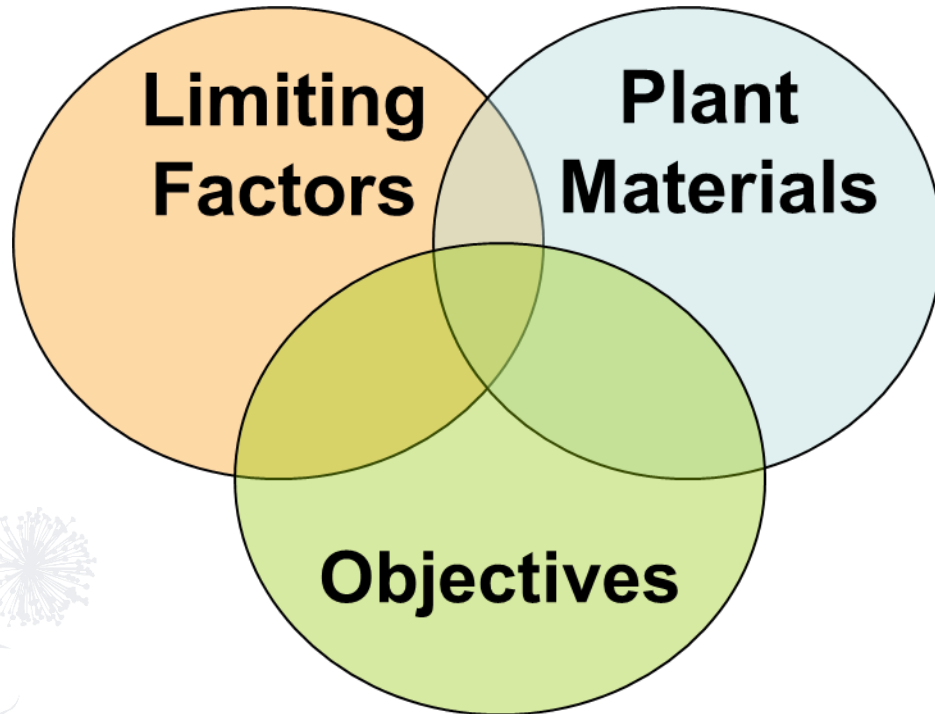


ROADSIDE REVEGETATION
An Integrated Approach to Establishing Native Plants and Pollinator Habitats

Revegetation as a process

Key components: Implementation guides

- Soil and site treatments
- Obtaining plant materials
- Installing plant materials
- Post installation care of plant materials



Phase	Tasks
Project Orientation & Inventory	Determine objectives
	Define preliminary DFCs (success criteria)
	Define cooperators
	Gather prefield information (maps, data etc)
	Identify revegetation units
	Select reference sites
	Inventory vegetation, soils, climate
Site Analysis	Identify limiting factors & site resources
	Identify mitigating measures
	Select species
	Identify target plant requirements
Develop the Revegetation Plan	Compare and select revegetation strategies
	Finalize DFCs (success criteria)
	Develop & share revegetation plan
Implementation	Develop contracts and oversee work
	Install treatments
	Keep records
	Carry out quality control
Monitoring & Maintenance	Develop monitoring plan based on DFCs (success criteria)
	Collect and evaluate data
	Write monitoring report
	Apply maintenance and corrective measures as needed
	Organize and file project data
	Share lessons learned

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Incorporating pollinator needs



- **Food, water, shelter**

- Implications for project design and maintenance
- Unique requirements compared to other project objectives

- **Objectives**

- Provide practitioners technical information for creating pollinator habitat with native plants

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An Integrated Approach to Establishing Native Plants and Pollinator Habitats

Ongoing modifications

- **National in scope**
- **Discussion of pollinators and their importance**
- **Nectar and shelter needs**
- **Phenology**
- **Plant palette selection**
- **Incorporation of FHWA and Xerces Society BMP's**
 - Pollinator-specific objectives in project design
 - Vegetation maintenance

Roadside Revegetation

An Integrated Approach to Establishing
Native Plants and Pollinator Habitat

Draft Version 1.1 — September 2016



ROADSIDE REVEGETATION

An Integrated Approach to Establishing Native Plants and Pollinator Habitats

Online resources:

www.nativererevegetation.org



ROADSIDE REVEGETATION
An Integrated Approach to Establishing Native Plants



the
art&science
of revegetation



This web site contains four integrated and interlinked modules dedicated to explaining the art and science of roadside revegetation. Each module contains similar topics, but communicates them differently depending on informational needs. You may begin with any module and continue through it step-by-step or you may use the *in depth* links to visit related information in other modules to reinforce what you are learning.

LEARN »

The Roadside Revegetation Technical Guide is a comprehensive 400+ page document detailing the complete roadside revegetation process from project initiation through monitoring and management. The condensed Manager's Guide complements the Technical Guide.

TRAIN »

The training modules offer an interactive, guided learning experience that teaches basic roadside revegetation principals using examples, illustrations, and quizzes.

VISUALIZE »

The visualize tool is an innovative approach to illustrating roadside revegetation procedures in practice. The interactive tool prompts you for specific criteria about a revegetation site and your approach, and then displays the impacts of those selections over time.

SHARE »

The online data form and Learning Summaries provide an opportunity for Revegetation specialists to share their experiences in implementing restoration projects using native plants.

www.nativererevegetation.org

Resource Library- report types

NATIVE REVEGETATION

A Practitioner's Resource Library for the Western US



Resource Library

What's New - April 2013

Search Filters

Report Type:

< All >

Restoration Type:

< All >

Topic Type:

< All >

Date:

< All >

Search:

Find

Reset

< All >

Contract Specification

Implementation Guide

Learning Summary

Literature

Plans and Reports

PowerPoint Presentation

Roadside Guide

Spreadsheet/Program

Website

Other

How to Use Library

g to re-sort listing in ascending or descending order.
y report abstract, author and download link.

100 | 411 Total: 339

1-10 Next >>

	Report Type	Topic	Year
and storing seeds ▶	Literature	Seeds	2009
A... ble nutrients on decomposed granite cut slopes and adjacent natural soils ▶	Literature	Soil	1998
A plant genetics primer ▶	Literature	Genetics	2004
a Sediment production from granitic cutslopes on forest roads in Idaho, USA© ▶	Literature	Soil Erosion, Slope Stability	2001
A Striking Profile: Soil Ecological Knowledge in Restoration Management and Science © ▶	Literature	Overviews & Synopsis	2008
A synthesis of postfire road treatments for BAER teams: methods, treatment effectiveness, and decisionmaking tools for rehabilitation. ▶	Literature	Soil Erosion, Water Quality	2009
About not knowing everything© ▶	Literature	Planning, Overviews & Synopsis	1984

www.nativervegetation.org

Resource Library- topics

NATIVE REVEGETATION

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Resource Library

What's New - April 2013

Search Filters

Report Type: Restoration Type: Topic Type: Date: Search:

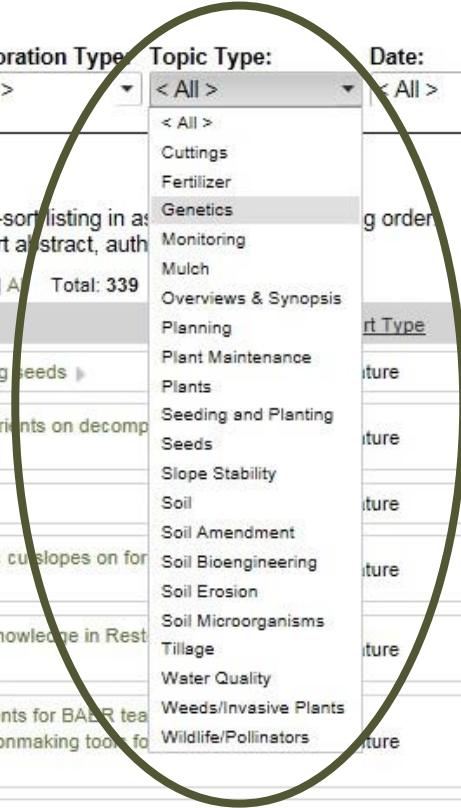
Export

Select any column heading to re-sort listing in ascending or descending order
Select report title to display report abstract, author, and date

Results per page: 10 | 25 | 50 | 100 | All | Total: 339

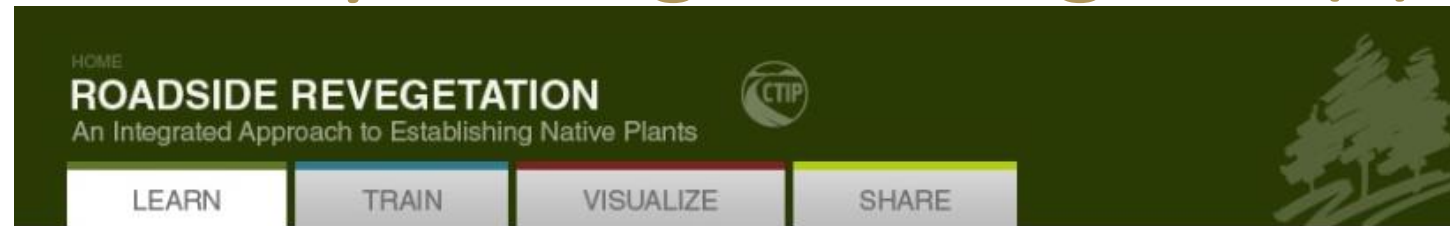
Report Title	Report Type	Topic	Year
7 Collecting, processing, and storing seeds >	Literature	Seeds	2009
A comparison of plant available nutrients on decomposed slopes and adjacent natural soils >	Literature	Soil	1998
A plant genetics primer >	Literature	Genetics	2004
a Sediment production from granitic cusp slopes on for Idaho, USA © >	Literature	Soil Erosion, Slope Stability	2001
A Striking Profile: Soil Ecological Knowledge in Restoration Management and Science © >	Literature	Overviews & Synopsis	2008
A synthesis of postfire road treatments for B&E treatment effectiveness, and decisionmaking tools for rehabilitation. >	Literature	Soil Erosion, Water Quality	2009
About not knowing everything © >	Literature	Planning, Overviews & Synopsis	1984

[How to Use Library](#)



www.nativererevegetation.org

Resource Library- revegetation guide(s)



Technical Guide » [Table of Contents](#)

 [print page](#)  [download page](#)

Table of Contents

Acronyms

Select Chapter 

- 1 Introduction
 - 1.1 Introduction
 - 1.2 The Ecological Effects of Roads
 - 1.3 Objectives of This Report
 - 1.4 Scope
 - 1.5 Approach
 - 1.6 How This Report is Organized
 - 1.7 Summary
- 2 Initiation Part One: Cooperators and Processes for Road Projects
 - 2.1 Introduction
 - 2.2 Preliminary Tasks of Initiation
 - 2.3 The Process of Road Development
 - 2.4 Next Steps
- 3 Initiation Part Two: Road Plans and Terminology
 - 3.1 Introduction
 - 3.2 Reading Plans
 - 3.3 Interpreting Engineering Views for Revegetation Planning
 - 3.4 Understanding Technical Concepts and Terminology
 - 3.5 Next Steps
- 4 Planning Phase One: Orient
 - 4.1 Introduction
 - 4.2 Step One — Define Revegetation Objectives
 - 4.3 Step Two — Define and Map Revegetation Units
 - 4.4 Step Three — Locate and Describe Reference Sites

Online application:

Ecoregional
Revegetation
Application (ERA)



Ecoregional Revegetation Application

■ Audience

- Revegetation practitioners/project designers
- All agencies/sectors
- National in scope

■ Objectives

- Support the inter agency seed strategy and pollinator health initiatives
- Support the native plants materials infrastructure
- Assist revegetation practitioners in project design and implementation



ROADSIDE REVEGETATION

An Integrated Approach to Establishing Native Plants and Pollinator Habitats



Ecoregional Revegetation Application

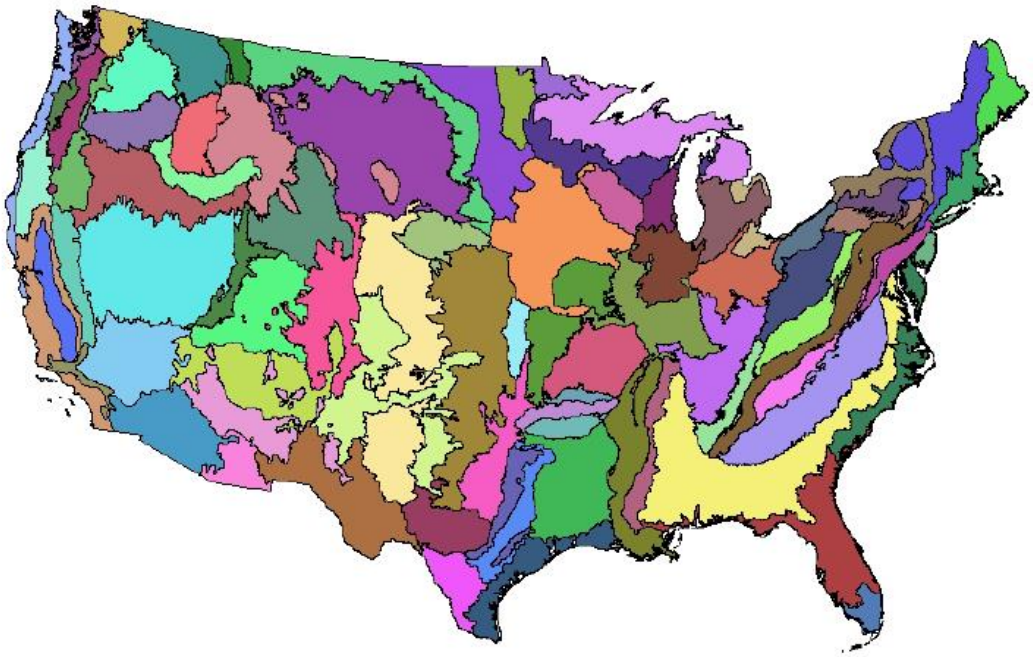
- **Data sources: pollinator-friendly species**
 - Xerces Society
 - Pollinator Partnership (pollinator.org)
- **Data sources: workhorse species (use and commercial availability)**
 - State DOT plant lists
 - The Chicago Botanic Garden (Abbey White and Andrea Kramer)
- **Validation with regional experts**
 - USFS and BLM botanists
 - State DOT Landscape architects
 - Others (USDA PLANTS database, literature)

Ecoregion
Height
Flower color
Showy
Flowering period
Sun exposure
Soil moisture
Soil texture
Salt tolerance
Palatability
Active growth period
Pollinator value
Benefits to Pollinators
Pollinator supported
Propagation
Commercial Availability



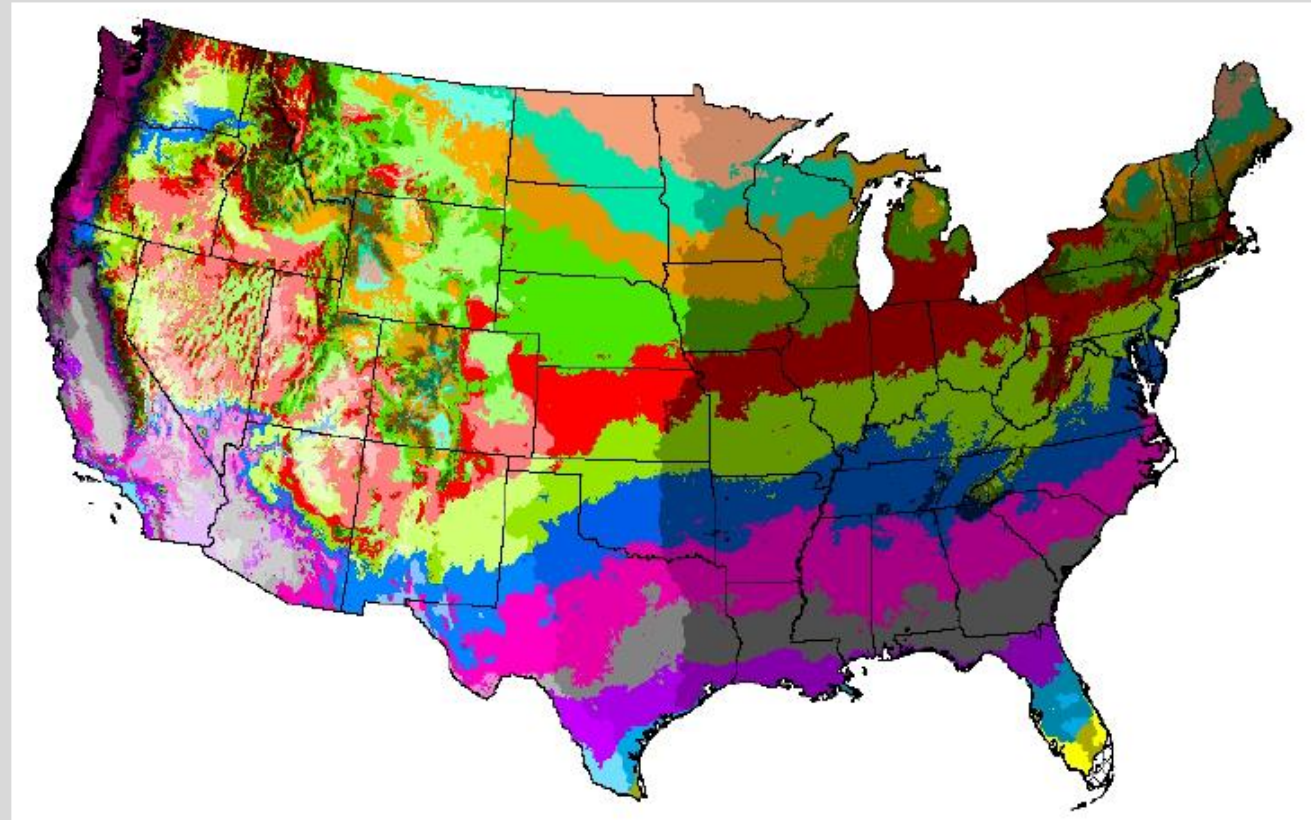






Omernik's Level III Ecoregions

+

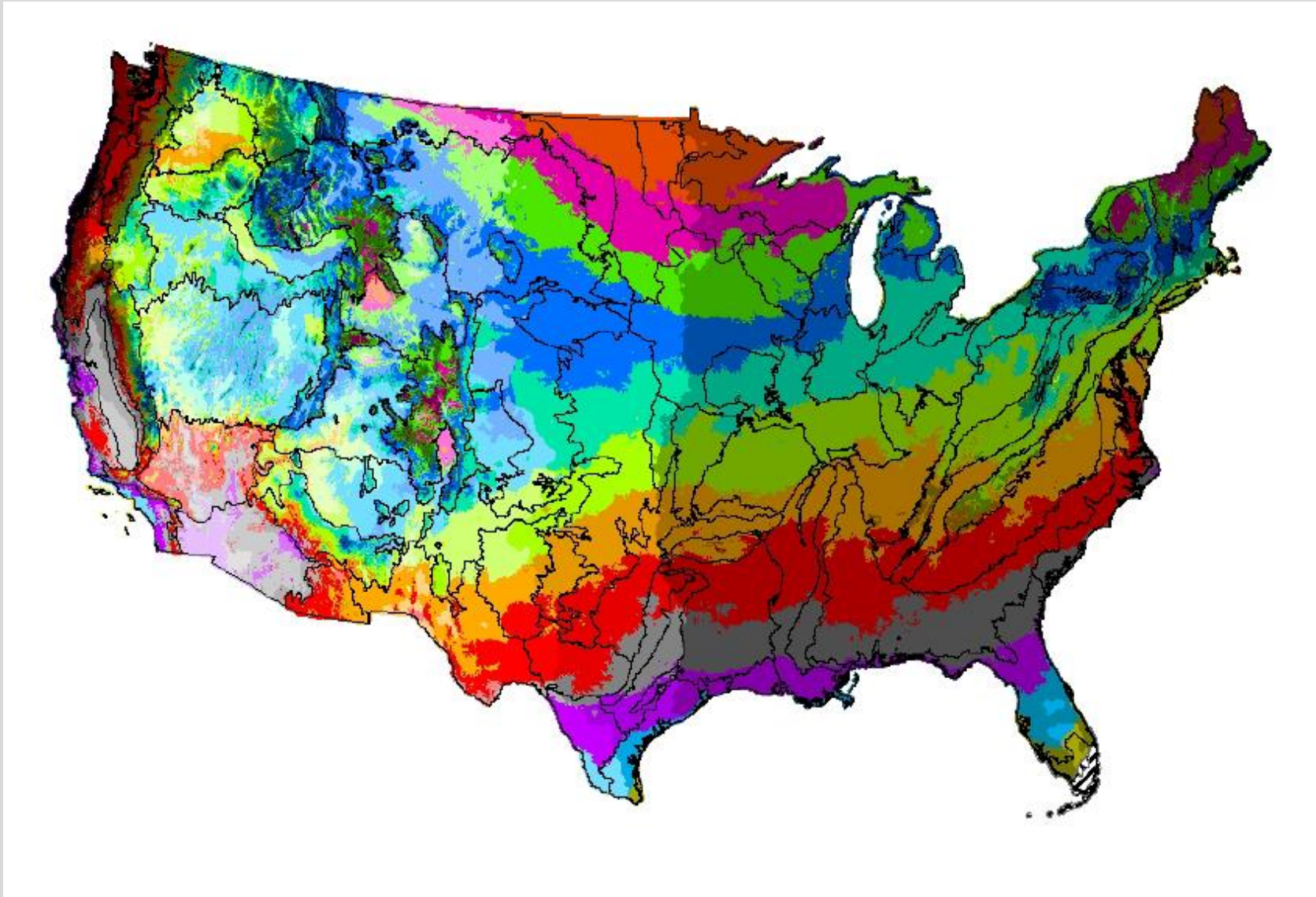


Provisional Seed Zones

Courtesy of A. Bower

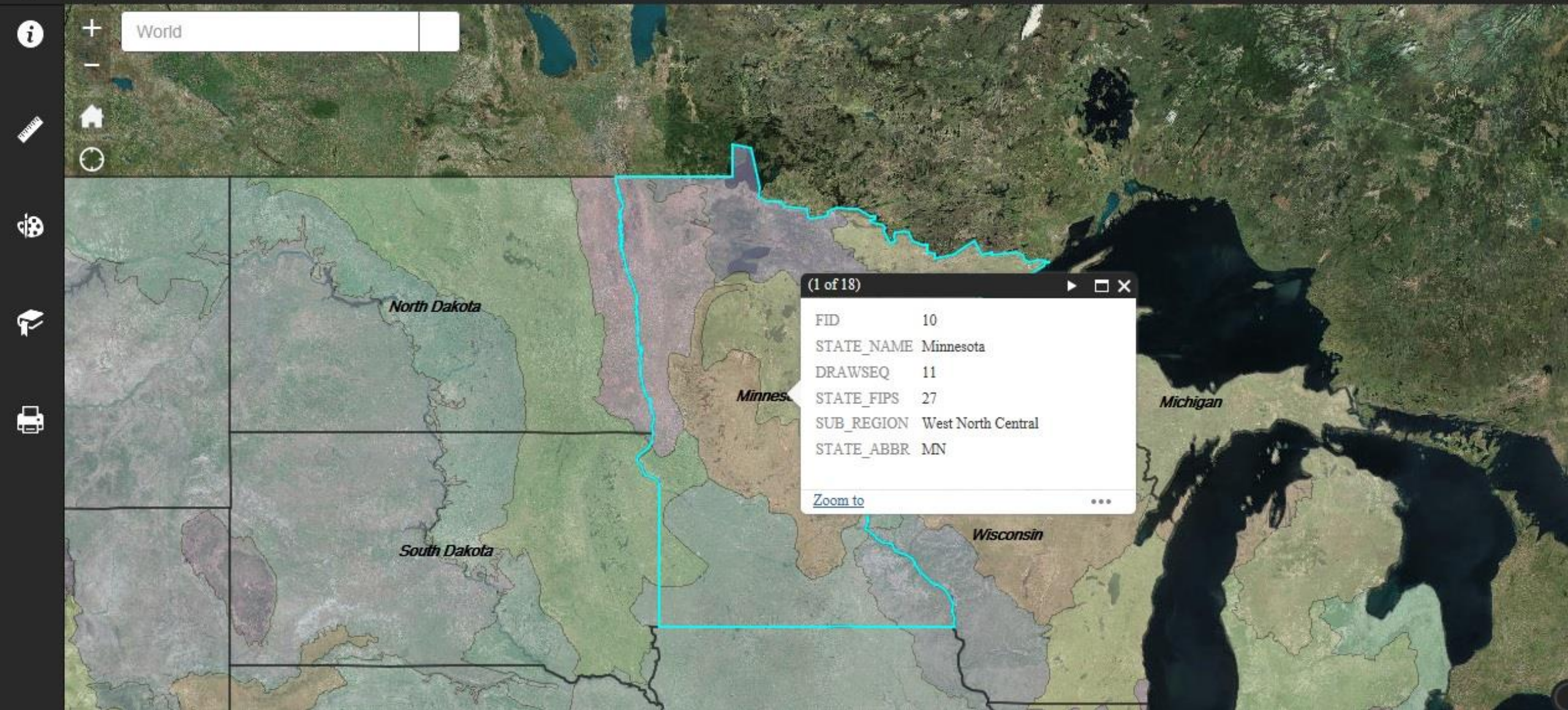


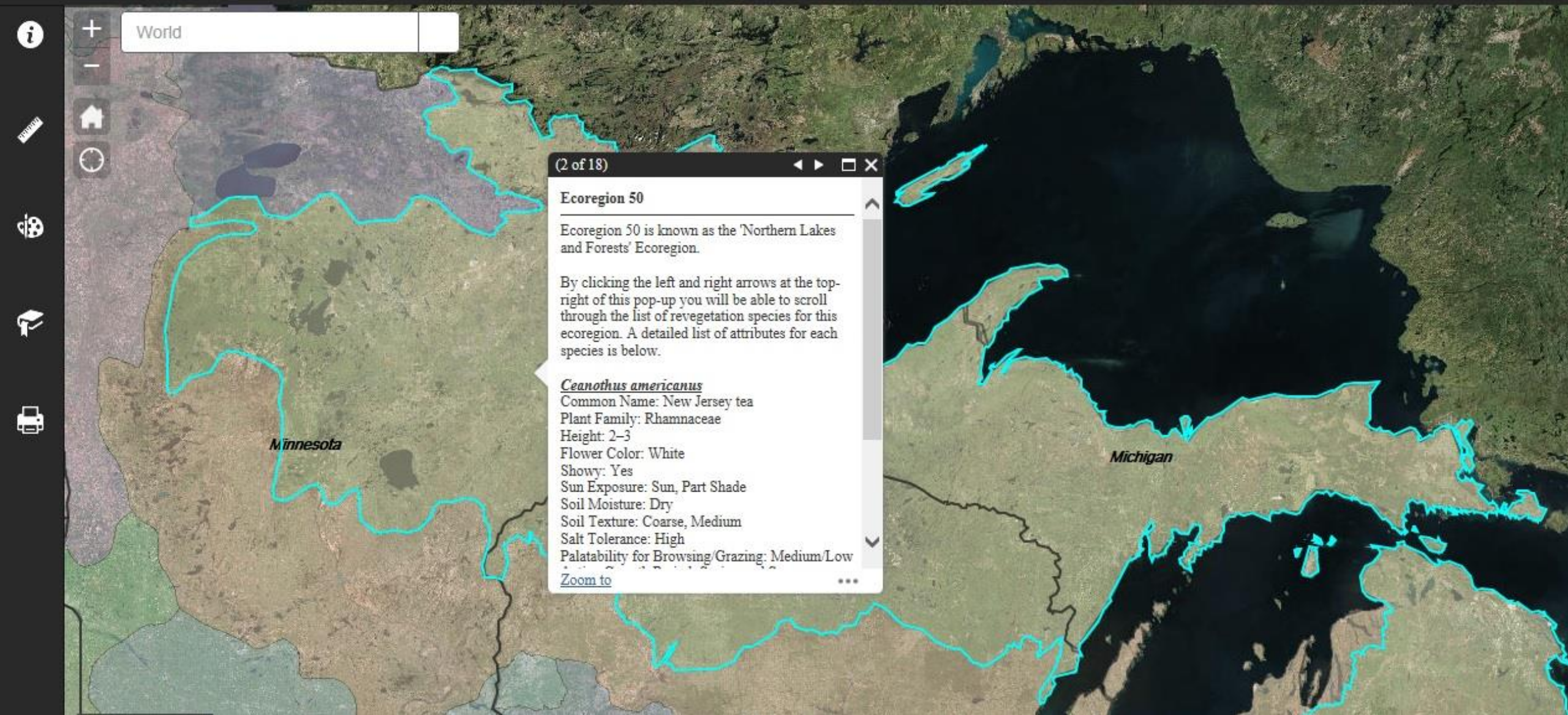
Provisional Seed Zones + Omernik's Level III Ecoregions



Courtesy of A. Bower







(2 of 18) [Navigation icons]

Ecoregion 50

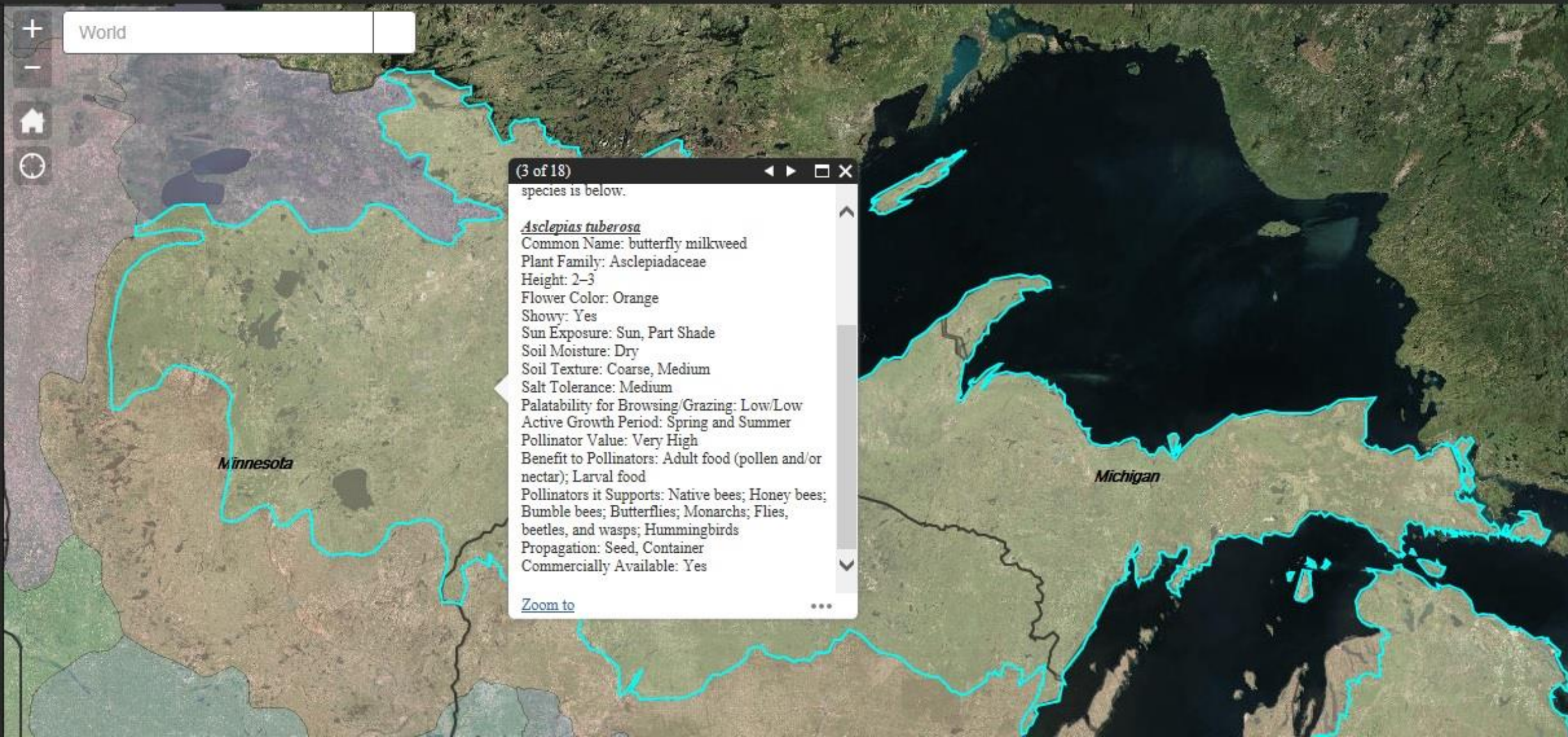
Ecoregion 50 is known as the 'Northern Lakes and Forests' Ecoregion.

By clicking the left and right arrows at the top-right of this pop-up you will be able to scroll through the list of revegetation species for this ecoregion. A detailed list of attributes for each species is below.

Ceanothus americanus
Common Name: New Jersey tea
Plant Family: Rhamnaceae
Height: 2-3
Flower Color: White
Showy: Yes
Sun Exposure: Sun, Part Shade
Soil Moisture: Dry
Soil Texture: Coarse, Medium
Salt Tolerance: High
Palatability for Browsing/Grazing: Medium/Low

[Zoom to](#) [More options icon]





(3 of 18) ◀ ▶ □ ×

species is below.

Asclepias tuberosa
 Common Name: butterfly milkweed
 Plant Family: Asclepiadaceae
 Height: 2-3
 Flower Color: Orange
 Showy: Yes
 Sun Exposure: Sun, Part Shade
 Soil Moisture: Dry
 Soil Texture: Coarse, Medium
 Salt Tolerance: Medium
 Palatability for Browsing/Grazing: Low/Low
 Active Growth Period: Spring and Summer
 Pollinator Value: Very High
 Benefit to Pollinators: Adult food (pollen and/or nectar); Larval food
 Pollinators it Supports: Native bees; Honey bees; Bumble bees; Butterflies; Monarchs; Flies, beetles, and wasps; Hummingbirds
 Propagation: Seed, Container
 Commercially Available: Yes

[Zoom to](#) ...





World

North Dakota

Minnesota

South Dakota

100mi

43.970 -87.533 Degrees

(3 of 18)

ecoregion. A detailed list of attributes for each species is below.

Asclepias tuberosa
 Common Name: butterfly milkweed
 Plant Family: Asclepiadaceae
 Height: 2-3
 Flower Color: Orange
 Showy: Yes
 Sun Exposure: Sun, Part Shade
 Soil Moisture: Dry
 Soil Texture: Coarse, Medium
 Salt Tolerance: Medium
 Palatability for Browsing/Grazing: Low/Low
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 Pollinators it Supports: Native bees; Honey bees; Bumble bees; Butterflies; Monarchs; Flies, beetles, and wasps; Hummingbirds
 Propagation: Seed, Container
 Commercially Available: Yes

[Zoom to](#)

Earthstar Geographics

US_State_Boundaries wfl_roadside_veg.sde.Eco52_Join wfl_roadside_veg.sde.Eco51_Join wfl_roadside_veg.sde.Eco50_Join wfl_roadside_veg.sde.Eco49_Join wfl_roadside_veg.sde.Eco48_Join

Options Filter by Map Extent Zoom to Clear Selection Refresh

plant_fami	all_states	eco_region	height_fe	flower_col	showy	flowering	sun_exposu	soil_moist	soil_textu	salt_toler	palatabili	active_gro
Asclepiadaceae	IA,KS,MN,MO,O	46,47,50,51,52	2-3	Orange	Yes	Jun-Aug	Sun, Part Shade	Dry	Coarse, Medium	Medium	Low/Low	Spring and Summer



ROADSIDE REVEGETATION

An Integrated Approach to Establishing Native Plants



the art & science of revegetation



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Draft Version 1.1 — September 2016



U.S. Department of Transportation
Federal Highway Administration



ERA: Ecoregional Revegetation Assistant Roadside Revegetation Website

World

1 of 10

Warning: A warning list of attributes for each species is below.

Asclepias tuberosa
 Common Name: Butterfly milkweed
 Plant Family: Asclepiadaceae
 Height: 2-3'
 Flower Color: Orange
 Shrub: Yes
 Soil: Moisture: Sun, Part Shade
 Soil Moisture: Dry
 Soil Texture: Coarse, Medium
 Salt Tolerance: Medium
 Availability for Breeding: Grazing: Low/Low
 Active Growth Period: Spring and Summer
 Pollinator Value: Very High
 Benefits to Pollinators: Adult food (pollen and/or nectar); Larval food
 Pollinators of Significance: Native bees, Honey bees, Bumble bees, Butterflies, Monarchs, Flies, bees, and many Hymenoptera
 Propagation: Seed, Cuttings
 Community Available: Yes

43.970 -87.533 Degrees

US_State_boundaries | wfi_roadside_veg_sde.Eco52_Join | wfi_roadside_veg_sde.Eco51_Join | wfi_roadside_veg_sde.Eco50_Join | wfi_roadside_veg_sde.Eco49_Join | wfi_roadside_veg_sde.Eco48_Join

Options | Filter by Map Extent | Zoom to | Clear Selection | Refresh

plant_fam	all_states	eco_region	height_fe	flower_col	showy	flowering	sun_exposu	soil_moist	soil_textu	salt_toler	palatabili	active_gr
Asclepiadaceae	IA,KS,MN,MO,OH	46,47,50,51,52	2-3	Orange	Yes	Jun-Aug	Sun, Part Shade	Dry	Coarse, Medium	Medium	Low/Low	Spring and Summer



Acknowledgements

- **Federal Highways Administration (FHWA)**
 - **Amit Armstrong**
 - **Erin Chipps**
 - **Deirdre Remley**
- **Parsons Brinckerhoff**
 - **Robin Christians**
 - **Shane Roberts**
 - **Todd Teuscher**
- **Xerces Society**
 - **Jennifer Hopwood**
- **US Forest Service**
 - **Vicky Erickson**
 - **Matt Horning**
 - **Lynda Moore**
 - **Mark Skinner**
 - **David Steinfeld (Native Restoration Consulting)**
- **Chicago Botanic Garden**
 - **Abbey White**
 - **Andrea Kramer**



www.nativererevegetation.org

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