

VEGETATION OF THE NATCHEZ TRACE PARKWAY



NatureServe

A Network Connecting Science With Conservation

Natchez Trace Parkway

- 720 km (444 miles) long
- Southern end at Natchez, Mississippi
- 31.5° N, -091.3° W
- Northern end near Nashville, Tennessee
- 36.0° N, -087.0° W
- 20-335 m (70-1100 feet) elevation

Natchez Trace Parkway

Nearly 16,000 hectares (39,000 acres) of the Natchez Trace Parkway's 21,000 hectares (52,000 acres) are maintained in a "natural" condition, i.e., forests, non-agricultural fields, and open water.

The majority of these lands are contained within the narrow 250 meter (800 foot) wide boundary that parallels the parkway itself.

Natchez Trace Parkway

Habitats are diverse and include: streams, lakes, swamps, riparian woodlands, bottomland hardwood forests, upland hardwood forests, pine and mixed hardwood forests, prairie, fallow fields, and agricultural croplands.

Natchez Trace Parkway



Freedom Hills Overlook, Alabama



Jackson Falls



Natchez Trace Parkway

- National Park Service-Tupelo, MS
- Historical Trail back to Nashville
- Mississippi, NW corner of Alabama, and Tennessee
- 4 TNC Ecoregions
- 13 Omernik Level 4 Ecoregions

Federal Partners

- 3 NPS funded projects 2004-2010
- NPS Gulf Coast I & M Network,
Martha Segura
- NPS Vegetation Mapping Program,
Chris Lea
- USGS National Wetlands Center
- USGS Fort Collins, Bob Waldermeier

Network Partners

- Tennessee NHIP, Roger McCoy, Todd Crabtree & Claude Bailey
- Alabama NHP, Al Schotz & Michael Barbour
- Mississippi NHP, Sherry Surette & Heather Sullivan
- NY NHP, Shelley Cooke (SharePoint site)

NatureServe Staff

- Erin L. Jones, plot fieldwork
- Milo Pyne, plot fieldwork
- Mary Russo, data management
- Lindsey Smart, stratification
- Jim Drake, data analysis
- Brigitte O'Donoghue, both
- Rickie White, NPS agreements

Help with data analysis

- Jeri Peck (Penn State University)
- Jim Drake (NatureServe)
- Regan Smyth (NatureServe)
- Brigitte O'Donoghue (NatureServe)
- Dave Roberts (ESA Vegetation Panel)
- Paul Geissler (USGS)
- Tom Philippi (NPS)

2007 Report, FY2010 Project

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. Associations and Alliances of Natchez Trace Parkway. NatureServe Central Databases. Arlington, VA. 305 pp.

Additional plots were needed because there were lots of vegetation associations with very few plots. Aim was to build a larger plot data set with more plots for the under sampled associations. 140 additional plots were collected in the fall of 2010, bringing the total to ~490 plots.

Sampling Stratification (2009)

- Vegetation lumped to Ecological Systems
- SE US GAP Ecological Systems Map (30m)
- Under sampled vegetation targeted
- Under sampled areas targeted (by mile)
- Over 200 new sampling points selected
- Done by Lindsey Smart, NatureServe
- Those over sampled vegetation associations noted in updated key

Plot Data Collection

- ~490 vegetation plots collected
- 3 separate NPS funded projects
- During the 2nd and 3rd projects, plots were keyed to association in the field
- Fall 2009 under sampled associations
- 140 plots completed in Fall 2009
- Accomplished with Network partners

Jennings et al 2009

Jennings_Faber-Langendoen_Loucks_Standards for Association and Alliance_EM2009.pdf (application/pdf Object) - Mozilla Firefox

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http://www.natureserve.org/publications/pubs/Jennings_Faber-Langendoen_Loucks_S

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Standards for associations and alliances of the U.S. National Vegetation Classification

MICHAEL D. JENNINGS,^{1,2,7} DON FABER-LANGENDOEN,³ ORIE L. LOUCKS,⁴ ROBERT K. PEET,⁵ AND DAVID ROBERTS⁶

¹The Nature Conservancy Center for Global Trends, 317 West Sixth Street, Suite 210, Moscow, Idaho 83843 USA
²Department of Geography, 375 S Line Street, McClure Hall 203, University of Idaho, Moscow, Idaho 83844-3021 USA
³NatureServe, 3467 Amber Road, Syracuse, New York 13215 USA and
SUNY College of Environmental Science and Forestry, 1 Forestry Dr., Syracuse, New York 13210 USA
⁴Department of Zoology, Miami University, 5221A Morning Son Rd., Oxford, Ohio 45056 USA
⁵Department of Biology CB#3280, University of North Carolina, Chapel Hill, North Carolina 27599-3280 USA
⁶Department of Ecology, Montana State University, P.O. Box 173460, Bozeman, Montana 59717-3460 USA

Abstract. This article provides guidelines for the description, documentation, and review of proposals for new or revised plant associations and alliances to be recognized as units of vegetation within the U.S. National Vegetation Classification (NVC). By setting forth standards for field records, analysis, description, peer review, and archiving, the Ecological Society of America's Vegetation Classification Panel, in collaboration with the U.S. Federal Geographic Data Committee, NatureServe, and others, seeks to advance our common understanding of vegetation and improve our capability to sustain and restore natural systems. We provide definitions for the two floristic levels of the NVC hierarchy: associations and alliances. This is followed by a description of standards for field plot records and the identification and classification of vegetation types. Procedures for review and evaluation of proposed additions and revisions of types are provided, as is a structure for data archiving and dissemination. These procedures provide a dynamic and practical way to publish new or revised descriptions of vegetation types while maintaining a current, authoritative list of types for multiple users to access and apply.

Key words: floristic types; national standards; plot data; U.S. National Vegetation Classification; vegetation alliance; vegetation association; vegetation classification.

Done

Jennings et al. 2009. Ecological Monographs 79(2):173-199
<http://www.natureserve.org/publications/library.jsp>

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PC-Ord 5

- MJM Software
- Willamette Valley oak woodlands example
- McCune, Bruce & James B. Grace. 2002. Analysis of Ecological Communities. MjM.
- \$299 + \$100 per simultaneous user
- Over 5,000 published papers used PC-Ord

Jeri Peck's PC-Ord 5 Workshop

Workshop in Oregon Aug. 30-31, 2010

<http://silv.cas.psu.edu/pcord.htm>

PC-ORD was written with community ecologists in mind and includes a variety of procedures and options best suited for species data.

Jeri Peck's PC-Ord 5 Workshop

Provide training in three areas:

- Multivariate community analyses, know tools
- The PC-ORD software, how to use these tools
- Defensible data analysis and interpretation

Plus

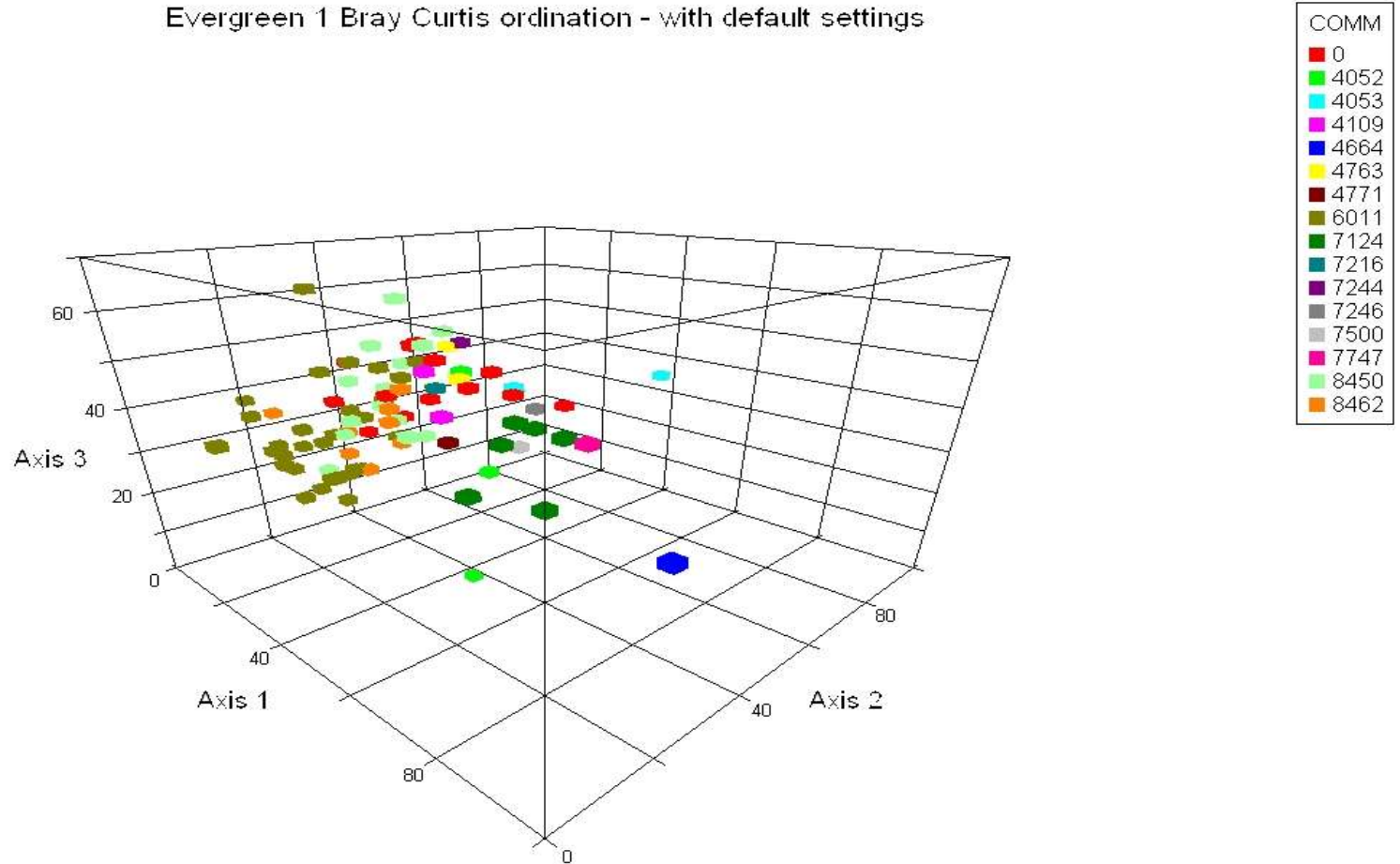
- Explanations of the tools and demonstrations
- exercises reinforce demonstrations
- Students ask questions about their datasets

Vegetation Classification (2007)

- 90 NVC Associations
- 63 NVC Alliances
- 27 Old NVC hierarchy formations
- Data analysis done using PC-Ord 5

Evergreen Bray Curtis ordination

Evergreen 1 Bray Curtis ordination - with default settings



New NVC Hierarchy Groups (2010)

- Developed with NPS funding
- Eastern US Forests done early 2010 (Draft)
- Descriptions are in draft
- Review process (Ecological Society of America)
- New National Vegetation Hierarchy is a multi-agency effort with NatureServe and partners
- Follows the 2008 FGDC Vegetation Standard
- 22 new NVC Groups on Natchez Trace Parkway

Southeastern North American Warm Temperate Forest (D006)

G007 Beech - Magnolia - Oak Forest Group

- includes 2 associations

The Natchez Trace Parkway crosses from warm temperate (southern Mississippi) to cool temperate (Tennessee)

Eastern North American Cool Temperate Forest (D008)

G015 Appalachian Oak - Chestnut Forest Group

- includes 1 association

G016 Chinquapin Oak - Ash - Red-cedar Alkaline
Forest Group

- includes 3 associations

Eastern North American Cool Temperate Forest (D008)

G159 South-Central Interior Oak Forest Group

- includes 6 associations

G012 Shortleaf Pine - Oak Forest Group

- includes 4 associations

G165 Piedmont & Central Atlantic Coastal Plain Oak Forest Group

- includes 2 associations

Eastern North American Cool Temperate Forest (D008)

G020 Appalachian & Interior Mesophytic Forest
Group

- includes 3 associations

G166 South-Central Coastal Plain Mesophytic
Forest Group

- includes 7 associations

Northeastern & Central North American Flooded & Swamp Forest (D011)

G040 Silver Maple - Green Ash - Sycamore
Floodplain Group

- includes 7 associations

G169 Central Depression Pond Group

- includes 1 association

G167 Northern & Central Shrub Swamp Group

- includes 1 association

Northeastern & Central North American Flooded & Swamp Forest (D011)

G552 Northern & Central Ruderal Flooded & Swamp Forest Group

- association assignment in progress

G553 Southeastern Ruderal Flooded & Swamp Forest Group

- association assignment in progress

Southeastern North American Flooded & Swamp Forest (D062)

**G033 Bald-cypress - Tupelo Floodplain Forest
Group**

- includes 3 associations

G034 Oak - Sweetgum Floodplain Forest Group

- includes 3 associations

Southeastern North American Flooded & Swamp Forest (D062)

G038 Atlantic Maritime Conifer & Hardwood
Swamp Group

- includes 1 association

G130 Wet Pine & Hardwood Flatwoods Group

- includes 2 associations

G036 Pond-cypress Swamp Group

- includes 1 association

Eastern North American Grassland, Meadow & Shrubland (D024)

G174 Eastern Interior Patch Prairie Group

- includes 1 association

G175 Eastern Coastal Patch Prairie Group

- includes 2 associations

G059 Eastern Ruderal Shrubland & Grassland
[Placeholder]

- association assignment in progress

North American Bog & Fen (D029)

G182 Interior Plateau Seepage Fen Group

- Includes 1 association

Eastern North America Freshwater Wet Meadow, Riparian & Marsh (D030)

G112 Eastern North American Wet Meadow Group

- includes 1 association

G556 Northern & Central Ruderal Wet Meadow & Marsh Group

- association assignment in progress

G557 Southeastern Ruderal Wet Meadow & Marsh Group

- association assignment in progress

Eastern North American Freshwater Aquatic Vegetation (D049)

G114 Eastern North American Freshwater
Aquatic Vegetation

- Includes 6 associations

Eastern North American Temperate Cliff, Scree & Rock Vegetation (D051)

G106 Eastern Temperate Cliff, Talus & Scree
[Placeholder]

- includes 3 associations

Questions?

- New 2008 NVC Hierarchy?
- Divisions, Macrogroups, Groups?
- Alliances, Associations?

Next, some information about R...

Learn R Course

USGS + NPS Inventory and Monitoring Program

<http://www.fort.usgs.gov/BRDScience/LearnR.htm>

Instructors

Paul Geissler, USGS Status & Trends Program

Tom Philippi, NPS Inventory & Monitoring Program

- Designed for natural resource managers
- Free and open to all who are interested (~1000)

Learn R Course

USGS + NPS Inventory and Monitoring Program

<http://www.fort.usgs.gov/BRDScience/LearnR.htm>

Instructors: Paul Geissler and Tom Philippi

- R is the open-source/free version of S
- A comprehensive statistical analysis environment
- Exportable publication quality graphics
- Many new, cutting-edge applications

Learn R Course

USGS + NPS Inventory and Monitoring Program

<http://www.fort.usgs.gov/BRDScience/LearnR.htm>

Instructors: Paul Geissler and Tom Philippi

- Topics 1 - 9 use R Commander and Rattle (GUIs)
- Topic 10 is Introduction to the R language
- Topic 14 is multivariate and spatial statistics
- Each topic is available as a .wmv file (~ 2 hours)

http://www.r-project.org/


The R Project for Statistical Computing - Mozilla Firefox

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http://www.r-project.org/

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The R Project for Statistical Computing



About R
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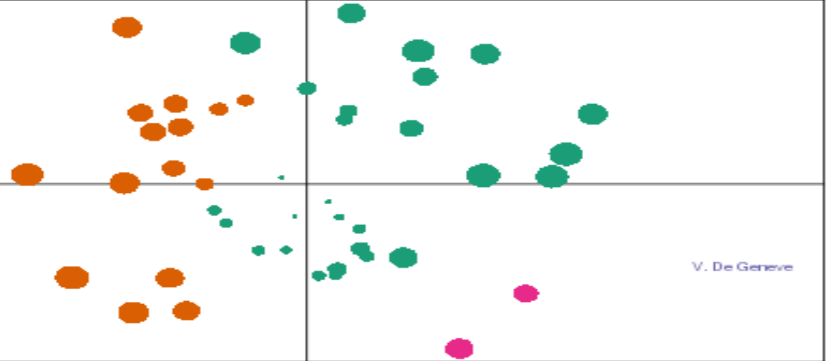
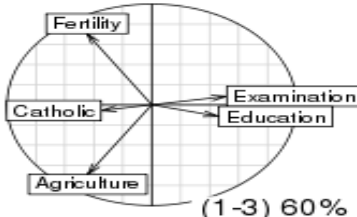
R Project
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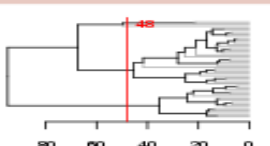
Done

PCA 5 vars

```
princomp(x = data, cor = cor)
```

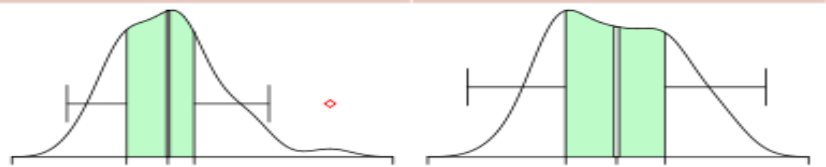


Clustering 4 groups



Groups

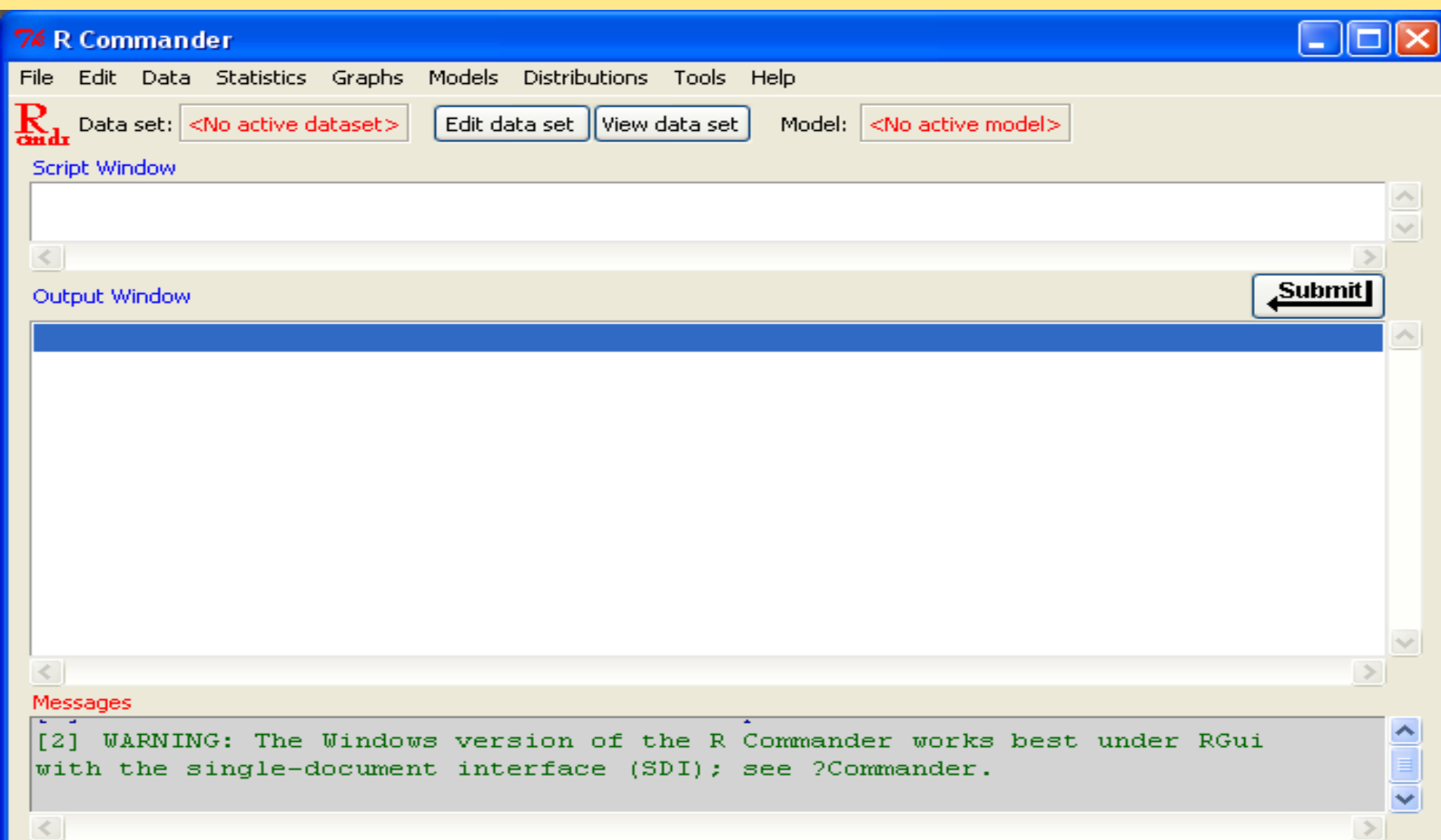
1	16
2	28



Getting Started:

- R is a free software environment for statistical computing and graphics. It compiles and runs on a wide variety of UNIX platforms, Windows and MacOS. To [download R](#), please choose your preferred [CRAN mirror](#).

R Commander



R Commander

- a GUI for the R programming language
- licensed under the GNU General Public
- viable alternative to statistical packages like SPSS
- highly useful to R novices
- underlying R code displayed for each analysis run
- Rcmdr can be installed from within R
- Integration with MS Excel with RExcel package

Rattle (R Data Miner)

R Data Miner - [Rattle] Rattle Version 2.5.3 togaware.com

Project Tools Settings Help

Execute New Open Save Report Export Quit

Data Explore Test Transform Cluster Associate Model Evaluate Log

Type: CSV File ARFF ODBC R Dataset RData File Library Corpus Script

Filename: (None) | Separator: , Header

Sample Percentage: 70 Count: 0 Seed: 123 View Edit

Input Ignore Weight Calculator: Target: Auto Categorical Numeric

Welcome to Rattle (rattle.togaware.com).

Rattle is a free graphical user interface for Data Mining, developed using R. R is a free software environment for statistical computing and graphics. Together they provide a sophisticated environments for data mining, statistical analyses, and data visualisation.

See the Help menu for extensive support in using Rattle. The Togaware Desktop Data Mining Survival Guide includes Rattle documentation and is available from datamining.togaware.com

Rattle is licensed under the GNU General Public License, Version 2. Rattle comes with ABSOLUTELY NO WARRANTY. See Help -> About for details.

Rattle version 2.5.3 Copyright (C) 2006-2009 Togaware Pty Ltd
Rattle is a registered trademark of Togaware Pty Ltd

To Begin: Choose the Type of data source, specifically identify the source, then click the Execute button.

Rattle: A Data Mining GUI for R

Data mining delivers insights, patterns, and descriptive and predictive models from the large amounts of data available today in many organizations. The data miner draws heavily on methodologies, techniques and algorithms from statistics, machine learning, and computer science. R increasingly provides a powerful platform for data mining. However, scripting and programming is sometimes a challenge for data analysts moving into data mining.

The Rattle package provides a graphical user interface specifically for data mining using R. It also provides a stepping stone toward using R as a programming language for data analysis.

R Labs for Vegetation Ecologists

<http://ecology.msu.montana.edu/labdsv/R/labs/>

David Roberts

droberts@montana.edu

Montana State University, Department of Ecology

- Department Head and Professor
- Ph.D. (plant ecology) U. of Wisconsin-Madison, 1984
- *Vegetation ecology*
- *ecological modeling*
- *multivariate analysis of ecological data*

R Labs for Vegetation Ecologists

<http://ecology.msu.montana.edu/labdsv/R/labs/>

Introduction

- [R for Ecologists](#), a primer on the S language and available software

Familiarization with Data

- [Lab 1](#) Loading Vegetation Data and Simple Graphical Data Summaries
- [Lab 2](#) Loading Site/Environment Data and Simple Graphical Summaries
- [Lab 3](#) Vegetation Tables and Summaries

R Labs for Vegetation Ecologists

<http://ecology.msu.montana.edu/labdsv/R/labs/>

Modeling Species Distributions

- [Lab 4](#) Modeling Species Distributions with Generalized Linear Models
- [Lab 5](#) Modeling Species Distributions with Generalized Additive Models
- [Lab 6](#) Modeling Species Distributions with Classification Trees

R Labs for Vegetation Ecologists

<http://ecology.msu.montana.edu/labdsv/R/labs/Ordination>

- [Lab 7](#) Principal Components Analysis
- [Lab 8](#) Principal Coordinates Analysis
- [Lab 9](#) **Nonmetric Multi-Dimensional Scaling**
- [Lab 10](#) Correspondence Analysis and Detrended Correspondence Analysis
- [Lab 11](#) Fuzzy Set Ordination
- [Lab 12](#) Canonical Correspondence Analysis

R Labs for Vegetation Ecologists

<http://ecology.msu.montana.edu/labdsv/R/labs/>

Cluster Analysis

- [Lab 13](#) Cluster Analysis
- [Lab 14](#) Discriminant Analysis with Tree Classifiers

R and R Packages are available here:

<http://www.cran.r-project.org>

R Packages for Vegetation Ecology

LabDSV now sponsors three R packages:

- **labdsv** is the original package for ecological data analysis and ordination
- **fso** is the package for fuzzy set ordination and multidimensional fuzzy set ordination
- **optpart** is a package for optimal partitioning, maximal clique analysis, and maximally compact sets analysis

Packages available at <http://www.cran.r-project.org>

Vegan Package for Vegetation Ecology

Jari Oksanen, University of Oulu (Finland)

- **Diversity analysis:** Shannon, Simpson, Fisher indices, Rényi diversities and Hill numbers.
- **Species abundance models:** Fisher and Preston models, species abundance distributions.
- **Analysis of species richness:** species accumulation curves, extrapolated richness.
- **Ordination:** support and meta functions for NMDS, redundancy analysis, constrained correspondence analysis, constrained analysis of proximities (all three with partial analysis)

Vegan Package for Vegetation Ecology

- **Support functions for ordination:** dissimilarity indices, extended dissimilarities, Procrustes analysis, ordination diagnostics, permutation tests.
- **Ordination and environment:** vector fitting, centroid fitting and smooth surface fitting, adding species scores as weighted averages, adding convex hull, SD ellipses, arrows etc. to ordination.
- **Dissimilarity analyses:** ANOVA using dissimilarities, ANOSIM, MRPP, BIOENV, Mantel and partial Mantel tests.
- **Data standardization:** Hellinger, Wisconsin, Chi-square, Beals smoothing.

Mission

NatureServe is a non-profit conservation organization whose mission is to provide the scientific basis for effective conservation action.

NatureServe and its **network of natural heritage programs** are the leading source for information about rare and endangered species and threatened ecosystems.

Q&A



NatureServe

A Network Connecting Science With Conservation