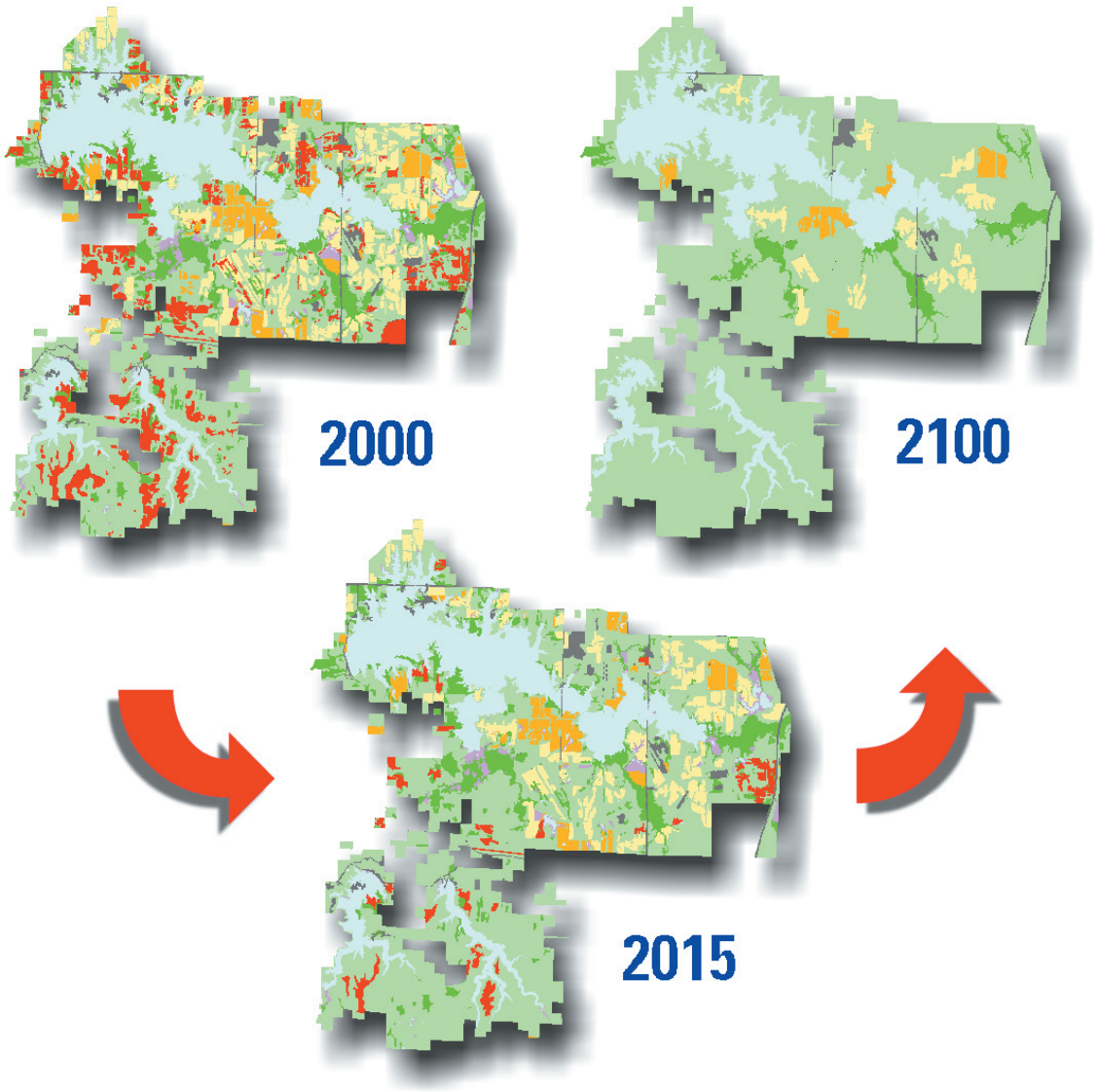
USGS
science for a changing world

Geographic Information System Tools for Conservation Planning: User's Manual



Information and Technology Report USGS/BRD/ITR—2003-0005

U.S. Department of the Interior
U.S. Geological Survey

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
00 MAR 2004	**N/A**	**-**

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Geographic Information System Tools for Conservation Planning: Users Manual	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) **U.S. Geological Survey Reston, VA**	8. PERFORMING ORGANIZATION REPORT NUMBER
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT
Approved for public release, distribution unlimited

13. SUPPLEMENTARY NOTES
The original document contains color images.

14. ABSTRACT

15. SUBJECT TERMS

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			
unclassified	**unclassified**	**unclassified**	**UU**	**71**	

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std Z39-18

Geographic Information System Tools for Conservation Planning: User's Manual

By Timothy J. Fox, Jason J. Rohweder, Kevin P. Kenow, Carl E. Korschgen, and Henry C. DeHaan

Information and Technology Report USGS/BRD/ITR—2003-0005

U.S. Department of the Interior
U.S. Geological Survey

U.S. Department of the Interior
Gale A. Norton, Secretary

U.S. Geological Survey
Charles G. Groat, Director

U.S. Geological Survey, Reston, Virginia: 2003

For more information about the USGS and its products:
Telephone: 1-888-ASK-USGS
World Wide Web: http://www.usgs.gov/

Any use of trade, product, or firm names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Suggested citation:
Fox, T.J., J.J. Rohweder, K.P. Kenow, C.E. Korschgen, and H.C. DeHaan, 2003, Geographic Information System Tools for Conservation Planning: User's Manual: U.S. Geological Survey, Biological Resources Discipline Information and Technology Report USGS/BRD/ITR—2003-0005, 4 p. + Appendixes A–B + CD-ROM.

Contents

Abstract 1
Introduction 1
ArcView GIS Platform 1
CCP GIS Query Tool 2
CCP GIS Clipping Tool 2
CCP GIS Edit Tool 2
Discussion 2
Acknowledgments 2
Reference 3
Appendix A: User's Manual A-1
- Section 1: General Information A-1
  - System Requirements A-1
  - ArcView GIS Platform A-1
  - User's Manual (Hard Copy/Digital) A-1
  - Technical Support A-1
- Section 2: Getting Started A-2
  - Installing the CCP GIS Tools from the CD-ROM A-2
  - Copying Sample Data/Matrix from the CD-ROM A-2
  - Downloading and Installing the CCP GIS Tools and Data from the Internet A-3
  - Starting ArcView A-3
  - Activating the Tool A-4
- Section 3: Data A-6
  - GIS Data Themes A-6
  - Matrix Tables A-6
  - Selecting the Directory Containing the Matrix Tables A-7
  - Linking Land Cover Themes and Matrix Tables A-8
  - Removing Data Associations from Matrix A-12
  - Advanced Topic: Creating Area-weighted Land Cover Themes and Matrices A-13
- Section 4: CCP GIS Query Tool Menu and Windows A-16
  - CCP_QT Menu A-16
  - Query Tool Flow A-16
  - Query Input Windows and Parameters A-16
  - Query Output Windows and Products A-17
- Section 5: Query Examples A-19
  - Single Species Query A-19
  - Multiple Species Query A-20
  - Querying with the Advanced Query Button A-24
- Section 6: Advanced Functions A-28
  - Moving Products to Other Applications A-28
  - Using ArcView GIS Tools A-29

Incorporating User Data A-33
Section 7: CCP GIS Clipping Tool A-35
Background A-35
Tutorial Exercise A-35
Using a Preexisting Polygon as a Clipping Region A-40
Section 8: CCP GIS Edit Tool A-42
Background A-42
Creating a Duplicate Theme for Editing A-43
Calculating Metrics for the Active Theme A-44
Converting Multiple Polygons to a New Class A-46
Converting Individual Polygons to a New Class A-47
Editing Feature Geometry A-51
Scenario 1: Adding Features to Edit Theme A-51
Scenario 2: Splitting a Polygon to Create Multiple Polygons A-52
Scenario 3: Adjusting Boundaries Among Polygons A-53
Summarizing Edited Habitats A-53
Scenario 1: Create Summary Statistics for a Land Cover Theme A-53
Appendix B. CCP GIS Query Tool Production Descriptions B-1

Figures

A2-1. Copying the Comprehensive Conservation Planning Geographic Information System Tools extensions A-2
A2-2. Starting ArcView A-4
A2-3. Opening Extensions dialog window A-4
A2-4. Activating Comprehensive Conservation Planning Geographic Information System Tools extensions A-5
A2-5. ArcView's Project window A-5
A3-1. Sample of a Comprehensive Conservation Plan land cover theme attribute table A-6
A3-2. Potential Species Occurrence geographic information system theme for Cerulean Warblers A-7
A3-3. A sample of a Comprehensive Conservation Plan matrix table created in Microsoft Excel A-7
A3-4. Copying from ArcView's Legend Editor A-8
A3-5. Select Matrix Directory menu option A-8
A3-6. Select Matrix Directory dialog window A-8
A3-7. Matrix Wizard menu option A-9
A3-8. Matrix Wizard dialog window—Select Data Theme A-9
A3-9. Matrix Wizard dialog window—Select Item A-9
A3-10. Matrix Wizard dialog window—Select Matrix A-10
A3-11. Matrix Wizard dialog window—Select Identification Fields A-10
A3-12. Matrix Wizard dialog window—Select Unique Identifier A-11
A3-13. Matrix Wizard dialog window—Matrix/data Theme Linkage A-11
A3-14. Matrix Wizard dialog window—Finish A-12
A3-15. Matrix Wizard dialog window—Multiple Data Theme Association A-12
A3-16. Matrix Wizard dialog window—Add Data Association to Matrix A-13
A3-17. Remove Data Association from Matrix menu option A-13
A3-18. Remove Data Association from Matrix dialog window A-13
A3-19. Reclassifying the Comprehensive Conservation Plan land cover theme A-14
A3-20. Creating a subset of perennial grass crops polygons A-14
A3-21. Recalculating field values using the Field Calculator A-15
A3-22. Creating a new area-weighted matrix A-15
A4-1. CCP_QT menu A-16
A4-2. Query Tool flow diagram A-17
A4-3. Query Input window A-18
A4-4. Query Output window A-18
A5-1. Single Species Query—Query Input window A-19
A5-2. Single Species Query—Query Output window A-20
A5-3. Single Species Query output products—Theme and Report A-21
A5-4. Single Species Query output products—Table and Chart A-21
A5-5. Single Species Query output products—Layout A-22
A5-6. Multiple Species Query—Query Input window A-22
A5-7. Multiple Species Query—Query Output window A-23
A5-8. Multiple Species Query output products—View A-23

A5-9. Multiple Species Query output products—Habitat Characteristics table A-24
A5-10. Multiple Species Query output products—Itemized Potential Habitat Summary table A-24
A5-11. Advanced Query—Query Builder dialog A-25
A5-12. Advanced Query—Query Input window A-25
A5-13. Advanced Query—Query Output window A-26
A5-14. Advanced Query output products—Textual Report A-26
A5-15. Advanced Query output products—Theme and Table A-27
A6-1. Selecting elements from the layout A-28
A6-2. Exporting tables A-29
A6-3. ArcView's graphical user interface for View documents A-30
A6-4. Zoom In, Zoom Out, and Pan to Active Themes tools A-30
A6-5. Identify Tool A-30
A6-6. Label Tool A-31
A6-7. Measure and Draw Tools A-31
A6-8. Query Builder Button A-32
A6-9. Habitat areas with high potential for species occurrence A-32
A6-10. Areas selected by the Query Builder (selected areas in dark gray) A-33
A6-11. American Redstart Potential Species Occurrence theme overlaid with U.S. Geological Survey 1995 Breeding Passerine Bird Survey data queried for presence (AMRE > 0) of American Redstarts (selected points in green) A-34
A6-12. ArcView's Project window A-34
A7-1. Check box by CCP GIS (Comprehensive Conservation Plan Geographic Information System) Clipping Tool activates the tool A-35
A7-2. Use the Comprehensive Conservation Plan Geographic Information System Clipping Tool to create a clipping polygon A-36
A7-3. Dialog box used to designate output specifications of the clipping procedure A-36
A7-4. Extracted files drawn in the View window after the clipping procedure A-37
A7-5. Charts created when the example clipping procedure is completed A-38
A7-6. Summary chart for one of the clipped themes A-38
A7-7. Comparison chart for all clipped themes showing the floating-leaved aquatic bed and semi-permanently flooded emergent perennial classes A-39
A7-8. Summary table for one of the clipped themes A-39
A7-9. Comparison table for all clipped themes showing acreages for each class A-40
A7-10. Using a preexisting data theme to clip other data A-40
A7-11. Data extracted by using a preexisting data theme A-41
A8-1. Example of products created with the Comprehensive Conservation Plan Geographic Inormation System Edit Tool A-42
A8-2. Check box by CCP GIS (Comprehensive Conservation Plan Geographic Information System) Edit Tool activates the tool A-43
A8-3. CCP_ET menu options A-43
A8-4. Choose Edit Field window A-43
A8-5. Save Data Theme as: window A-44
A8-6. Identify results A-44
A8-7. Calculate Metrics For Entire Theme dialog window A-45
A8-8. A graphic display of core area A-45

A8-9. Identify results A-46
A8-10. A sample data land cover theme A-46
A8-11. Using the Query Builder to select "Fallow Herbaceous Field" A-47
A8-12. Selected fallow herbaceous fields are in yellow A-47
A8-13. The CCP GIS (Comprehensive Conservation Plan Geographic Information System) Edit Tool Convert Multiple Polygons to New Class dialog window A-48
A8-14. Output theme created by using the Convert Multiple Polygons to New Class menu A-48
A8-15. Converting individual polygons to a New Class dialog window A-49
A8-16. Calculate metrics for individual polygon A-49
A8-17. Individual polygon metrics results A-50
A8-18. Dissolving similar boundaries A-50
A8-19. Comprehensive Conservation Plan Geographic Information System Edit Tool "Save Edits?" window A-50
A8-20. ArcView's Drawing and Editing Tools A-51
A8-21. Adding a new feature to a theme A-51
A8-22. Subtract Features menu option A-52
A8-23. Splitting a polygon A-52
A8-24. Editing vertices A-53
A8-25. Data theme attribute table A-54
A8-26. Summary Table Definition dialog box A-54
A8-27. Summary table A-54
B1-1. Query Report Part 1 ..... B-1
B1-2. Area-weighted Average Potential Species Occurrence (PSO) Score B-2
B1-3. Query Report Part 2 ..... B-3
B1-4. Potential Species Occurrence products B-3
B1-5. Potential Species Occurence layout B-4
B1-6. Potential Species Richness products B-5
B1-7. Selected habitat products B-5

Tables

A2-1. Sample data included in the sample_data directory A-3
A4-1. Query Tool product descriptions A-18

Geographic Information System Tools for Conservation Planning: User's Manual

Timothy J. Fox, Jason J. Rohweder, Kevin P. Kenow,
Carl E. Korschgen, and Henry C. DeHaan

Abstract

Public and private land managers desire better ways to incorporate landscape, species, and habitat relations into their conservation planning processes. We present three tools, developed for the Environmental Systems Research Institute's ArcView 3.x platform, applicable to many types of wildlife conservation management and planning efforts. These tools provide managers and planners with the ability to rapidly assess landscape attributes and link these attributes with species-habitat information. To use the tools, the user provides a detailed land cover spatial database and develops a matrix to identify species-habitat relations for the landscape of interest. The tools are applicable to any taxa or suite of taxa for which the required data are available. The user also has the ability to interactively make polygon-specific changes to the landscape and re-examine species-habitat relations. The development of these tools has given resource managers the means to evaluate the merits of proposed landscape management scenarios and to choose the scenario that best fits the goals of the managed area.

Introduction

Public and private land managers desire better ways to incorporate landscape, species, and habitat relationships into the conservation planning process. For example, the U.S. Congress mandated long-term planning efforts for the National Wildlife Refuge System by way of the Refuge Improvement Act of 1997 (P.L. 105-57, October 8, 1997). The National Park Service's Organic Act of 1916 (16 U.S.C. 1) and the National Forest Management Act of 1976 (16 U.S.C. §§ 1600-1614, August 17, 1974, as amended 1990) also require comprehensive planning processes in the selection and management of public lands. On private lands such interactive tools allow land managers to evaluate outcomes from different management scenarios.

In response to this need, the U.S. Geological Survey (USGS) Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin, used decision support concepts to identify and assess conservation issues relating to the management and planning needs of resource managers (Korschgen et al. in press). Decision support systems provide a process for organizing existing geographical, physical, and biological data for better management of natural resources. Decision support tools developed in a geographic information system (GIS) framework allow managers and planners to rapidly assess landscape attributes and link these attributes with species-habitat information. We describe three types of Comprehensive Conservation Planning GIS Tools (CCP GIS Tools) developed for use in resource planning: A Query Tool for examining areas for potential habitat, potential species occurrences, and potential species richness; A Clipping Tool for selecting important data themes and viewing summary statistics for a given area; and an Edit Tool for altering land cover themes of an area to create depictions of future landscapes.

ArcView GIS Platform

Environmental Systems Research Institute's (ESRI) ArcView 3.x GIS was selected as the development platform for our CCP GIS Tools because of its powerful analytical capabilities, easily customized interface, overall user-friendliness, and widespread availability. It integrates data from many sources and manages them by using various document windows (e.g., view, table, and layout). ArcView also provides the ability to exchange data with a variety of other software products (e.g., Microsoft Excel, Microsoft PowerPoint, and Microsoft Word). The minimum system requirements include a personal computer with Pentium processor, 32 MB random access memory (RAM), Microsoft Windows 95/98/2000/NT/XP, 32 MB hard drive space, and ESRI's ArcView 3.x. Users must have a basic knowledge of computers and ESRI's ArcView program.

The CCP GIS Tools were developed using ESRI Avenue macro language and can be used with any ArcView version 3.x. Output from the tools can be further enhanced by using ArcView's GIS tools and by incorporating user data. This software will not work in ArcView version 8.x. The CCP GIS Query Tool (Query Tool; *ccp.avx*), CCP GIS Clipping Tool (Clipping Tool; *ccpclp.avx*), and CCP GIS Edit Tool (Edit Tool; *ccpet.avx*) extensions are distributed free as part of the installation package for the CCP GIS Tools CD-ROM available from the Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin. A User's Manual for the three ESRI ArcView 3.x-based tools is provided (Appendix A) as well as some additional product descriptions (Appendix B). Interested users may also download copies of the software and User's Manual at www.umesc.usgs.gov/management/dss/gis_tools_for_conservation_planning.html.

CCP GIS Query Tool

The CCP GIS Query Tool (Query Tool) is an ArcView GIS extension. The Query Tool uses a wildlife species-habitat matrix that is developed specifically for an area of interest. A matrix may be prepared regionally or for a specific area, but it is up to the user to provide this information as it is not included with the software. The user may base the matrix on the entire range of wildlife species, on regional conservation priority species, or on an area-specific prioritization scheme. A recent land cover spatial database usually serves as the basis for land cover community descriptions used in the matrix. Habitat potential for each land cover type is ranked on a simple scoring scheme (e.g., 0 = no potential, 1 = low, 2 = medium, 3 = high) for each species. Scoring is based on expert opinions of staff with knowledge of species-habitat relations for the area of interest. For public lands, we encourage regional or network oversight to ensure consistency among areas while providing flexibility to meet individual differences in habitat values among areas with respect to individual species ranges.

The level of detail provided by the available spatial land cover limits the application of the Query Tool. Land cover themes are general in nature and typically do not provide information concerning the specific-habitat requirements of animal species (e.g., appropriate visual obstruction, vegetation height, litter depth, floristic composition). Consequently, some assumptions or generalizations about how well vegetation types meet specific needs of each species are required.

The Query Tool allows the user to choose from various matrices linked to specific land cover themes and was designed to quickly generate information about user-specified wildlife species or habitats for managed lands. Selections include potential species habitat, occurrence, and richness through the production of GIS themes, tables, charts, maps, and textual reports. Products generated with the Query Tool will help establish a technically sound, consensus-based management of specific areas or groups of areas.

CCP GIS Clipping Tool

The CCP GIS Clipping Tool (Clipping Tool) is an additional ArcView extension provided with the latest version of the CCP GIS Tools CD-ROM. The Clipping Tool allows the user to clip data themes and view summary statistics of the clipped region. What makes the Clipping Tool a powerful analytical tool is its ability to cut through multiple themes and compare those themes using a common attribute.

CCP GIS Edit Tool

The CCP GIS Edit Tool (Edit Tool) is used to alter the land cover themes of a refuge to create depictions of future landscapes. The Edit Tool allows the user to select specific polygons for changing to a new cover type. If the new designation for the polygon matches an adjacent polygon, the border between the two is dissolved automatically, and the area is recalculated for the resulting polygon. The Edit Tool also allows for calculation of several area metrics for individual polygons as well as the entire land cover theme.

Discussion

The Query Tool couples species-habitat information to spatial data in a decision support system format. The Edit Tool allows planners and managers to interactively make polygon specific changes to a base coverage to depict future landscapes under various management scenarios. The Clipping Tool allows the user to clip data themes and view summary statistics of the clipped region. Uses of these tools for conservation planning efforts are illustrated with examples in the User's Manual.

The conservation planning tools described here are applicable to many types of wildlife conservation management and planning efforts. The tools provide resource managers a means to evaluate the merits of alternative land management scenarios. Resource managers need only provide a land cover spatial database and develop a matrix to identify species-habitat relations for the landscape of interest to fully use the tools. Managers can focus their queries on either an array of habitats in a land area of interest, the needs of specific species, or both. The tools described here can be applied to any taxa or suite of taxa and any landscape, given that spatial data layers representing habitats are available and species-habitat relationships can be defined.

Acknowledgments

We thank P. Heglund, K. Lohman, L. Leake, L. Holland-Bartels, and G. Ardinger from U.S. Geological Survey and Sean Fields, Ken Rice, and Nick Palaia of the U.S. Fish and Wildlife Service for their thoughtful comments on various versions of this manuscript. Special thanks go to the many U.S. Fish and Wildlife Service refuge biologists who provided their ideas and concerns throughout the development of this product. Funding for this work was provided by the U.S. Geological Survey.

Reference

Korschgen, C. E., M. G. Knutson, T. J. Fox, L. E. Holland-Bartels, H. C. DeHaan, C. H. Theiling, J. J. Rohweder, K. P. Kenow, L. E. Leake, and T. Will. *In Press*. Natural resource assessment and decision support tools for bird conservation planning. Proceedings of the Third International Partners in Flight Conference: A workshop on bird conservation and implementation (C. J. Ralph, editor). Partners in Flight and the U.S. Forest Service, Asilomar, California, USA.

Appendix A: User's Manual

Section 1: General Information

System Requirements

The minimum system requirements include a personal computer with Pentium processor, 32 MB random access memory, Microsoft Windows 95/98/2000/NT/XP, 32 MB hard drive space, and Environmental Systems Research Institute's (ESRI's) ArcView 3.x. Users must have a basic knowledge of computers and ESRI's ArcView program. **This software will not work in ArcView version 8.x.**

ArcView GIS Platform

ESRI's ArcView 3.x Geographic Information Systems (GIS) was selected as the development platform for our Comprehensive Conservation Planning GIS Tools (CCP GIS Tools) because of its powerful analytical capabilities, easily customized interface, overall user-friendliness, and widespread availability. It integrates data from many sources and manages them by using various document windows (e.g., view, table, and layout). ArcView also provides the ability to exchange data with a variety of other software products (e.g., Microsoft Excel, Microsoft PowerPoint, and Microsoft Word).

The CCP GIS Tools were developed using ESRI Avenue macro language and can be used with any ArcView version 3.x. Output from the tools can be further enhanced by using ArcView's GIS tools and by incorporating user data. The CCP GIS Query Tool (Query Tool; *ccp.avx*), CCP GIS Clipping Tool (Clipping Tool; *ccpclp.avx*), and CCP GIS Edit Tool (Edit Tool; *ccpet.avx*) extensions are distributed as part of the installation package for the CCP GIS Tools CD-ROM available from the U.S. Geological Survey, Upper Midwest Environmental Sciences Center, La Crosse, Wisconsin. Interested users may also download copies of the software and user's manual at www.umesc.usgs.gov/management/dss/gis_tools_for_conservation_planning.html.

User's Manual (Hard Copy/Digital)

This manual was developed to assist you in using the CCP GIS Tools. You should have a basic knowledge of computers and ESRI's ArcView GIS program. The manual is similar in structure to other software user's manuals available today. Throughout the manual, certain conventions have been applied. Field names are in ***bold and italics***, file names are in *italics*, and features that are to be selected by the user are in **bold**. Section 1 of the manual provides information (e.g., system requirements) required before installing the tools, Section 2 goes through the tool installation process, Section 3 reviews the data inputs and matrix wizard for the Query Tool, Section 4 provides a discussion on the Query Tool structure, Section 5 walks the user through several example queries, Section 6 discusses several advanced topics including using ArcView tools to improve query results, Section 7 describes the CCP GIS Clipping Tool, and Section 8 describes the CCP GIS Edit Tool.

A digital copy of this manual is also available in PDF format in the *user_manual directory* on the CD-ROM and is readable by Adobe Acrobat Reader. This digital version has hypertext that allows the user to navigate to the sections of the manual.

ArcView's online help is also available to answer questions about the ArcView GIS and its analytical tools.

Technical Support

This user's manual and ArcView's online help should address the majority of your questions. For additional help, visit our Web site at www.umesc.usgs.gov/management/dss/gis_tools_for_conservation_planning.html for important updates and downloads or contact the following:

U.S. Geological Survey
Upper Midwest Environmental Sciences Center
Geospatial Sciences and Decision Support Laboratory
2630 Fanta Reed Road
La Crosse, Wisconsin 54603
Telephone: (608) 783-6451

Section 2: Getting Started

Installing the CCP GIS Tools from the CD-ROM

1. Insert the CCP GIS Tools CD-ROM from the back cover of this manual into the computer's CD-ROM drive.
2. Open Windows Explorer on the computer by clicking the **Start** button, navigate to **Programs -> Accessories -> Windows Explorer**.
3. In Windows Explorer, double-click the **CD-ROM drive** on the computer.
4. Copy the files (*ccp.avx*, *ccpclp.avx*, and *ccpet.avx)* to the directory where the ArcView software is installed (fig. A2-1). This typically is *C:\esri\AV_GIS30\ARCVIEW\EXT32* on the computer's hard drive. If the ArcView software is installed in a different directory (e.g., *D:*\), you should copy the files listed previously to the directory *D:\esri\AV_GIS30\ARCVIEW\EXT32* instead.
5. After these files are copied in this directory, you can access the customized extensions in ArcView created for the conservation planning process.

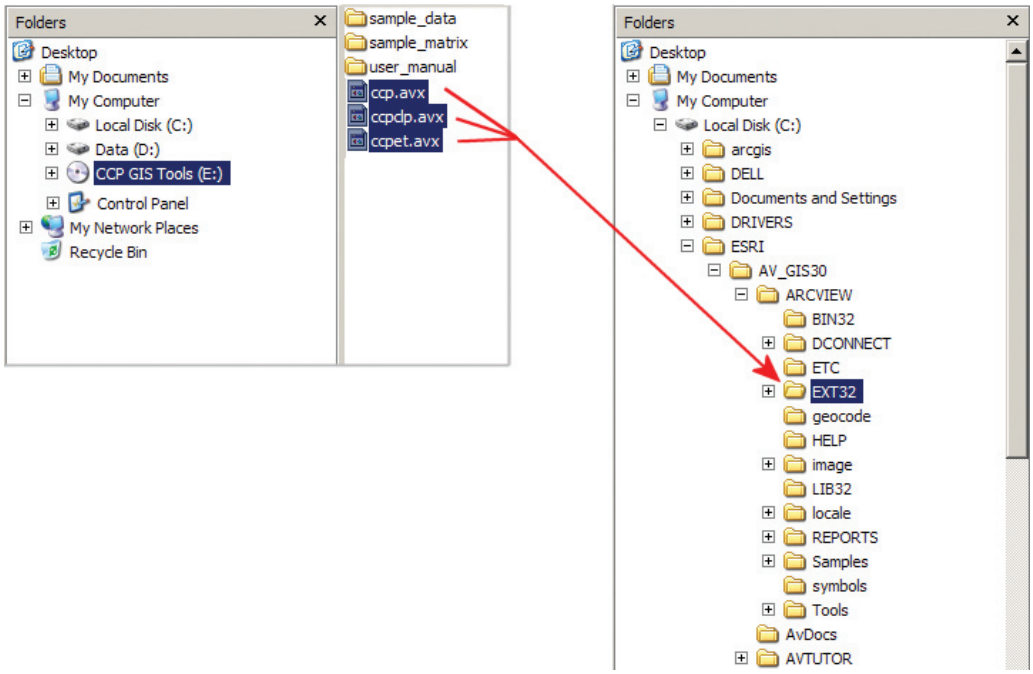


Figure A2-1. Copying the Comprehensive Conservation Planning Geographic Information System Tools extensions

Copying Sample Data/Matrix from the CD-ROM

1. Several sample data themes have been included on the CCP GIS Tools CD-ROM in the directory *CD:\sample_data*. Copy this entire directory from the CD-ROM to the computer's hard drive (e.g., *D:\CCP*). Table A2.1 lists and describes the data themes included in the *sample_data* directory.

   The CCP GIS Query Tool generates products (reports, maps, charts, and tables) based on information concerning species-specific habitat potential that you provide. Products generated reflect the quality and integrity of the information used. The user needs to evaluate the usefulness of rankings made by the mapping tool.
2. A sample habitat matrix (*Sample Refuge Matrix.txt*) is also included on the CCP GIS Tools CD-ROM in the directory *CD:\sample_matrix*. Copy this entire directory from the CD-ROM to the computer's hard drive (e.g., *D:\CCP*).
3. Files in the *sample_data* and *sample_matrix* directories copied from the CD-ROM will be in read-only format. To use these sample files with the CCP GIS Tools, select all of the files in each directory using **Windows Explorer** (accessing Windows

Table A2-1. Sample data included within the sample_data directory

Sample data theme	Data theme description
Cro_lcu.shp	Sample land cover theme from Crab Orchard National Wildlife Refuge. This theme is used in Sections 3, 4, and 5.
Cro_reclass.shp	A small portion of the theme cro_lcu.shp to be used in the advanced topic of Section 3.
Amre_hab.shp	Sample theme depicting American Redstart Potential habitat is used in Section 6.
Bird_pts.shp	Sample theme depicting U.S. Geological Survey 1995 Breeding Passerine Bird Survey data is used in Section 6.
Lcu75.shp	Sample 1975 Land Cover theme is used in Section 7.
Lcu89.shp	Sample 1989 Land Cover theme is used in Section 7.
Lcu91.shp	Sample 1991 Land Cover theme is used in Section 7.
Lcu94.shp	Sample 1994 Land Cover theme is used in Section 7.
Lcu98.shp	Sample 1998 Land Cover theme is used in Section 7.
Aqua89.shp	Sample 1989 Aquatic Areas theme is used in Section 7.
Cro_edit.shp	A small portion of the theme cro_lcu.shp is used to demonstrate the utility of the CCP GIS Edit Tool (Section 8).

Explorer is described previously in this section). When the files are selected, click the **Properties** button or **right button-click** and select the **Properties** option. When the dialog window appears, uncheck the **Read-only** check box and click **OK**. The files now have read/write access and are ready to be used with the tools.

Downloading and Installing the CCP GIS Tools and Data from the Internet

1. Open a Web browser (i.e., Internet Explorer or Netscape Navigator) and navigate to the Web site at www.umesc.usgs.gov/management/dss/gis_tools_for_conservation_planning.html.
2. Scroll to the bottom of the page and click the hyperlink labeled **CCP GIS Tools Complete Package**. This link contains all of the tools, data, and user's manual compressed into one file (the links below this allow the user to select the tools, sample data, user's manual, and sample matrix separately).
3. A window will open prompting you to designate a location to save the file *ccp_gis_tools.exe* on the user's hard drive (i.e., *D:\CCP*), press **save** and **designate a directory**.
4. Within the designated directory, **double-click** on the file *ccp_gis_tools.exe* to uncompress the contents to the hard drive.
5. Copy the uncompressed files (*ccp.avx*, *ccpclp.avx*, and *ccpet.avx)* to the directory where the ArcView software is installed. This typically is *C:\esri\AV_GIS30\ARCVIEW\EXT32* on the computer's hard drive. If the ArcView software is installed in a different directory (e.g., *D:*), you need to copy the previously listed files to the directory *D:\esri\AV_GIS30\ARCVIEW\EXT32* instead.
6. After these files are copied in this directory, you can access the customized extensions in ArcView created for the conservation planning process.
7. The sample data files are located in the uncompressed directory *sample_data*. Table A2.1 lists and describes the data themes included in the *sample_data* directory.
8. The sample habitat matrix (*Sample Refuge Matrix.txt*) is located in the uncompressed directory *sample_matrix*.

Starting ArcView

1. Click the Windows **Start** button.
2. From the Start menu, navigate to **Programs -> ESRI -> ArcView GIS Version 3.x ->** and select **ArcView GIS Version 3.x** to bring up ArcView (fig. A2-2).

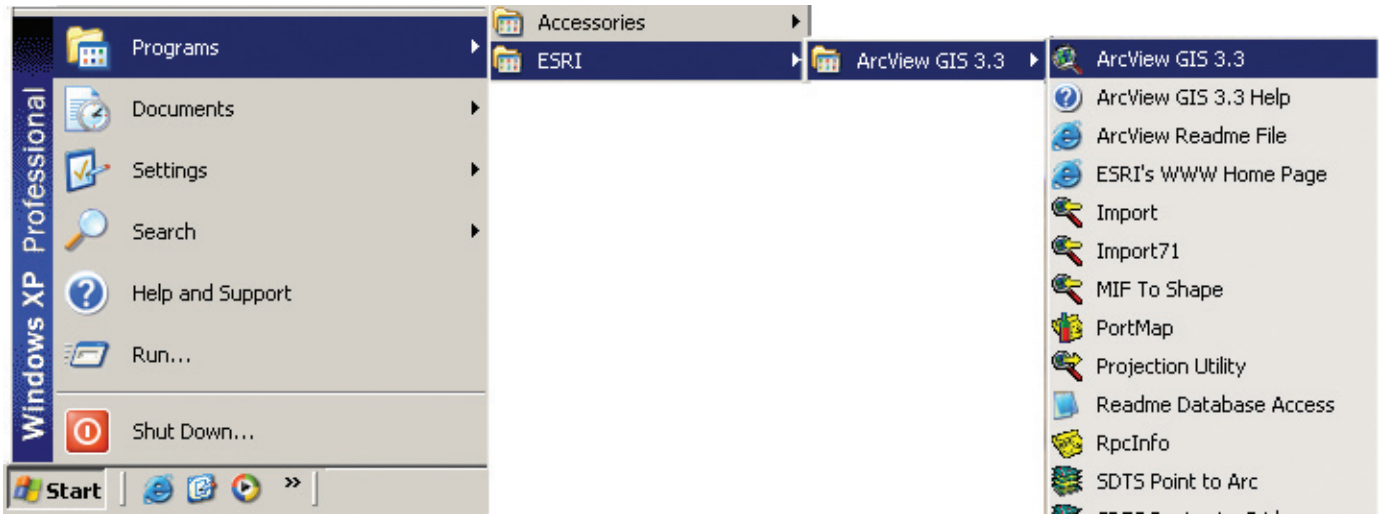


Figure A2-2. Starting ArcView

Activating the Tool

The tool is activated as an extension in ArcView. Extensions are used to share program customizations, GIS data, and any other type of information supported by ArcView.

1. After starting ArcView, cancel out of the Welcome to ArcView GIS window, if it appears.
2. Select **Extensions** from the **File** menu (fig. A2-3).

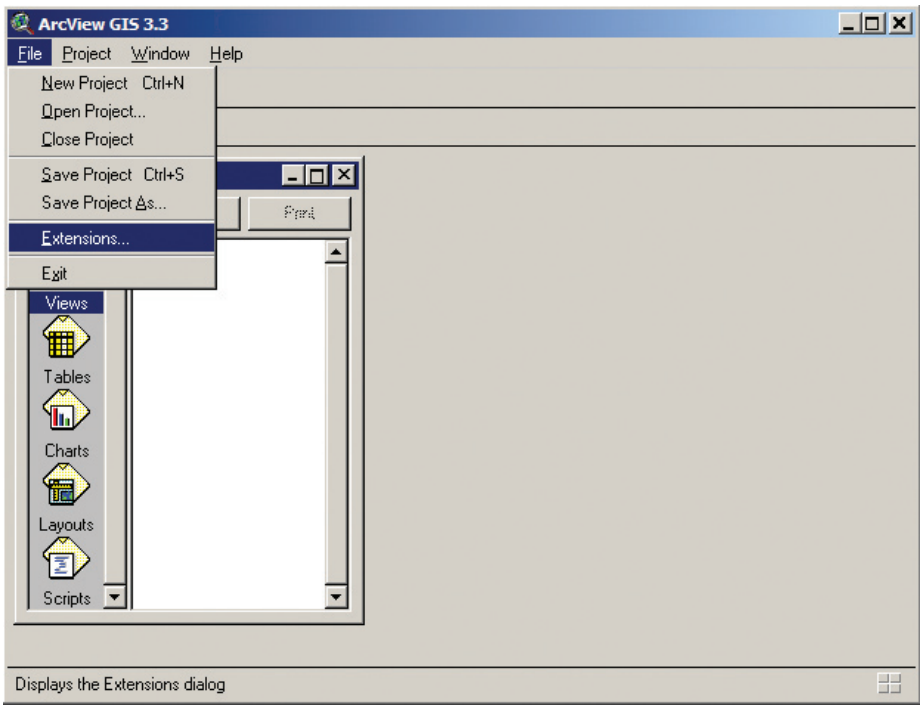


Figure A2-3. Opening Extensions dialog window

3. Scroll down through the list of available extensions until **CCP GIS Query Tool** is displayed.
4. Click the box next to it so that a check mark appears and then click the **OK** button (fig. A2-4). The extension now loads.
5. Repeat this for the **CCP GIS Clipping Tool** and the **CCP GIS Edit Tool** extensions.
6. The CCP GIS Tools are loaded and will be visible when a View window is open and active.

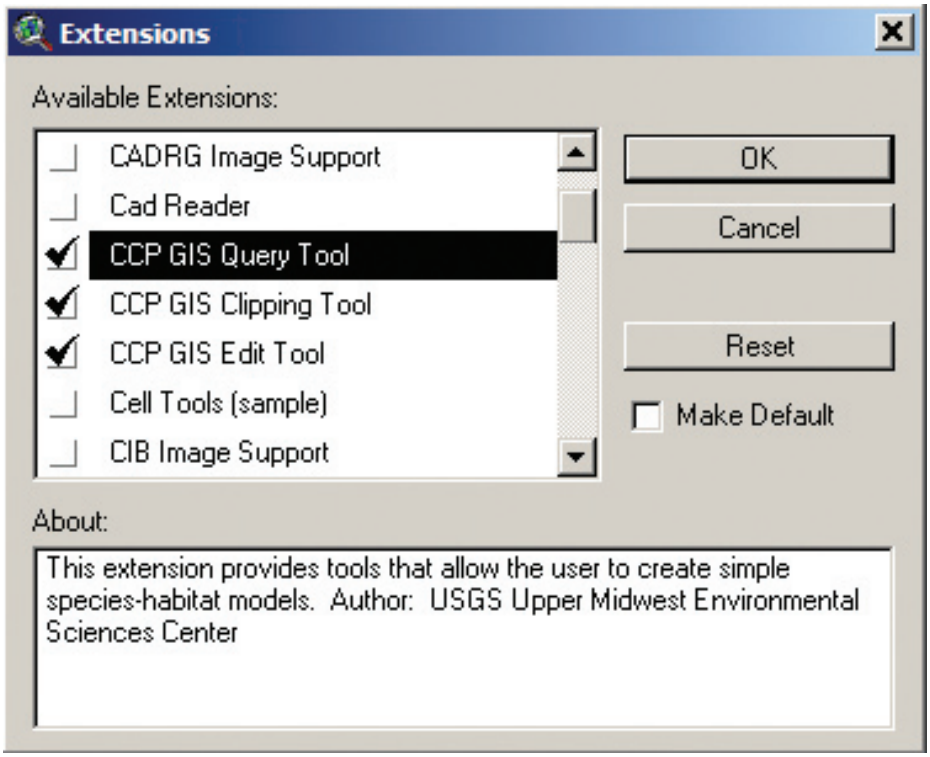


Figure A2-4. Activating Comprehensive Conservation Planning Geographic Information System Tools extensions

7. In the Project window, select the **Views** icon and click the **New** button (fig. A2-5).

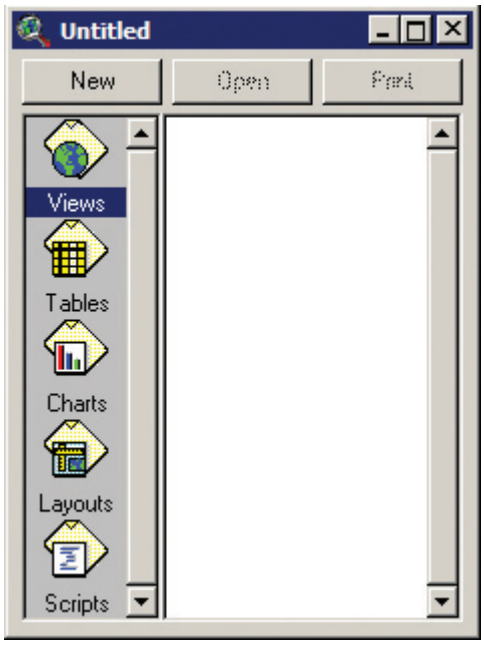


Figure A2-5. ArcView's Project window

8. A new View window opens and the **CCP_QT** and **CCP_ET** menus appear in the menu bar. Also, the CCP GIS Clipping Tool (Clip with theme) button, CCP GIS Clipping Tool, and CCP GIS Edit Tool appear.

Section 3: Data

GIS Data Themes

The Query Tool uses a land cover theme as the base theme for all queries. The land cover theme used by the Query Tool should be ecologically relevant. The more detailed the land cover information provided by the land cover classification system and spatial resolution, the more useful the Query Tool will be for evaluating land cover potential. Land cover themes are general in nature and typically do not provide information concerning the specific habitat requirements of animal species (e.g., appropriate visual obstruction, vegetation height, litter depth, floristic composition). Consequently, some assumptions or generalizations about how well vegetation types meet specific needs of each species are needed.

The Query Tool requires the land cover theme to provide a unique identifier to use in the tool's classifications. For instance, if a data theme has several fields, you need to choose the one that is most useful in your management context. In fig. A3-1, the field ***Map_desc*** from the theme *cro_lcu.shp* was used because it was the most descriptive and detailed of the fields available. This will be the field that links the land cover layer to the matrix.

Note: It is important that all of the polygons in the land cover theme have a value in its database for this field, otherwise the Query Tool will not function properly!

Map_att	Map_desc	Hydro_src	Form_code	Class	Group
HBF	Mixed Hardwood Bottomland F	N/A	I.B.2.N.d. / I.B.2.N.e.	Forest	Cold-deciduous forest
HUF	Mixed Hardwood Upland Fores	N/A	I.B.2.N.a.	Forest	Cold-deciduous forest
HUF	Mixed Hardwood Upland Fores	N/A	I.B.2.N.a.	Forest	Cold-deciduous forest
HUF	Mixed Hardwood Upland Fores	N/A	I.B.2.N.a.	Forest	Cold-deciduous forest
FFH-F	Fallow Herbaceous Field	N/A	V.A.5.N.c.	Herbaceous	Temperate or subpolar grasslar
HUF	Mixed Hardwood Upland Fores	N/A	I.B.2.N.a.	Forest	Cold-deciduous forest
AFH	Agricultural Field	N/A	V.D.2.C.a. / V.D.2.C.b.	Herbaceous	Temperate or subpolar annual
AMH-L	Aquatic Herbaceous Marsh	Reservoir Lake	V.C.2.N.a.	Herbaceous	Temperate or subpolar hydrome
HUF	Mixed Hardwood Upland Fores	N/A	I.B.2.N.a.	Forest	Cold-deciduous forest
OWR-I	Open Water	Impounded Pond	Open Water	Open Water	Open Water
FFH-G	Fallow Herbaceous Field	N/A	V.A.5.N.c.	Herbaceous	Temperate or subpolar grasslar
HBF	Mixed Hardwood Bottomland F	N/A	I.B.2.N.d. / I.B.2.N.e.	Forest	Cold-deciduous forest
HBF	Mixed Hardwood Bottomland F	N/A	I.B.2.N.d. / I.B.2.N.e.	Forest	Cold-deciduous forest
PHF	Pine Plantation - Mixed Hardwo	N/A	I.C.3.N.a.	Forest	Mixed needle-leaved evergree

Figure A3-1. Sample of a Comprehensive Conservation Plan land cover theme attribute table

Matrix Tables

Besides having a land cover theme for the Query Tool to function, you also need a species-land cover matrix to associate the land cover classifications to selected species. Typically, development of the matrix is based on opinion of staff who are experts in wildlife species-land cover associations. Regional oversight is encouraged to ensure consistency among planning areas (e.g. refuges, parks) while providing flexibility to meet individual area differences in land cover values with respect to species ranges.

Several matrices may be linked to each land cover theme. For instance, an agency may want to create a separate matrix to score that only applies during the breeding season, etc.

After you select a species, the Query Tool searches and selects the species in the matrix table. Then, using the matrix table, it examines the land cover data for the selected species. With this information, the Query Tool then connects to the GIS land cover data and generates the selected theme, table, chart, or map products. For example, if a potential species occurrence map was to be generated for the Cerulean Warbler, the Query Tool first opens the matrix and selects the **Cerulean Warbler** row of information. It then examines the land cover rankings in that row. Finally, it links this information to the GIS land cover theme table and generates a graphical depiction of the potential species occurrence rankings in the land cover area (fig. A3-2).

A template (fig. A3-3) of the recommended format for the species-land cover matrix was developed in Microsoft Excel. The species included in the matrix is at your discretion or that of regional planners and may be based on wildlife species of concern (e.g., Regional Conservation Priority Species). Additional information that you may wish to include can be added to the right of the species column as a new column (e.g., species abundance for your area, resource conservation priority, life stage, priority within your area, additional nomenclature, etc). The remaining columns added to the spreadsheet should contain each of

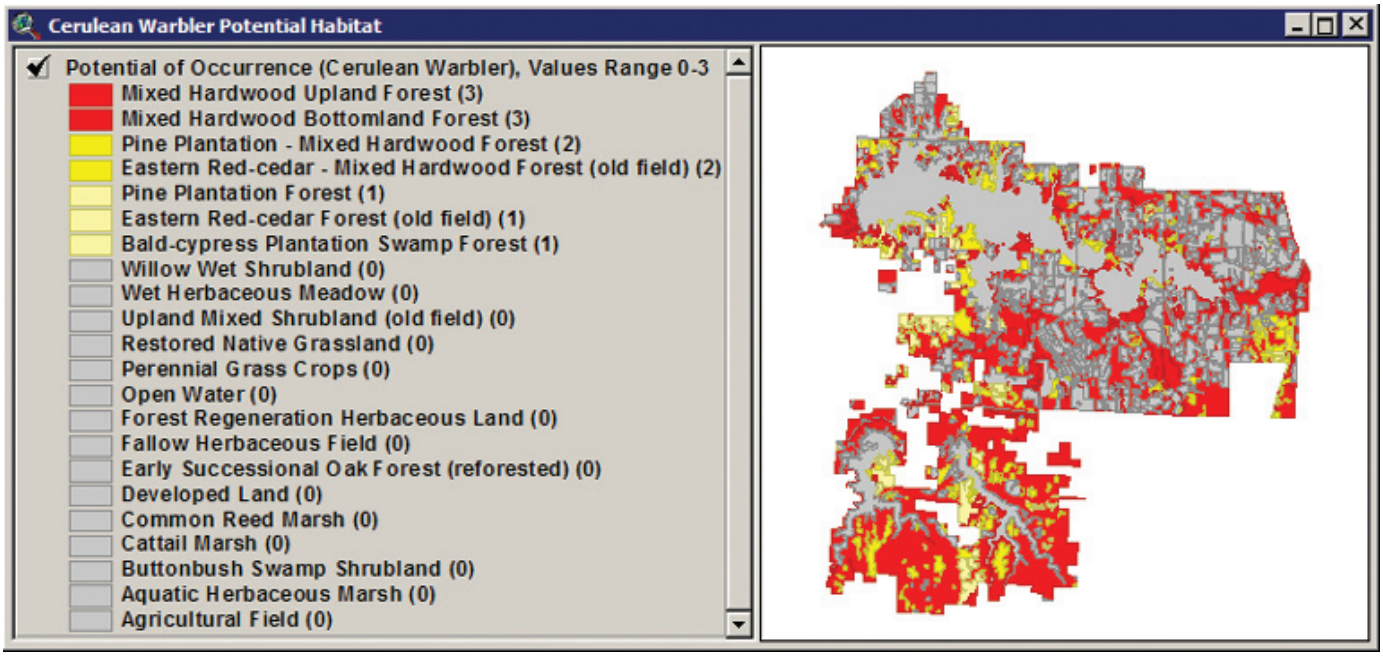


Figure A3-2. Potential Species Occurrence geographic information system theme for Cerulean Warblers

	A	B	C	D	E	F
1	Common Name	Refuge Abundance	Mixed Hardwood Upland Forest	Fallow Herbaceous Field	Perennial Grass Crops	Cattail Marsh
2	Double-crested Cormorant	Common	0	0	0	0
3	Canada Goose	Abundant	0	1	2	1
4	Wood Duck	Common	1	0	0	1
5	American Black Duck	Uncommon	0	1	0	2
6	Mallard	Common	0	1	0	2
7	Blue-winged Teal	Common	0	1	0	2
8	Canvasback	Occasional	0	0	0	2
9	Bald Eagle	Uncommon	0	0	0	1
10	Red-shouldered Hawk	Occasional	2	1	1	1
11	American Woodcock	Uncommon	1	1	1	1
12	Black Tern	Rare	0	0	0	2
13	Loggerhead Shrike	Rare	0	1	1	0
14	Bell's Vireo	Uncommon	0	1	0	0
15	Sedge Wren	Rare	0	0	0	1
16	Wood Thrush	Common	3	0	0	0

Figure A3-3. A sample of a Comprehensive Conservation Plan matrix table created in Microsoft Excel

the possible "land cover" types from the land cover theme for the unique identifier field (i.e., ***Map_desc***). The most efficient way to add these is to cut-and-paste from ArcView's Legend Editor (fig. A3-4).

Note: It is important that all possible values from the unique identifier field in the land cover theme database are represented as individual fields in the matrix that you will link to the land cover theme, otherwise the Query Tool will not function properly!

Species habitat potential for each land cover type is ranked on a simple scoring scheme (e.g., 0 = no potential, 1 = low, 2 = medium, 3 = high) for each species. In fig. A3.3, cell D7, the species is mallard and the land cover type is fallow herbaceous field. The value of the cell is 1, which means that mallards use the land cover type fallow herbaceous field, although it represents poor habitat. Make sure each land cover column type is set to number and there are not any non-number values. Once the matrix is completed, save the spreadsheet as a *Tab-Delimited Text File* (*.txt*) in a directory on the hard drive where you intend to store the matrices.

Selecting the Directory Containing the Matrix Tables

Before you can use the Query Tool with the matrices, you must let the program know where you have stored them. Select **Matrix Directory** from the **CCP_QT** menu (fig. A3-5).

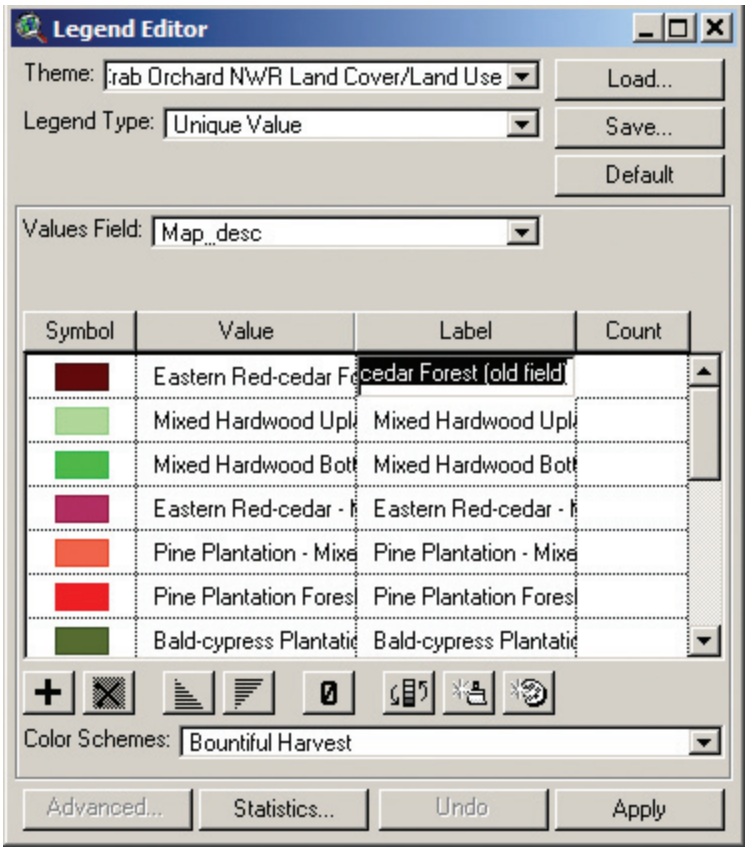


Figure A3-4. Copying from ArcView's Legend Editor

Figure A3-5. Select Matrix Directory menu option

In the window that is brought up, select the directory where the matrices are stored (fig. A3-6). A sample matrix, *Sample Refuge Matrix.txt*, is in the directory *sample_matrix* that you copied to the computer's hard drive in Section 2. If the program subsequently finds a matrix/matrices (**.txt*) there, you can use the **Matrix Wizard** to link the matrix to the land cover theme.

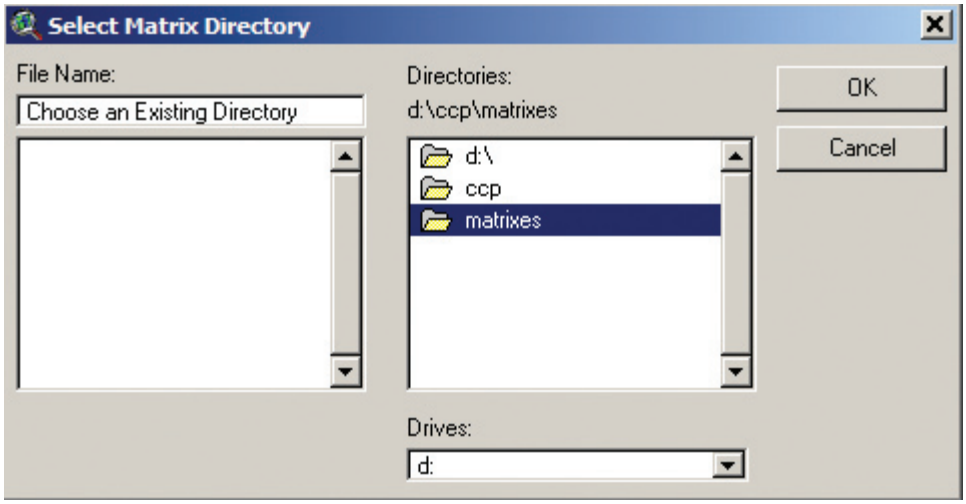


Figure A3-6. Select Matrix Directory dialog window

Linking Land Cover Themes and Matrix Tables

The Query Tool operates by linking the species-land cover matrix tables to GIS land cover theme data. This connection provides potential habitat information about a selected species or grouping of species.

To link the matrix to the land cover theme, a program option was created called the Matrix Wizard. First, you add a land cover theme to the ArcView Project View window using the Add Theme button. Add the land cover theme, *cro_lcu.shp,*

from the *sample_data* directory that you copied from the CD-ROM in Section 2. Once this theme is added to the View window, make it active by clicking its name in the **table of contents**. You know the theme is active because it appears raised above the other themes in the table of contents. Next, select **Properties** from the **View** menu. Once the dialog window opens, set ***Map Units: to meters***. Select the **Matrix Wizard** from the **CCP_QT** menu (fig. A3-7). The Matrix Wizard option will be grayed-out until you add a land cover theme to the view.

The first window initiated by the Matrix Wizard looks like fig. A3-8.

Figure A3-7. Matrix Wizard menu option

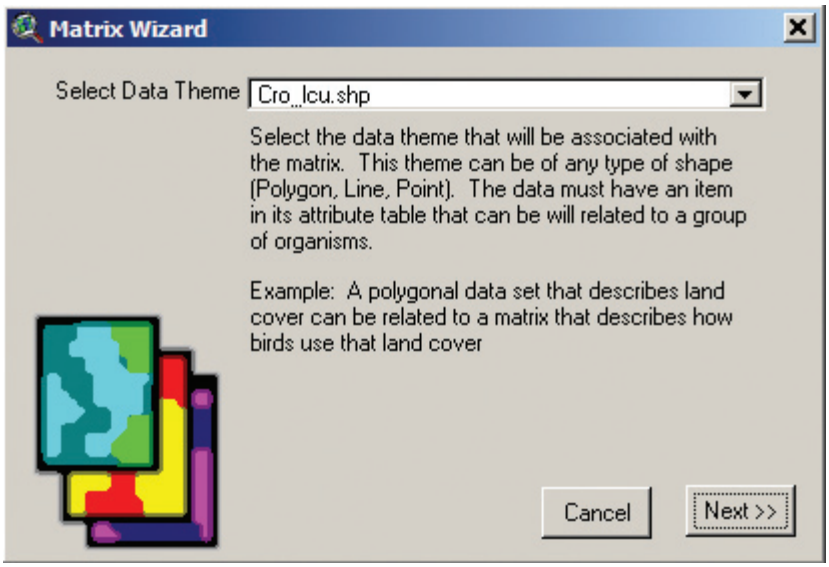


Figure A3-8. Matrix Wizard dialog window—Select Data Theme

Hint: If the text is scrambled and extends off the window or part of the text is missing from the dialog box, the computers fonts are set too large. To alleviate the scrambled text, click **Start -> Settings -> Control Panel** and select the **Display** icon. Next, click the **Settings** tab and click the **Advanced** button. Set the font size to ***Small Fonts***.

You will need to select the data theme to link with the matrix the user created previously (fig. A3-8). Once the user selects the **data theme**, click the **Next >>** button.

In this window, you will select the unique identifier (fig. A3-9). The values of this item in the land cover theme should occur in the matrix you created. These values will be used to link the land cover theme to the matrix. The theme used for this step needs to have read/write access permissions for this to work. To edit the theme, follow the directions in Section 2, Copying Sample Data/Matrix from the CD-ROM, step 2. When finished, click the **Next >>** button.

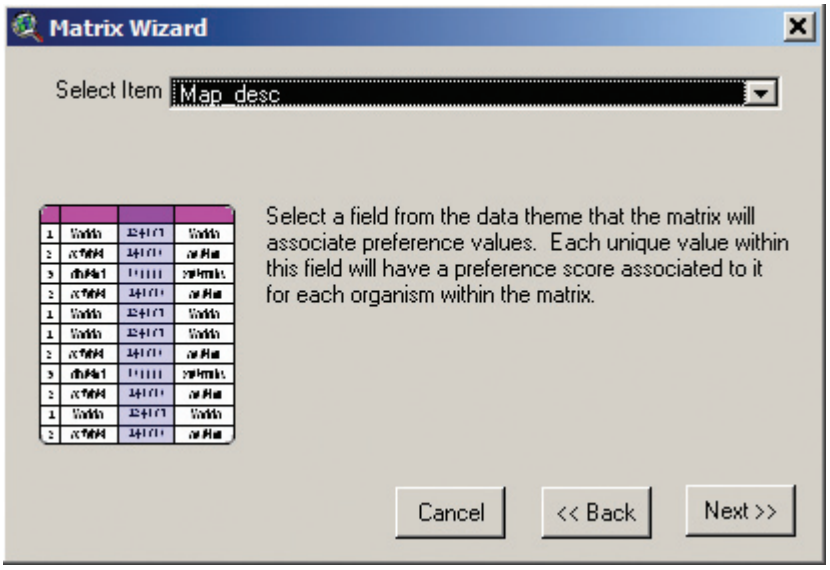


Figure A3-9. Matrix Wizard dialog window—Select Item

This window allows you to select the matrix to link with the land cover theme (fig. A3-10). The matrices displayed exist in the matrix directory you selected previously by choosing **Select Matrix Directory** from the **CCP_QT** menu.

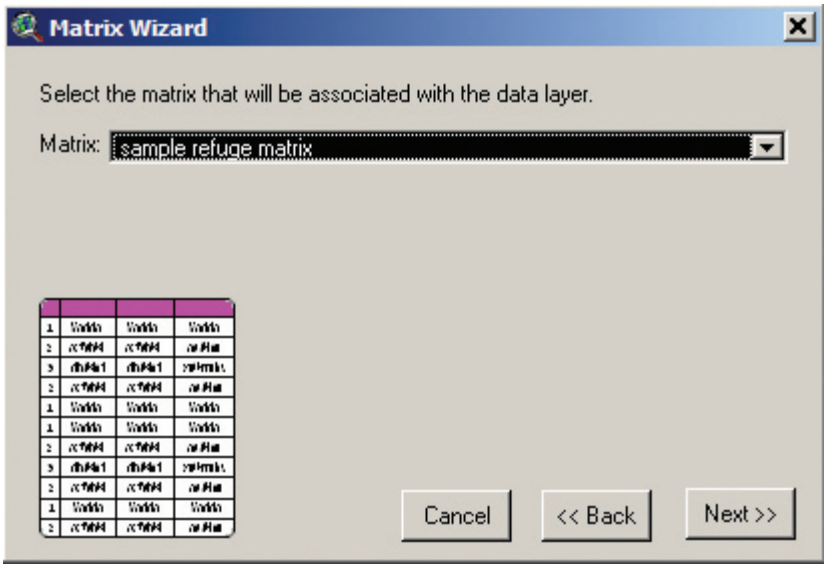


Figure A3-10. Matrix Wizard dialog window—Select Matrix

In this window, you will select the ***field(s)*** that identify and correspond to the species that will be used in the Query Tool (fig. A3-11). Typically, in this window, you select **all of the fields** EXCEPT the fields associated with land cover types (i.e., Mixed hardwood upland forest).

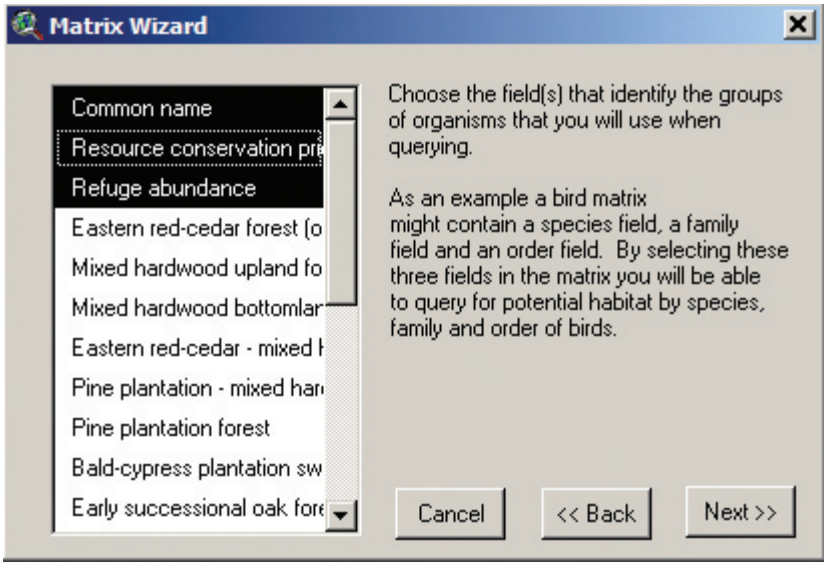


Figure A3-11. Matrix Wizard dialog window—Select Identification Fields

In this window, select the **one unique identifier** that links the land cover theme to the matrix (fig. A3-12). When finished, click the **Next >>** button.

This window actually allows you to create the link between the land cover theme and the matrix (fig. A3-13). The top part of the window shows all of the values for the unique identifier (***Map_desc***) and the bottom part of the window shows all of the land cover type values from the matrix the user created. By clicking the **Auto Match** button, the program looks for identical matches between the data theme and the matrix and automatically matches these identical pairs (this is why it is important to fill in the matrix with the exact values from the land cover theme). You can also select a value from the ***Data Theme Value List*** and a corresponding value from the ***Matrix Fields List*** and click the **Match** button to link the land cover theme and the matrix one-

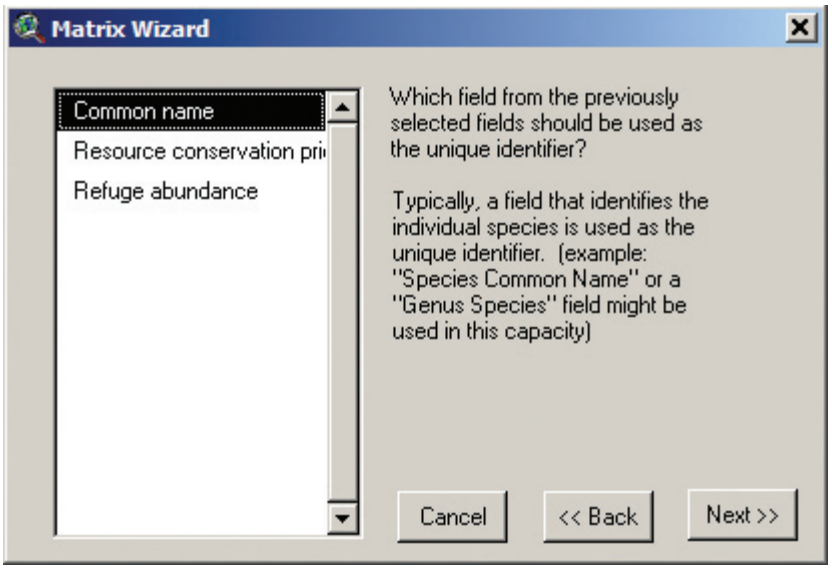


Figure A3-12. Matrix Wizard dialog window—Select Unique Identifier

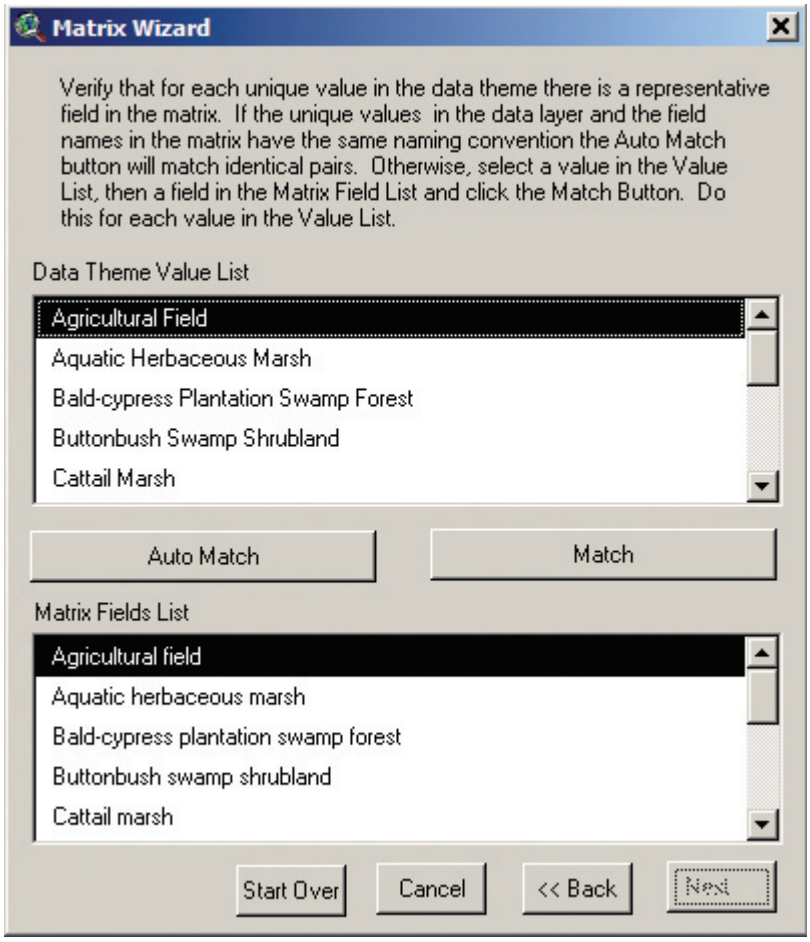


Figure A3-13. Matrix Wizard dialog window—Matrix/data Theme Linkage

by-one manually. If you make a mistake, just click the **Start Over** button and the links created in this window will be broken and you can start again. When you are finished, click the **Next >>** button.

When this window appears, click the **Finish** button and the matrix and land cover theme will be joined and added to the Query Tool (fig. A3-14).

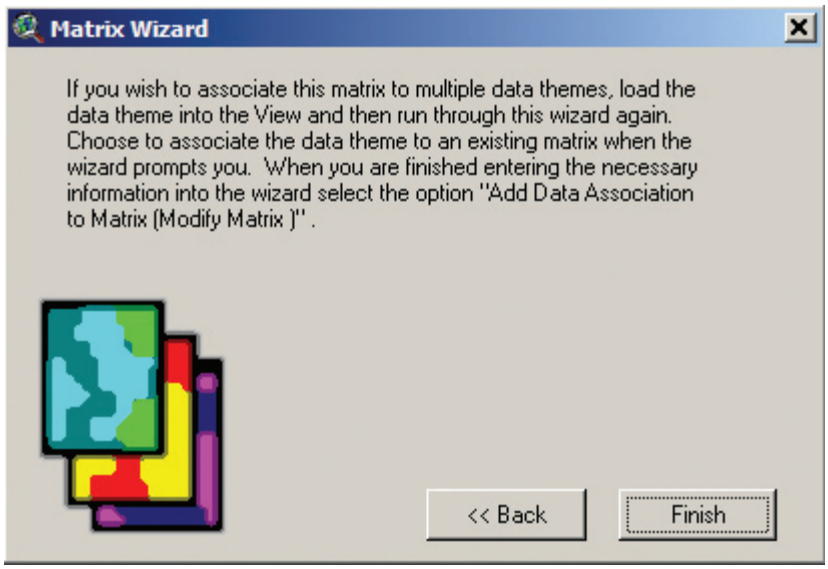


Figure A3-14. Matrix Wizard dialog window—Finish

If this window appears and there is a **Next >>** button instead of a Finish button, this means that there is already a data theme linked to the matrix used. Many matrices can be linked to a single data theme and many data themes can be linked to a single matrix (fig. A3-15). Select the **Next >>** button to advance to the last window.

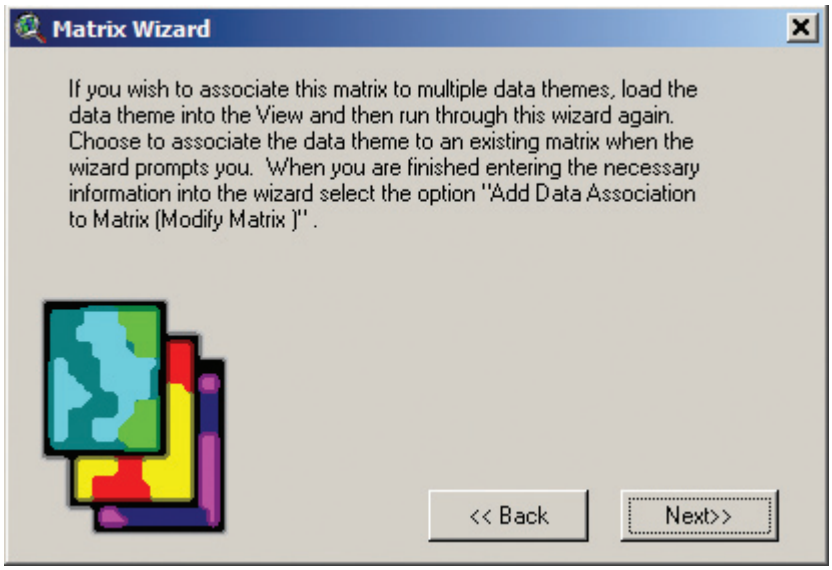


Figure A3-15. Matrix Wizard dialog window—Multiple Data Theme Association

This window allows you to append an additional land cover theme to a matrix that already has a land cover theme attached (fig. A3-16). You can either modify the matrix header (first option) or you can create a new matrix header (second option). If you decide to create a new matrix header, this will cause all other associations to other data themes to be lost; thus, we recommend you select the first option, **Add Data Association to Matrix**. Click the **OK** button to finish.

Removing Data Associations from Matrix

To remove the link between a land cover theme and a matrix that you created previously, select **Remove Data Association From Matrix** from the **CCP_QT** menu (fig. A3-17). You would do this if the values initially entered in the matrix were not correct. When the matrix/land cover theme data association is severed, you can update the matrix, and then use the Matrix Wizard to recreate the matrix/land cover theme data association (fig. A3-18).

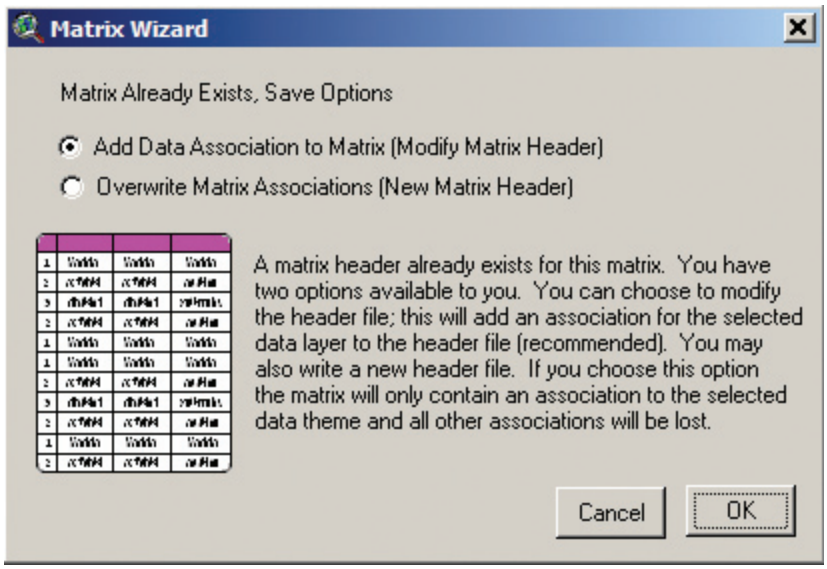


Figure A3-16. Matrix Wizard dialog window—Add Data Association to Matrix

Figure A3-17. Remove Data Association from Matrix menu option

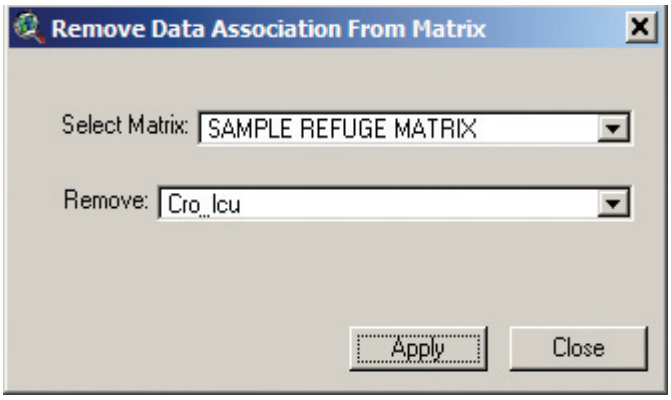


Figure A3-18. Remove Data Association from Matrix dialog window

Advanced Topic: Creating Area-weighted Land Cover Themes and Matrices

The user may want to modify the existing land cover theme to better fit the management of area sensitive species. Fig. A3-19 depicts how a sample portion of a land cover theme data table was converted from Perennial Grass Crops to three different area-weighted Map_desc classifications, ***Perennial Grass Crops < 25 Acres, Perennial Grass Crops >= 25 Acres and <= 50 Acres,*** and ***Perennial Grass Crops > 50 Acres***.

1. Add the theme *cro_reclass.shp* to the View window.
2. Make the theme active in the table of contents and click the **Open Theme Table** button .
3. Select **Start Editing** from the **Table** menu.
4. With the theme's table open, use the **Query Builder** button to select a **subset of Perennial Grass Crops polygons** (Query Builder is discussed in Section 6).
5. Use the **Query Builder** to select ***Perennial Grass Crops < 25 acres*** (fig. A3-20).
6. With the table in edit mode, click the ***Map_desc*** field so it is depressed.
7. Next, click the **Field Calculator** button and calculate the ***Map_desc*** field to be equal to ***"Perennial Grass Crops < 25 Acres"*** (fig. A3-21). Make sure you use double quotes (") at the beginning and ending of the new classification text.
8. Repeat steps 4–7 to select ***Perennial Grass Crops > 50 Acres*** and also ***Perennial Grass Crops >= 25 acres and <= 50 Acres*** (fig. A3-19).
9. Once these updates have been made to the attribute table, select **Stop Editing** from the **Table** menu and save the edits when prompted.

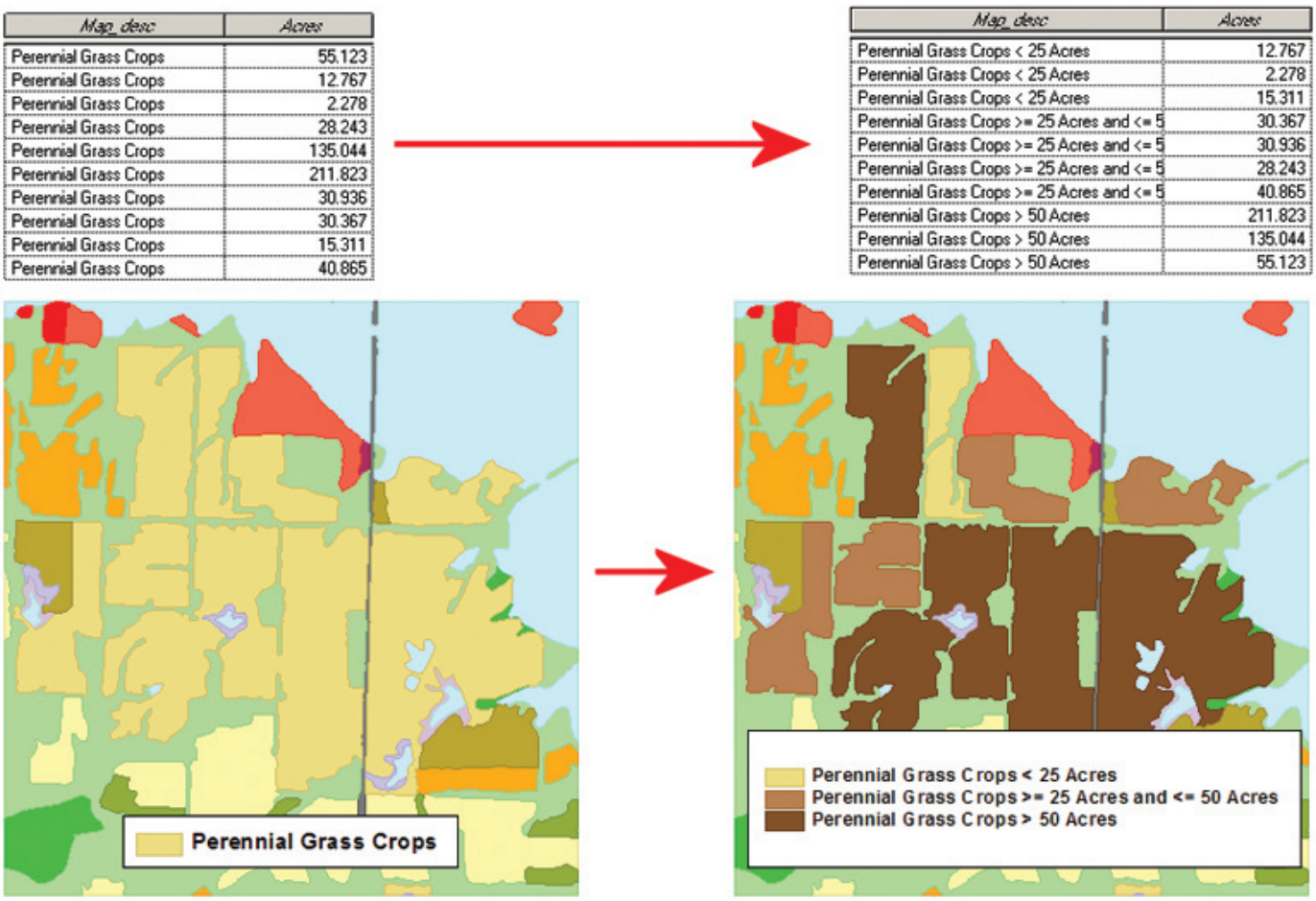


Figure A3-19. Reclassifying the Comprehensive Conservation Plan land cover theme

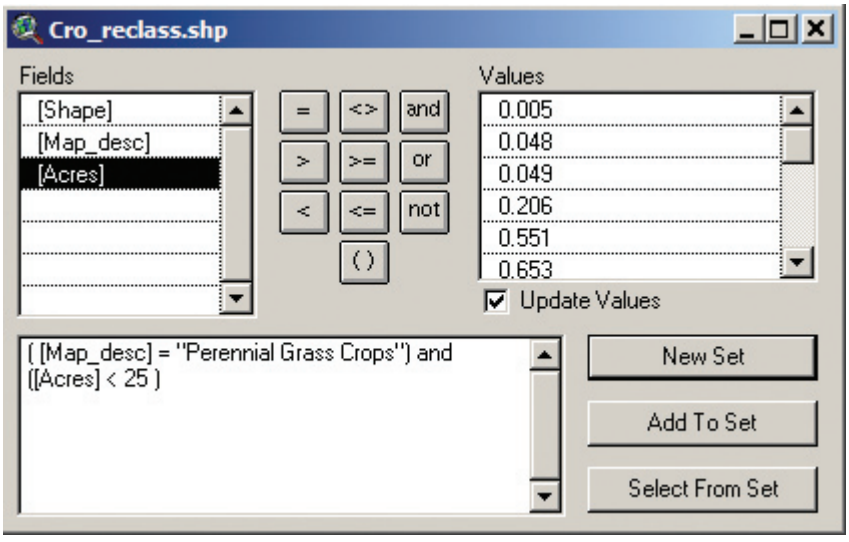
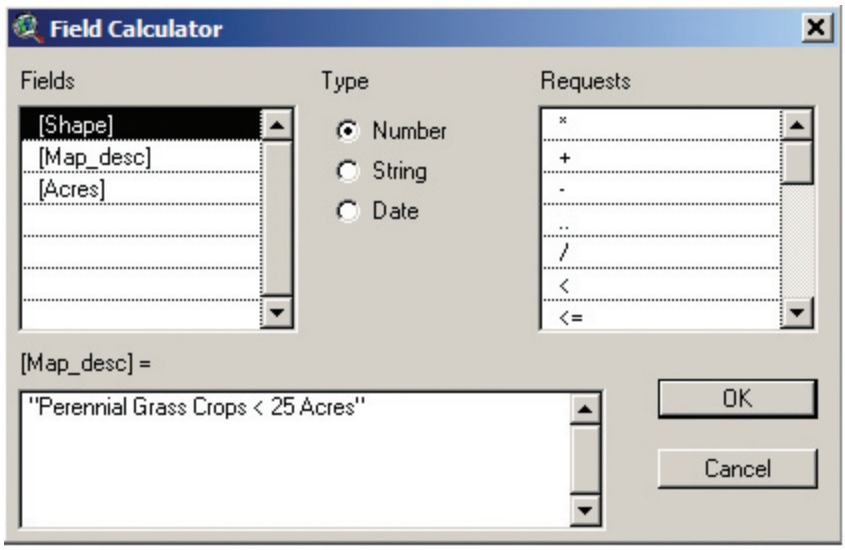


Figure A3-20. Creating a subset of perennial grass crops polygons

10. The new ***Map_desc*** classifications that you associate with the land cover theme need updating in the matrix.
11. Open *Sample Refuge Matrix.txt* from the directory *sample_matrix* that you copied from the CD-ROM in Section 2 in Microsoft Excel.
12. Delete the P***erennial Grass Crops*** field and create three new fields—***Perennial Grass Crops < 25 Acres***, ***Perennial Grass Crops >= 25 Acres and <= 50 Acres***, and ***Perennial Grass Crops > 50 Acres***.



Map_desc	Acres
Perennial Grass Crops	12.767
Perennial Grass Crops	2.278
Perennial Grass Crops	15.311
Agricultural Field	1.696
Agricultural Field	3.114
Agricultural Field	3.267
Agricultural Field	0.206
Agricultural Field	1.033
Agricultural Field	32.327
Agricultural Field	42.496
Agricultural Field	23.657

Map_desc	Acres
Perennial Grass Crops < 25 Acres	12.767
Perennial Grass Crops < 25 Acres	2.278
Perennial Grass Crops < 25 Acres	15.311
Agricultural Field	1.696
Agricultural Field	3.114
Agricultural Field	3.267
Agricultural Field	0.206
Agricultural Field	1.033
Agricultural Field	32.327
Agricultural Field	42.496
Agricultural Field	23.657

Figure A3-21. Recalculating field values using the Field Calculator

13. Under all three new columns, fill in each cell with **new Potential Species Occurrence values** (fig. A3-22).

	A	B	C	D	E	F
1	Scientific Name	Refuge Abundance	Mixed Hardwood Upland Forest	Perennial Grass Crops < 25 Acres	Perennial Grass Crops >= 25 Acres and <= 50 Acres	Perennial Grass Crops > 50 Acres
2	**Double-crested Cormorant**	Common	0	0	1	1
3	**Canada Goose (Resident)**	Common	0	1	1	2
4	**Canada Goose (Migrant)**	Abundant	0	1	2	3
5	**Wood Duck**	Common	1	0	1	2
6	**American Black Duck**	Uncommon	0	0	1	1
7	**Mallard**	Common	2	0	1	1
8	**Blue-winged Teal**	Common	0	0	0	0
9	**Northern Pintail**	Uncommon	3	1	1	1
10	**Canvasback**	Uncommon	0	0	0	0
11	**Bald Eagle**	Uncommon	0	0	0	0
12	**Red-shouldered Hawk**	Uncommon	2	1	2	2
13	**American Woodcock**	Uncommon	1	1	1	1
14	**Chuck-will's-widow**	Uncommon	2	0	0	1
15	**Whip-poor-will**	Uncommon	2	0	0	0
16	**Red-headed Woodpecker**	Uncommon	2	0	0	0

Figure A3-22. Creating a new area-weighted matrix

14. Save the spreadsheet as a new *Tab-Delimited Text File (.txt)*.
15. Use the Matrix Wizard to associate the new land cover layer to the new matrix.

Section 4: CCP GIS Query Tool Menu and Windows

CCP_QT Menu

The CCP_QT menu (fig. A4-1) provides access to the Query Tool.

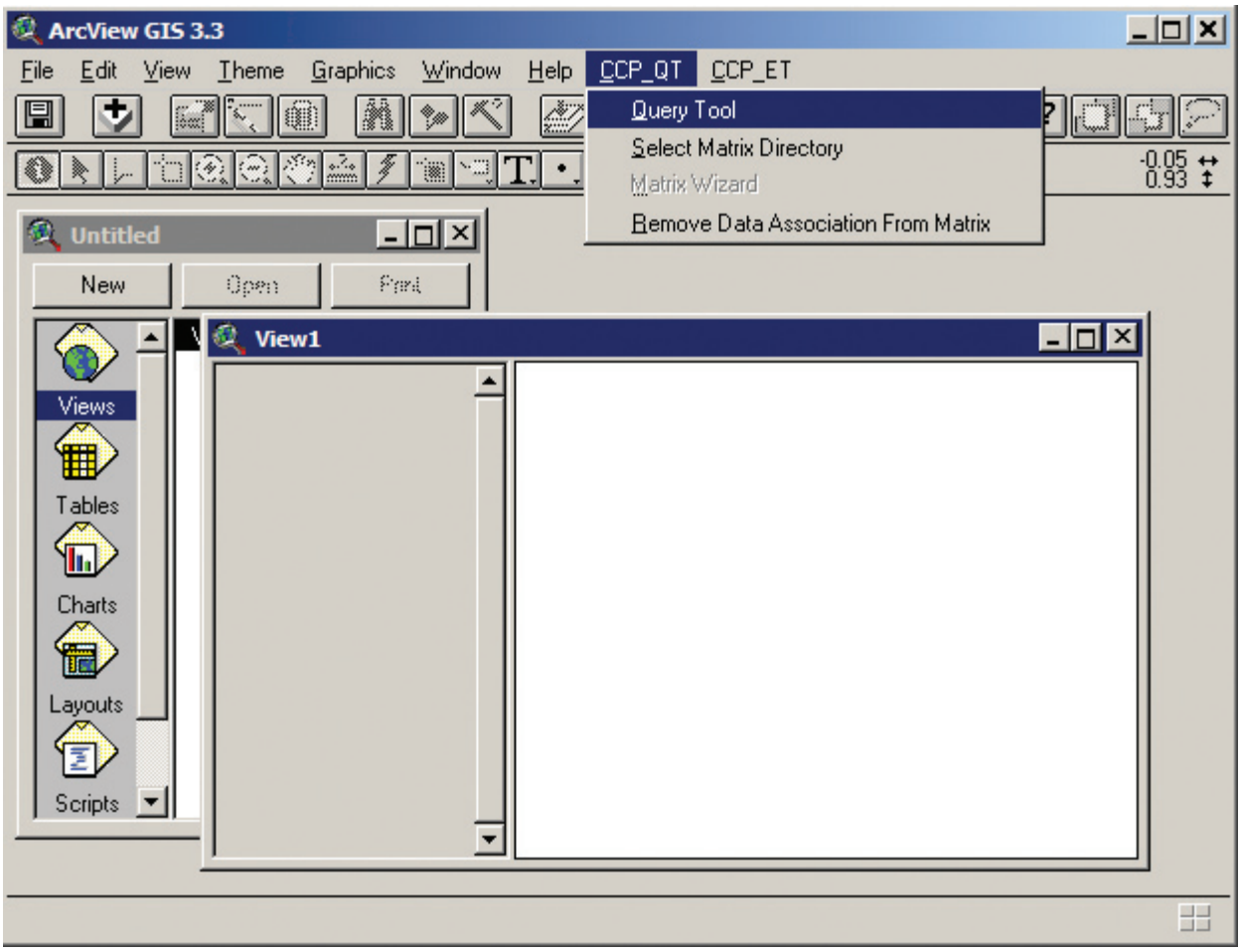


Figure A4-1. CCP_QT menu

Query Tool Flow

The Query Tool allows the user to perform queries of species to obtain potential habitat information. The Query Tool flows from a query input window (where you set up the query parameters) to a query output window (where you select the desired products; fig. A4-2).

Query Input Windows and Parameters

The Query Input window is used to set up a species query. Fig. A4-3 displays the Query Input window with the species and land cover parameters that may be modified during a query.

The Query Input window is made up of several sections where you can enter query parameters. In the ***Query Selection***, you can select **a species**. The species may be listed with common or scientific names and may be grouped by species, guild, genus, or family depending upon the matrix developed. Multiple species may be selected by holding down the **Shift** key. In the ***Notes Selection***, the species that are currently selected are listed. In the ***Matrix Selection***, you can select a matrix. The matrices displayed exist in the directory selected from using the **Select Matrix Directory** menu option (see Section 3). In the ***Selection Field***, you can query on a species or guild description field (the ***Query Selection*** box, in the upper right-hand corner, will update when you change this value). In the ***Habitat Selection***, you can query a list of data sources (i.e., land cover themes). The

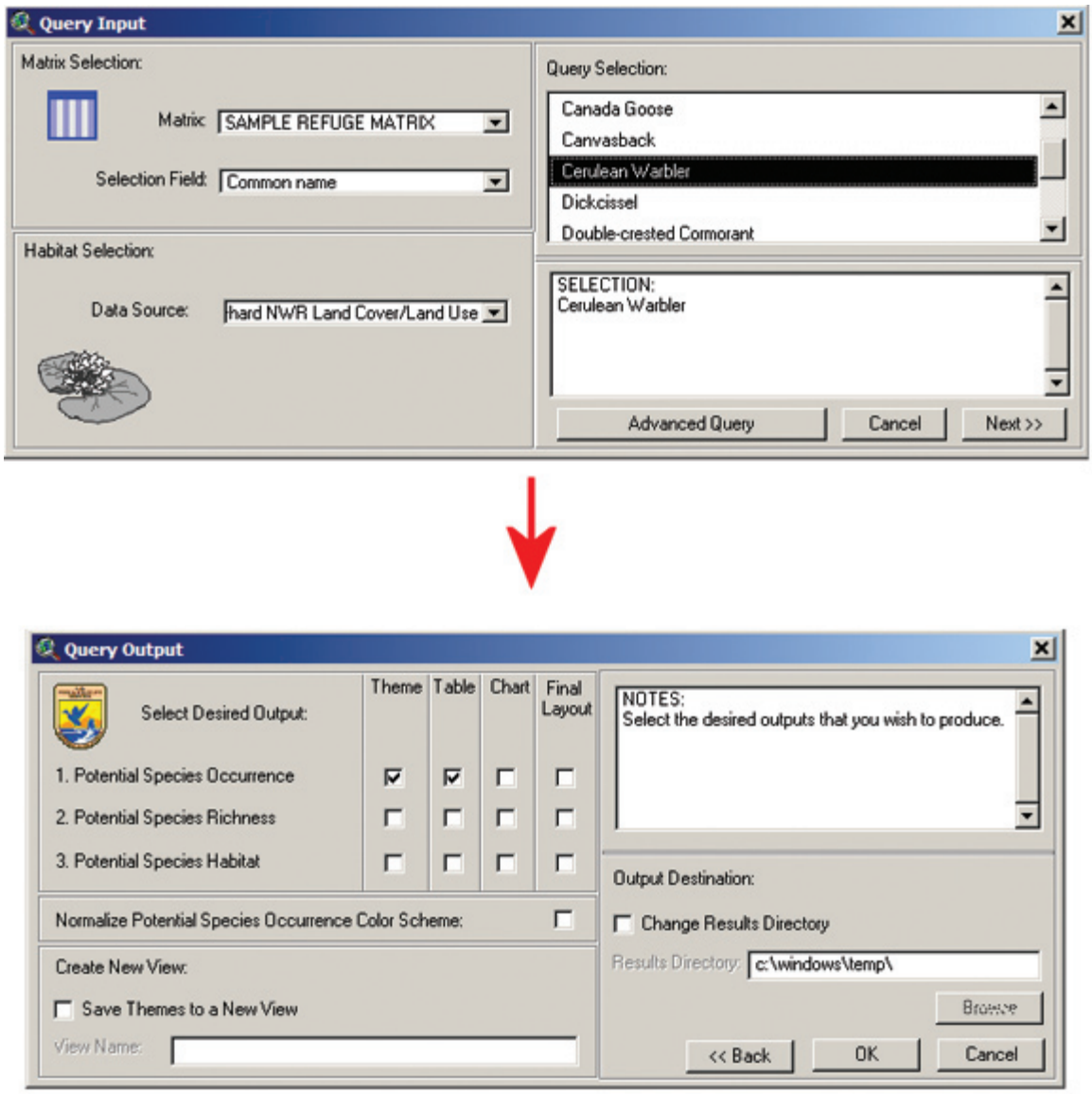


Figure A4-2. Query Tool flow diagram

Advanced Query button allows you to further query and subset the species matrix information by using the Query Builder discussed in Section 6. After the query parameters are entered, click the **Next>>** button to bring up the Query Output window.

Query Output Windows and Products

The desired products are selected in the query output windows. Fig. A4-4 displays the Query Output window with the available product type and format choices.

The Query Output window is made up of several sections used to define the desired products. In the ***Notes Section*** as the check boxes are clicked, descriptive information about the products is displayed. In the ***Select Desired Output Section***, you provide your choices for the type and format of the Query Tool products. Three types of species products are available (Table A4-1). They may be produced in several formats including GIS themes, tables, charts, and final layouts (i.e., maps). Graphic examples of the products, with descriptions, are in Appendix B. In the ***Normalize Potential Species Occurrence Color Scheme***, if you check the box, the color scheme normalizes so you can compare themes to each other based on color (Red = 3, Orange = 2, Yellow = 1). If you do not check the box, the program will try to stretch the values between red and light yellow to optimize visual appeal. In the ***Create New View Section***, you can specify whether to save the results to a new view, and you provide the name for the view. In the ***Output Destination Section***, you can specify where to save the query products. The **Browse** button specifies the directory where the products are stored. The **<<Back** button sends you back to the Query Input window. Clicking

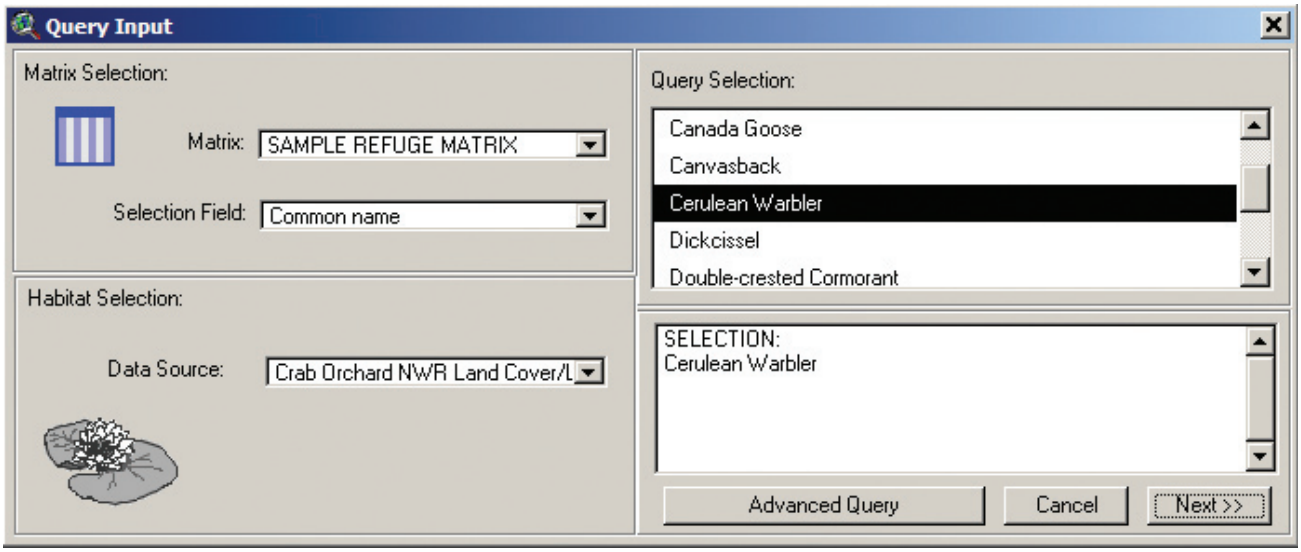


Figure A4-3. Query Input window

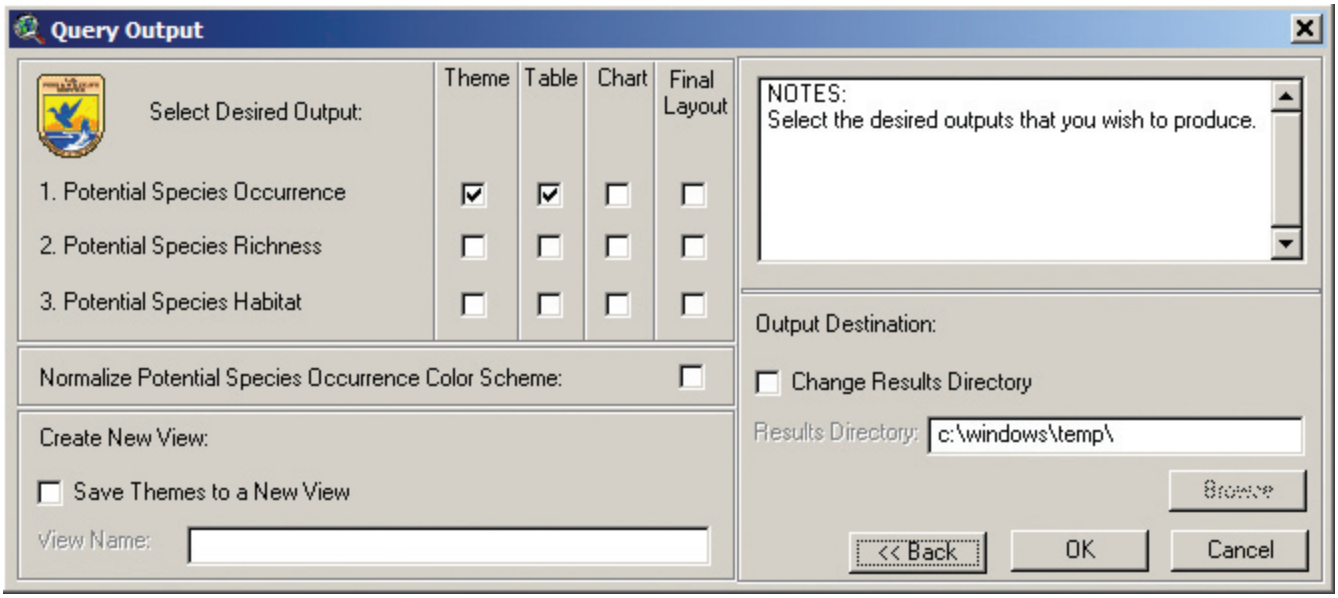


Figure A4-4. Query Output window

Table A4-1. Query Tool product descriptions

Products	Description
Textual Reports	
Query Report	A textual query report is produced with every query. It contains information about the query parameters and results.
Species Products	
Potential Species Occurrence	Displays potential species habitat in the selected extent shading the polygons according to their score from the species-land cover matrix.
Potential Species Richness	Displays potential species richness in the selected extent. The values represent the total number of species (selected by the user) that potentially exist in each habitat class (Potential Species Occurrence [PSO] score > 0).
Potential Species Habitat	Displays potential species habitat for a species query.

the **OK** button runs the query and generates the selected products. Output product area units are measured in acres. To convert these numbers to hectares, multiply the value by 0.4046873.

Section 5: Query Examples

This section provides several examples of queries that can be run with the Query Tool. Input-output parameters and tool products are discussed. Additional product information is available in Appendix B.

Single Species Query

This query identifies potential habitat for Wood Ducks.

1. Start **ArcView**.
2. Activate the **CCP GIS Query Tool** extension.
3. Open a **View** window and select **Query Tool** from the **CCP_QT** menu (if the Query Tool option is disabled [grayed-out] make sure the matrix directory has been designated as described in Section 3).
4. In the upper left-hand corner, select **SAMPLE REFUGE MATRIX** from the ***Matrix*** drop-down list.
5. Select **Common name** from the ***Selection Field*** drop-down list.
6. Select **Cro_lcu** from the ***Data Source*** drop-down list.
7. In the upper right-hand corner, select **Wood Duck** in the ***Query Selection***.
8. When finished, the Query Input window looks like fig. A5-1.

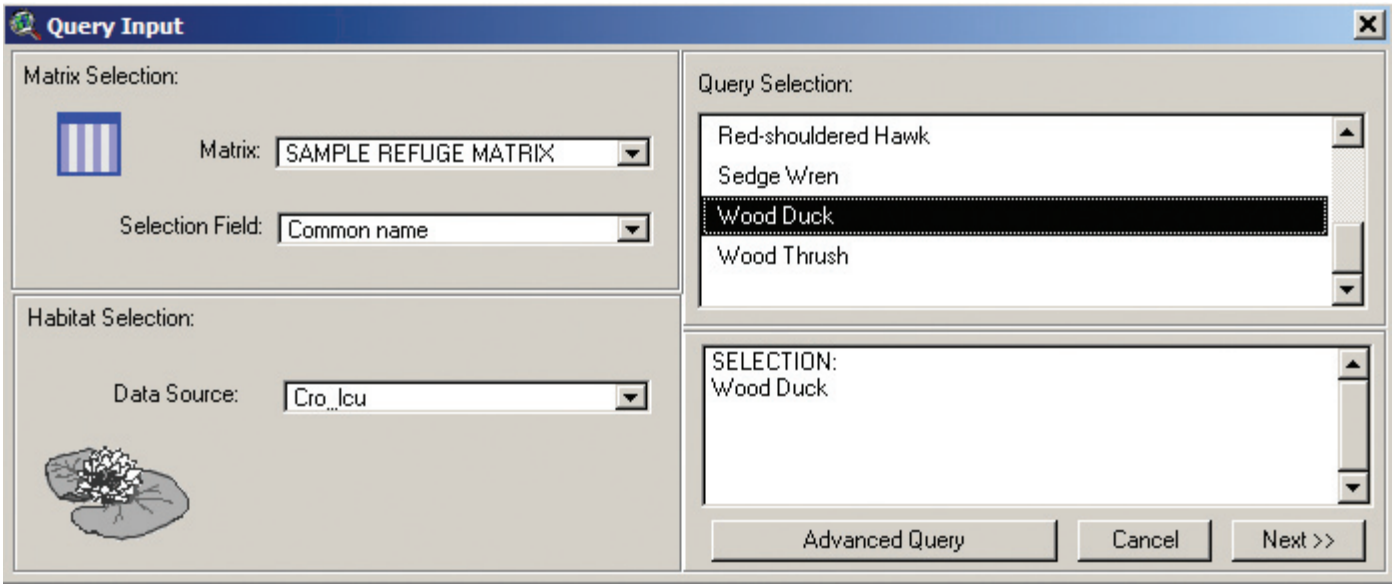


Figure A5-1. Single Species Query—Query Input window

9. Click the **Next>>** button to bring up the Query Output window.
10. Click the **Theme**, **Table**, **Chart**, and **Final Layout** boxes in the top row of the check boxes. This instructs the tool to generate **Potential Species Occurrence** products in these four selected formats. Notice that the products are described as they are selected in the ***Notes Selection***.
11. In the lower left-hand corner, click the box by **Save Themes to a New View**.
12. Type **Wood Duck Query** in the ***View Name***.
13. When finished, the Query Output window should look like fig. A5-2.
14. Click the **OK** button to run the query and generate the products. This takes a few seconds.

    Note: Appendix B provides descriptions of the query tool products.
15. The textual reports and Potential Species Occurrence themes are generated.

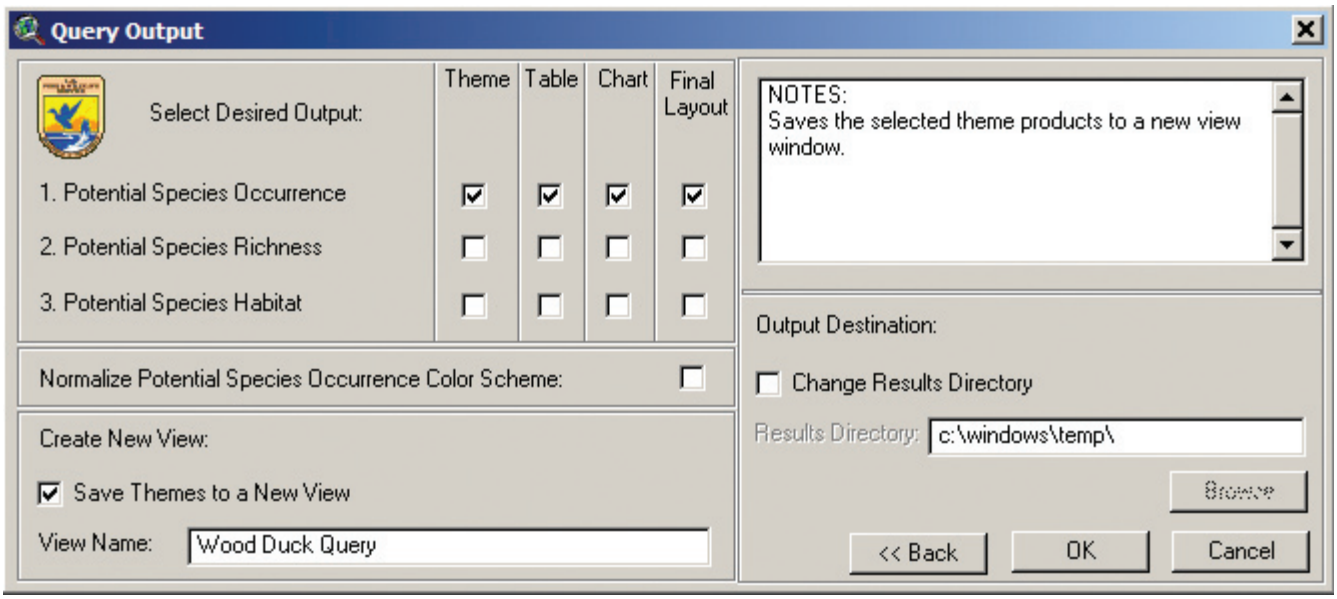


Figure A5-2. Single Species Query—Query Output window

16. The Query Report provides information about the query. The second line of the report is the directory on your computer where the report has been saved. If you want to print the report, open the file *report.txt* from this directory using a text editor, such as Microsoft Word or WordPad, and select **Print** from the **File** menu.
17. The Potential Species Occurrence GIS theme displays Wood Duck habitat ranking information. The Potential Species Occurrence values range from 0 to 3 for this particular matrix. Zero means there is no or very low potential for species occurrence and 3 means there is high potential for species occurrence. Habitats with a rank of 0 are gray. Ranked habitat areas (i.e., rank > 0) are yellow to red to represent low to high potential for species occurrence. The ranking values are averaged for habitat areas if multiple species are queried.
18. The other products generated by this query are accessed through the ArcView Project window by clicking the appropriate icon (e.g., **Tables**, **Charts**, or **Layouts**), selecting the desired product from those listed, and clicking the **Open** button.
19. A total of five products are generated from this query (figs. A5-3–A5-5) including one textual report (produced automatically for every query) and the user-specified Potential Species Occurrence theme, table, chart, and final layout. The table displays acres and percent of ranked potential of occurrence of Wood Duck habitat, and the chart displays the table information graphically. The layout brings together the theme, table, and chart products and displays them in an 11" x 8.5" format.
20. To permanently combine the Potential Species Occurrence ranking values to the theme in the View window, convert the theme to a new shapefile by selecting **Convert to Shapefile** from the **Theme** menu. This will permanently add the Potential Species Occurrence ranking values to the new shapefile.
21. The current ArcView session (i.e., Project) can be saved by selecting **Save Project As** from the **File** menu and providing a **file name** and **directory** and clicking the **OK** button. The saved Project can be opened later with ArcView.

Multiple Species Query

This multiple species query identifies potential habitat for Cerulean Warbler and Golden-winged Warbler.

1. Select **Query Tool** from the **CCP_QT** menu to bring up the Query Input window.
2. In the upper right-hand corner, select **Cerulean Warbler** from the ***Query Selection*** drop-down list. Scroll further down the list to **Golden-winged Warbler,** hold down the **Shift** key, and click it. In the lower right-hand corner, both species should be listed in the ***Notes Section***.
3. When finished, the Query Input window should look like fig. A5-6.
4. Click the **Next>>** button to bring up the Query Output window.
5. Click the **Theme** and **Table** boxes by **Potential Species Habitat**.

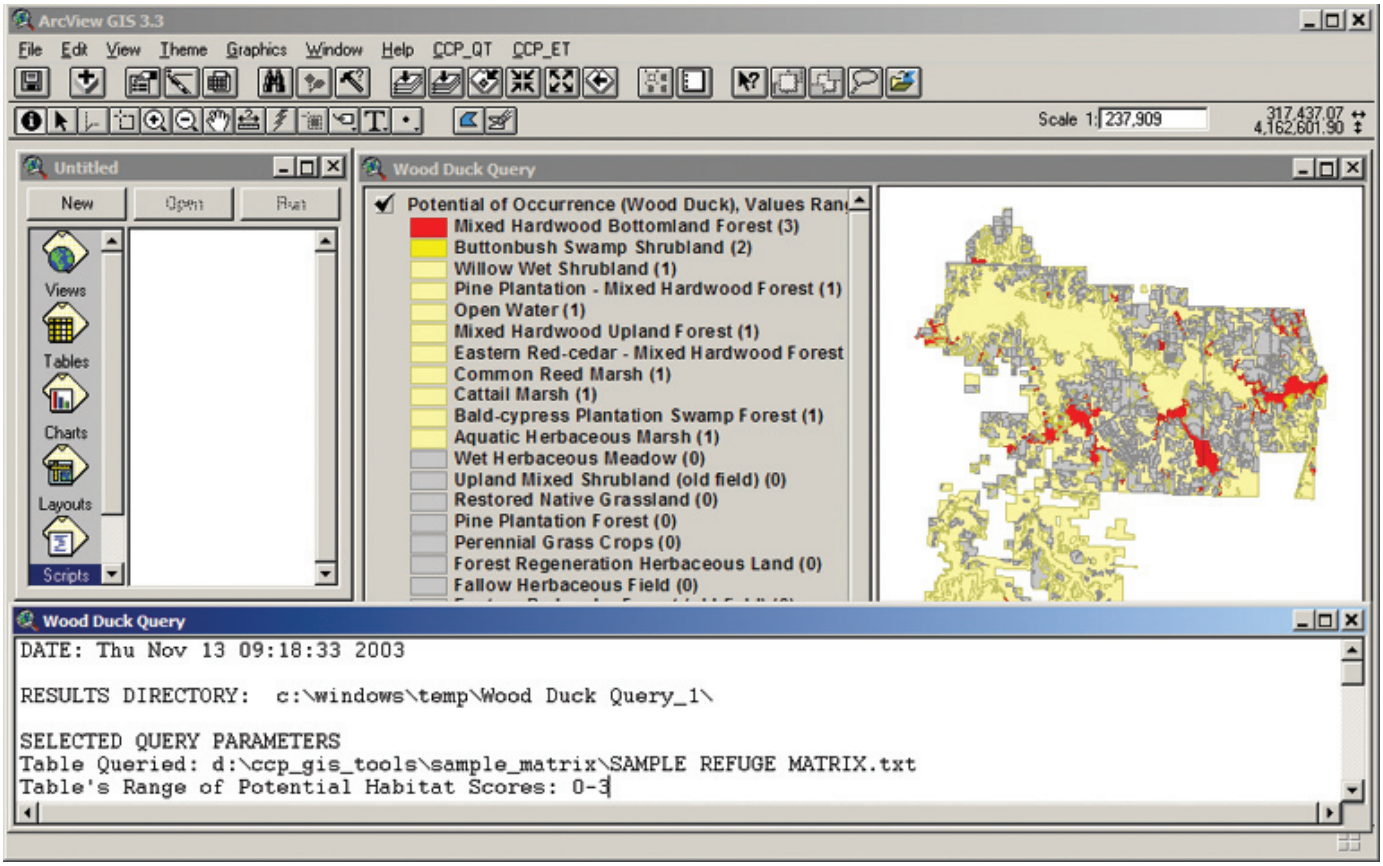


Figure A5-3. Single Species Query output products—Theme and Report

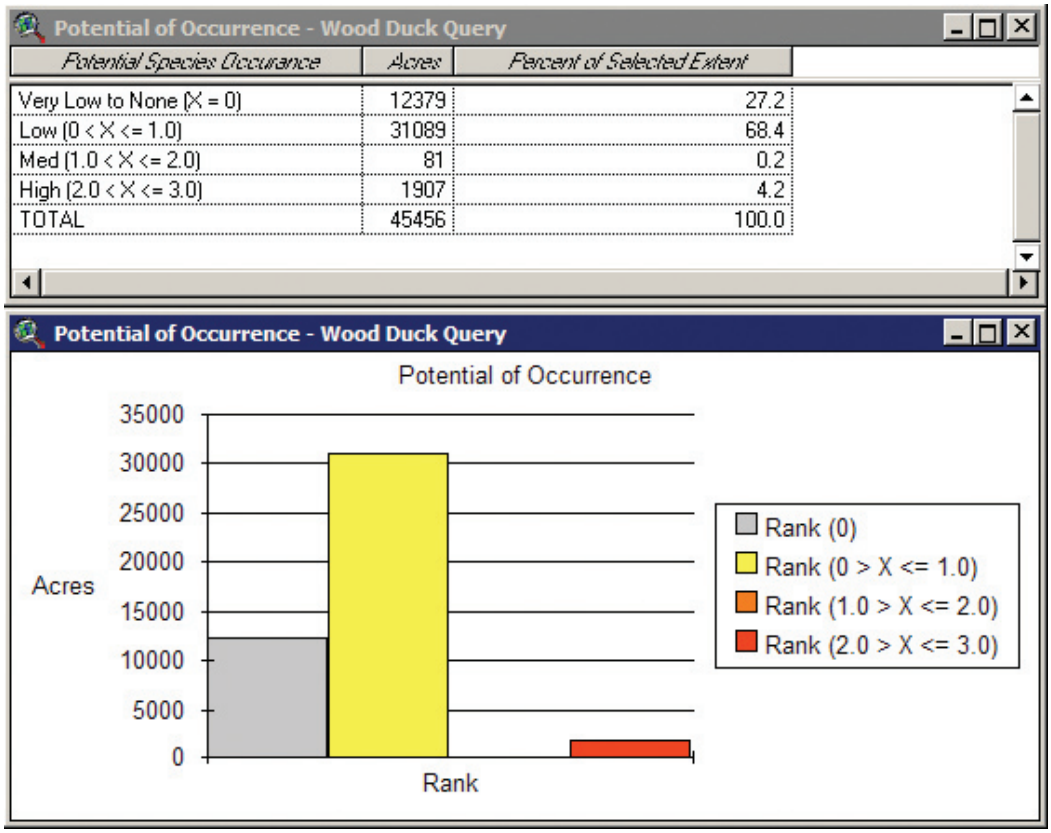


Figure A5-4. Single Species Query output products—Table and Chart

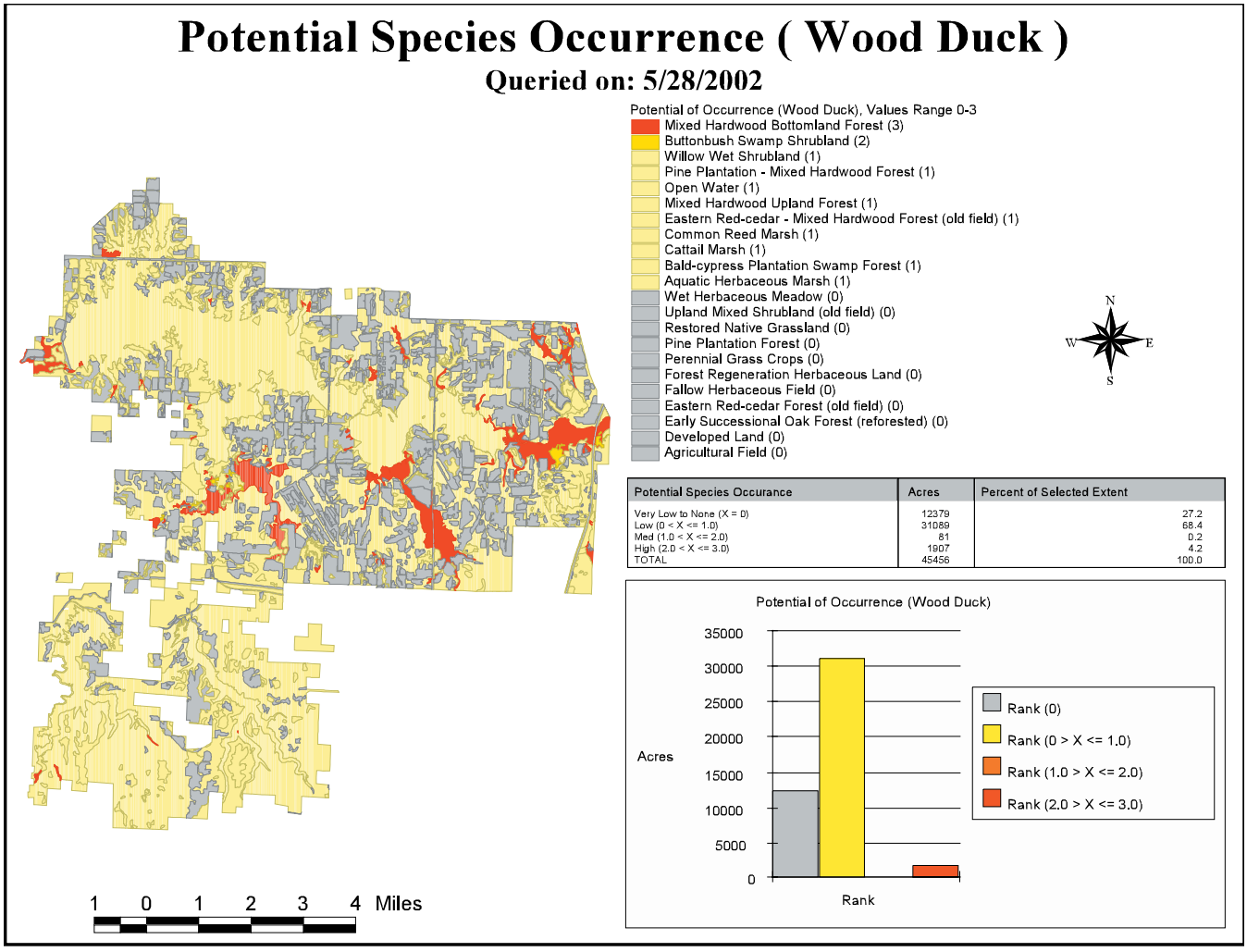


Figure A5-5. Single Species Query output products—Layout

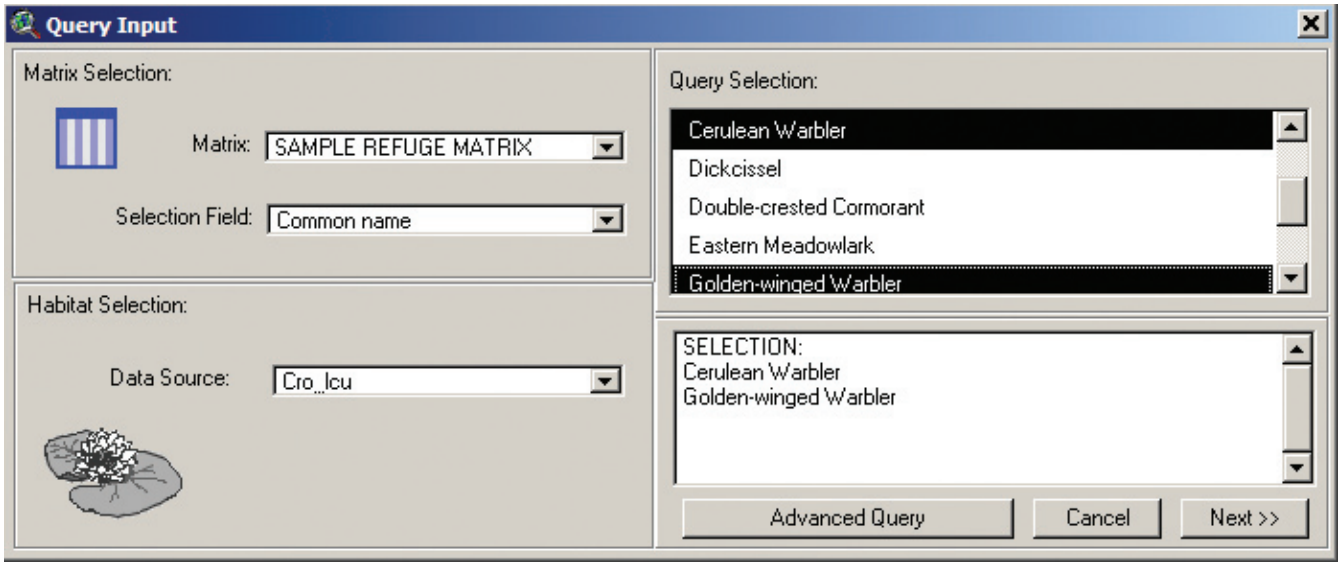


Figure A5-6. Multiple Species Query—Query Input window

6. In the lower left-hand corner, click the box by **Save Themes to a New View**.
7. Type **Cerulean and Golden-Winged Warbler Habitat** in the ***View Name***.
8. Click the box by **Change Results Directory**.
9. Click the **Browse** button and select *d:\ccp\data* in the ***Results Directory***.
10. When finished, the Query Output window should look like fig. A5-7.

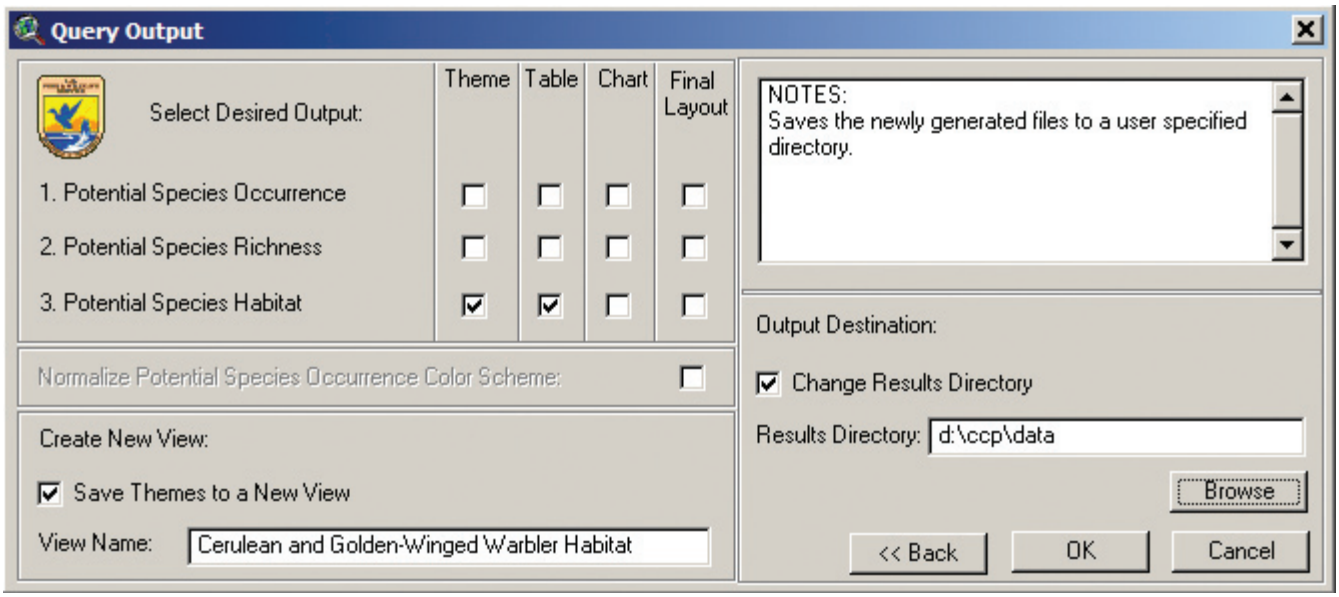


Figure A5-7. Multiple Species Query—Query Output window

11. Click the **OK** button to run the query and generate the products.
12. A textual report, one theme, and two tables are generated. The theme is saved to a new View window named *Cerulean and Golden-Winged Warbler Habitat* (fig. A5-8). The View window displays the Potential Species Habitat theme. The habitats were only selected if they had a species occurrence ranking greater than zero for at least one of the selected species. The number in parenthesis after the land cover classification value in the legend (fig. A5-8) denotes the average Potential Spe-

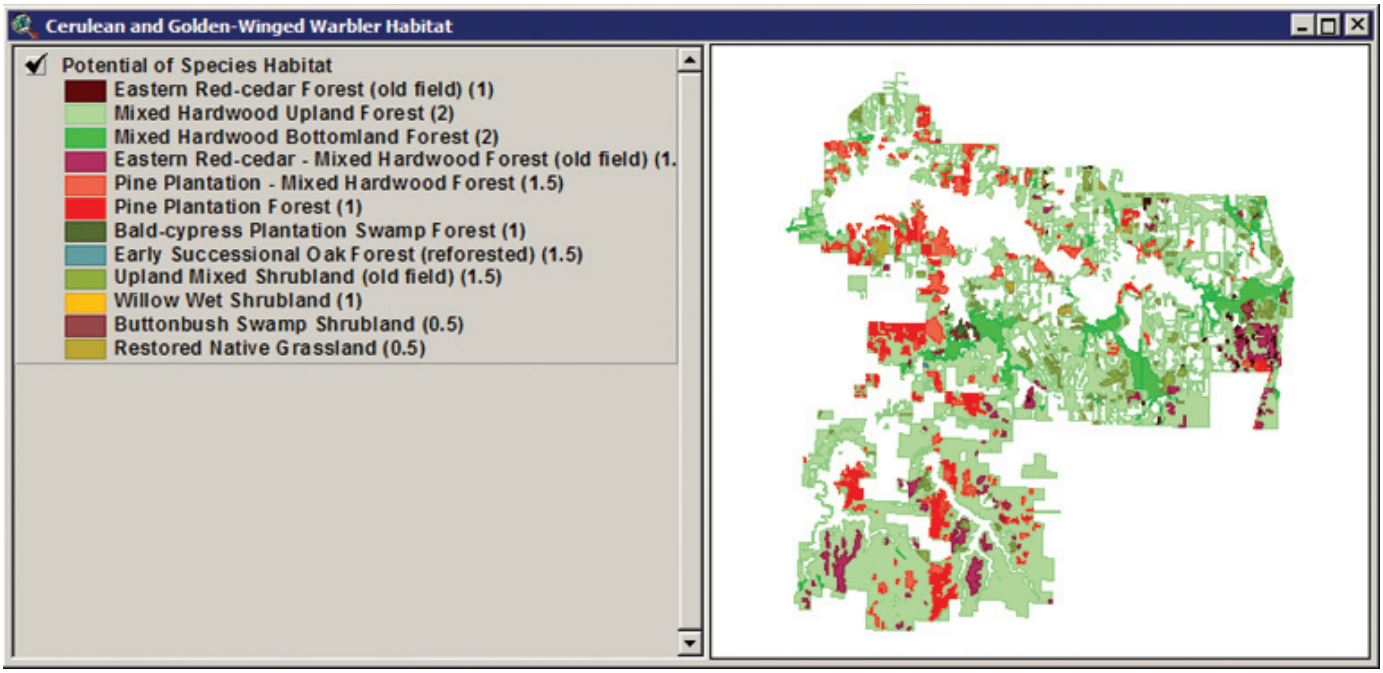
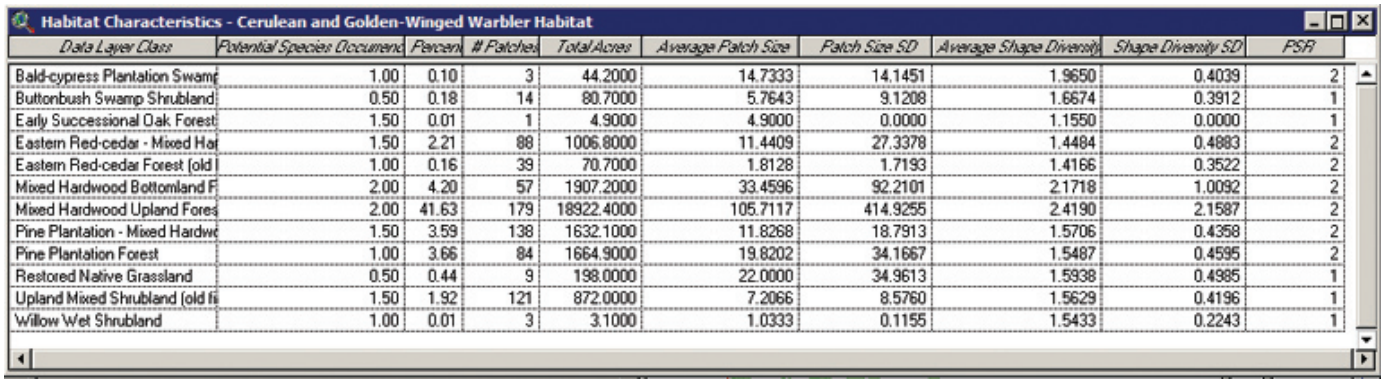


Figure A5-8. Multiple Species Query output products—View

cies Occurrence score for all of the species queried (e.g., Upland Mixed Shrubland (old field) (1.5) means that one species had a Potential Species Occurrence value of 1 and the other species had a Potential Species Occurrence value of 2).

13. The tables summarize the potential habitat for both species' habitats in two different ways.

    a. Potential habitat summarized by Data Layer class (fig. A5-9).

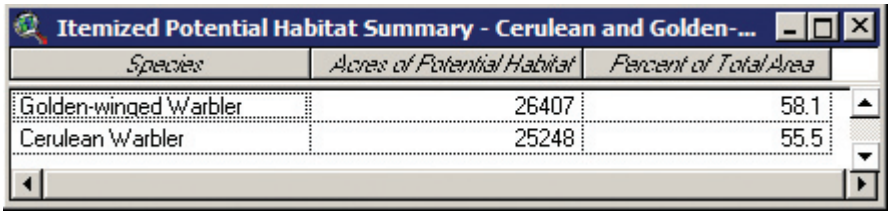


Habitat Characteristics - Cerulean and Golden-Winged Warbler Habitat

Data Layer Class	Potential Species Occurrenc	Percen	# Patches	Total Acres	Average Patch Size	Patch Size SD	Average Shape Diversity	Shape Diversity SD	PSR
Bald-cypress Plantation Swamp	1.00	0.10	3	44.2000	14.7333	14.1451	1.9650	0.4039	2
Buttonbush Swamp Shrubland	0.50	0.18	14	80.7000	5.7643	9.1208	1.6674	0.3912	1
Early Successional Oak Forest	1.50	0.01	1	4.9000	4.9000	0.0000	1.1550	0.0000	1
Eastern Red-cedar - Mixed Hat	1.50	2.21	88	1006.8000	11.4409	27.3378	1.4484	0.4883	2
Eastern Red-cedar Forest (old	1.00	0.16	39	70.7000	1.8128	1.7193	1.4166	0.3522	2
Mixed Hardwood Bottomland F	2.00	4.20	57	1907.2000	33.4596	92.2101	2.1718	1.0092	2
Mixed Hardwood Upland Fores	2.00	41.63	179	18922.4000	105.7117	414.9255	2.4190	2.1587	2
Pine Plantation - Mixed Hardwo	1.50	3.59	138	1632.1000	11.8268	18.7913	1.5706	0.4358	2
Pine Plantation Forest	1.00	3.66	84	1664.9000	19.8202	34.1667	1.5487	0.4595	2
Restored Native Grassland	0.50	0.44	9	198.0000	22.0000	34.9613	1.5938	0.4985	1
Upland Mixed Shrubland (old fi	1.50	1.92	121	872.0000	7.2066	8.5760	1.5629	0.4196	1
Willow Wet Shrubland	1.00	0.01	3	3.1000	1.0333	0.1155	1.5433	0.2243	1

Figure A5-9. Multiple Species Query output products—Habitat Characteristics table

    b. Potential habitat summarized by species (fig. A5-10).



Itemized Potential Habitat Summary - Cerulean and Golden-...

Species	Acres of Potential Habitat	Percent of Total Area
Golden-winged Warbler	26407	58.1
Cerulean Warbler	25248	55.5

Figure A5-10. Multiple Species Query output products—Itemized Potential Habitat Summary table

Querying with the Advanced Query Button

This Advanced Query example identifies the Resource Conservation Priority species that occur in the refuge. The Advanced Query button allows the user to make complex queries using the Query Builder.

1. Select **Query Tool** from the **CCP_QT** menu to bring up the Query Input window.
2. Click the **Advanced Query** button to bring up the Query Builder window. Now enter a **query string** (as seen below). **Double-click** the [***Resource Conservation Priority***], **single click** the **=** button, and **double-click** the "***Y***." This query string tells the Query Tool to select Resource Conservation Priority species in the refuge.
3. When finished, the Query Builder window should look like fig. A5-11.
4. Click the **OK** button to return to the Query Input window.

   Note: The ***Matrix Selection*** and the ***Query Selection*** are grayed-out (deactivated) and the Advanced Query button now reads Remove Advanced Query. Clicking this button resets the advanced query selection and activates the ***Matrix Selection*** and the ***Query Selection***.
5. When finished, the Query Input window should look like fig. A5-12.
6. Click the **Next>>** button to bring up the Query Output window.
7. Click the **Theme** and **Table** boxes by ***Potential Species Richness***.
8. In the lower left-hand corner, click the box by **Save Themes to a New View**.
9. Type **Advanced Resource Conservation Priorities** in the ***View Name***.
10. Click the box by **Change Results Directory**.
11. Click the **Browse** button and select *d:\ccp\data* in the ***Results Directory***.

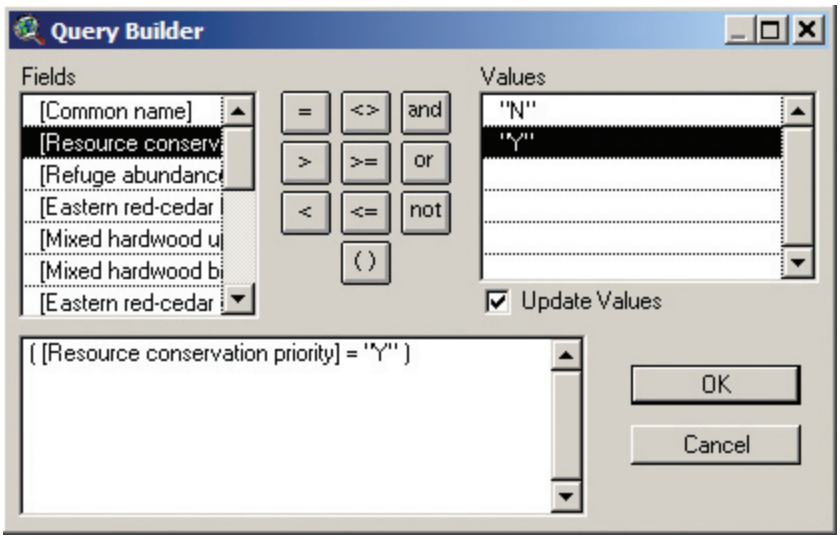


Figure A5-11. Advanced Query—Query Builder dialog

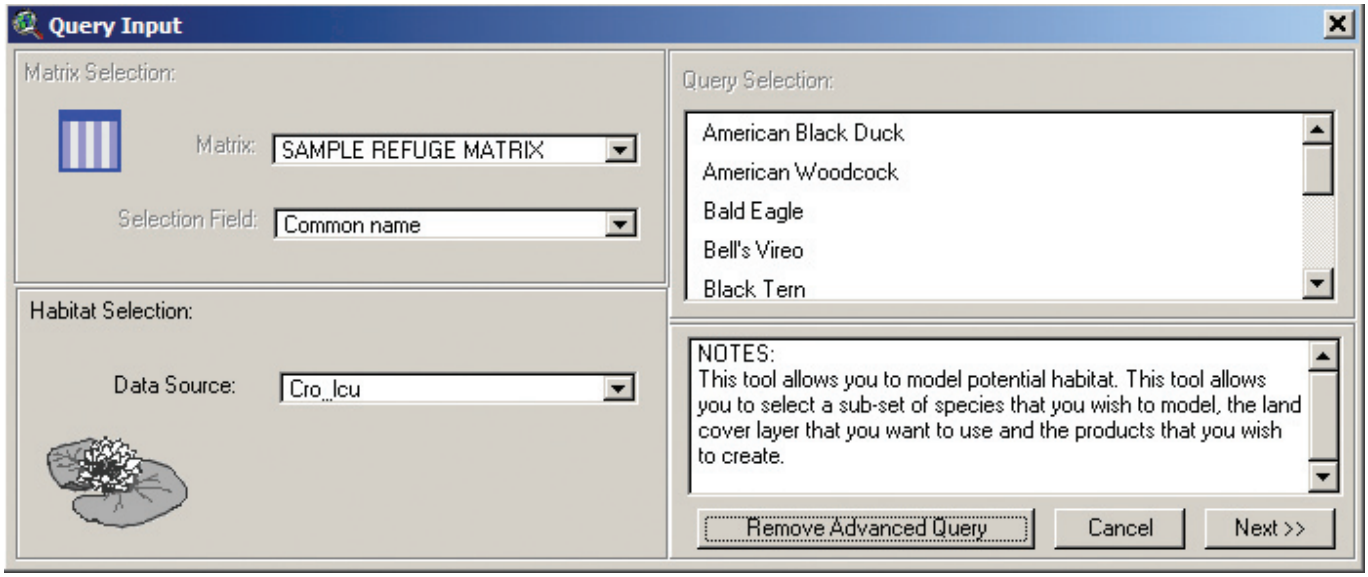


Figure A5-12. Advanced Query—Query Input window

12. When finished, the Output window should look like fig. A5-13.
13. Click the **OK** button to run the query and generate the products.
14. A textual report, theme, and table are generated. The textual report includes information about the selected Resource Conservation Priority species that meet the advanced query parameters (fig. A5-14).
15. The theme and table products display habitat information with the total number of selected species that potentially occur in each habitat type (fig. A5-15).

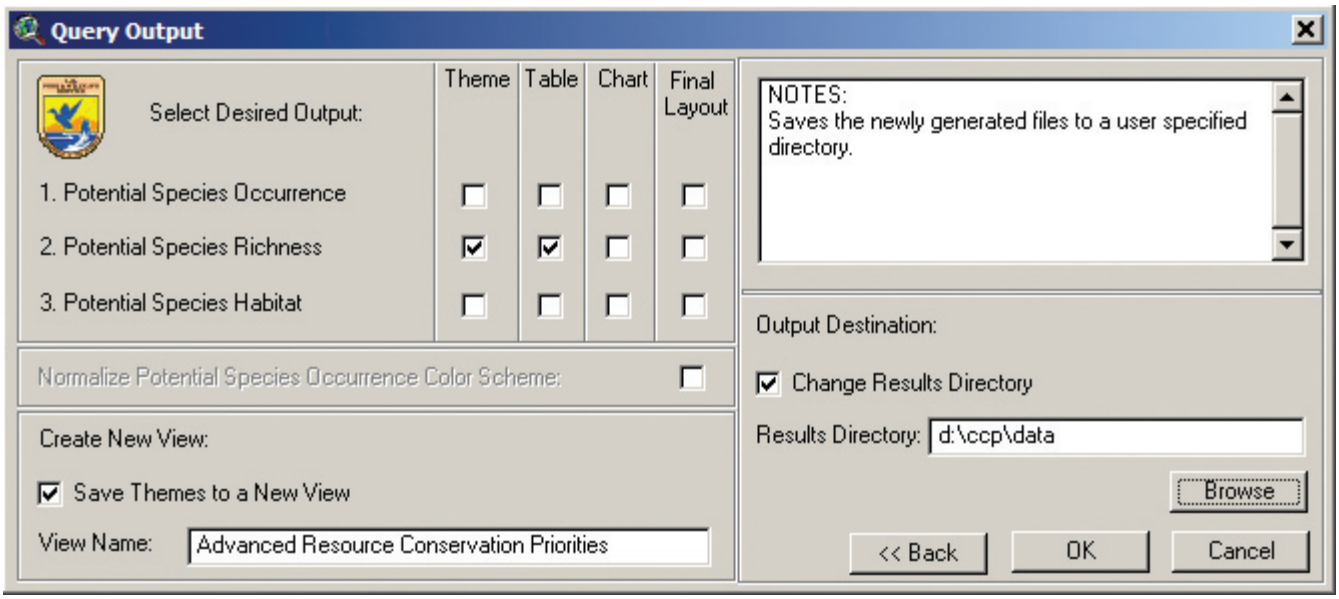


Figure A5-13. Advanced Query—Query Output window

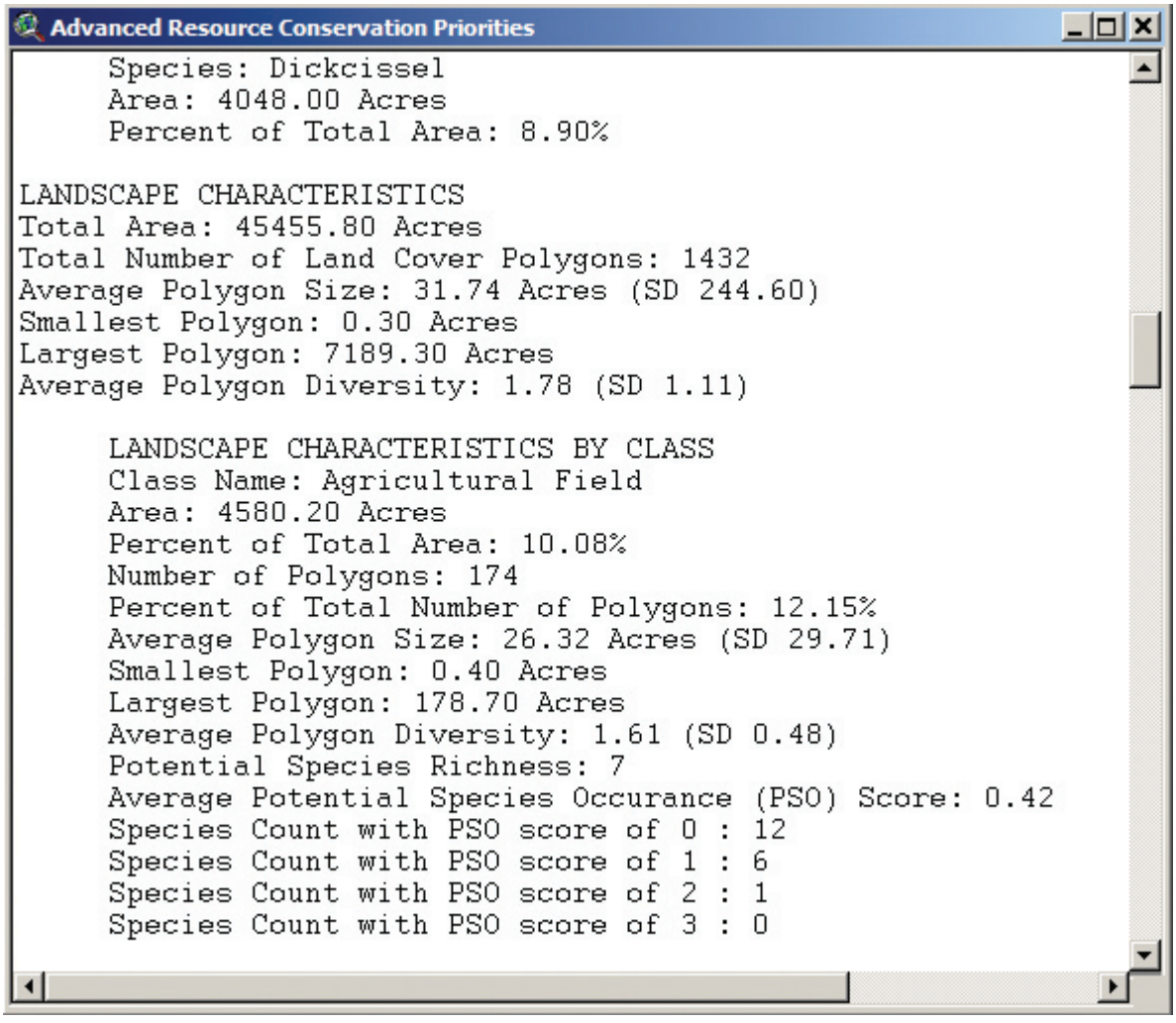
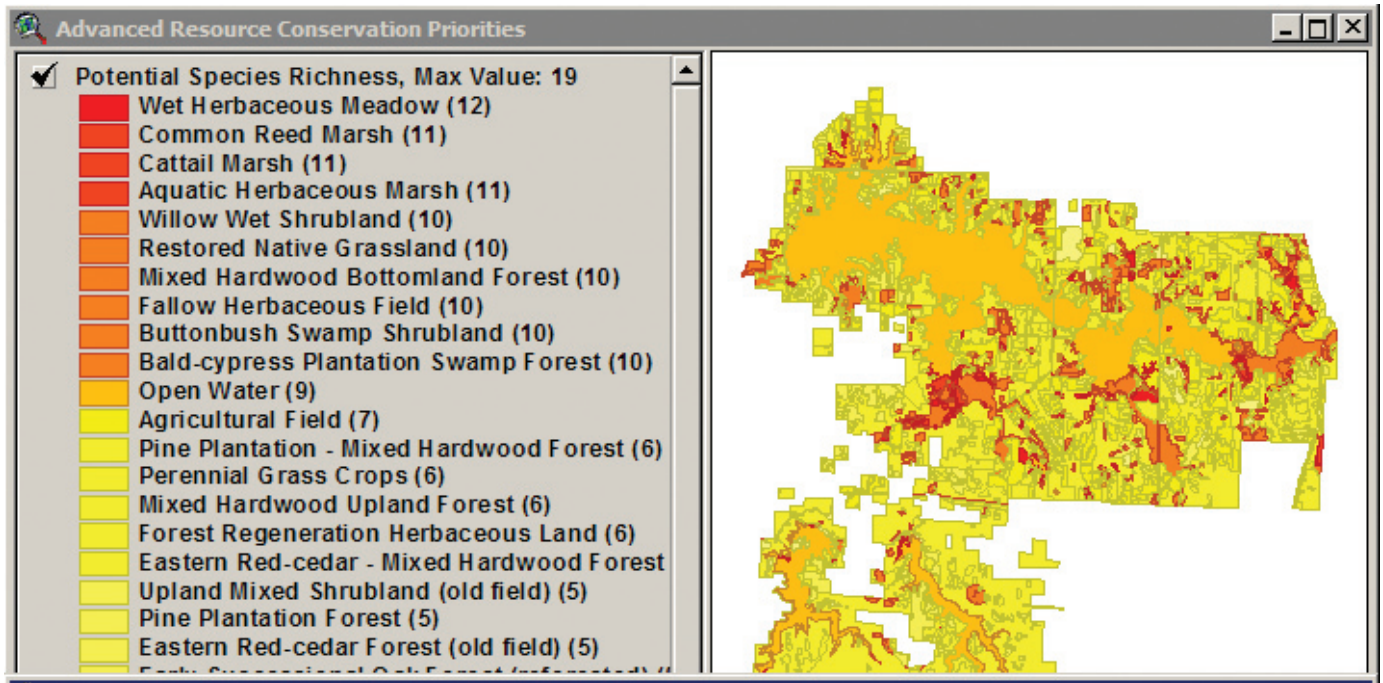


Figure A5-14. Advanced Query output products—Textual Report



Potential Species Richness - Advanced Resource Conservation Priorities

Data Layer Class	Number of Species	Acres	Percent of Total Area
Agricultural Field	7	4580.2000	10.08
Aquatic Herbaceous Marsh	11	365.4000	0.80
Bald-cypress Plantation Swamp Forest	10	44.2000	0.10
Buttonbush Swamp Shrubland	10	80.7000	0.18
Cattail Marsh	11	24.8000	0.05
Common Reed Marsh	11	7.4000	0.02
Developed Land	2	1138.5000	2.50
Early Successional Oak Forest (reforested)	5	4.9000	0.01
Eastern Red-cedar - Mixed Hardwood Forest (old field)	6	1006.8000	2.21
Eastern Red-cedar Forest (old field)	5	70.7000	0.16
Fallow Herbaceous Field	10	1541.7000	3.39
Forest Regeneration Herbaceous Land	6	167.7000	0.37
Mixed Hardwood Bottomland Forest	10	1907.2000	4.20

Figure A5-15. Advanced Query output products—Theme and Table

Section 6: Advanced Functions

Moving Products to Other Applications

The graphical and tabular products generated by the Query Tool can be moved to other computer applications.

Graphic information may be moved from an ArcView Layout document to other applications (e.g., Microsoft PowerPoint, Microsoft Word) using the following process:

1. Start **ArcView**.
2. In ArcView, open an **existing Layout** document, or create a **new one** with map elements.
3. With the Layout document active, click the **Pointer** Tool.
4. Click the **graphic element** to select it. Multiple elements may be selected by holding down the **Shift** key and clicking them (fig. A6-1).

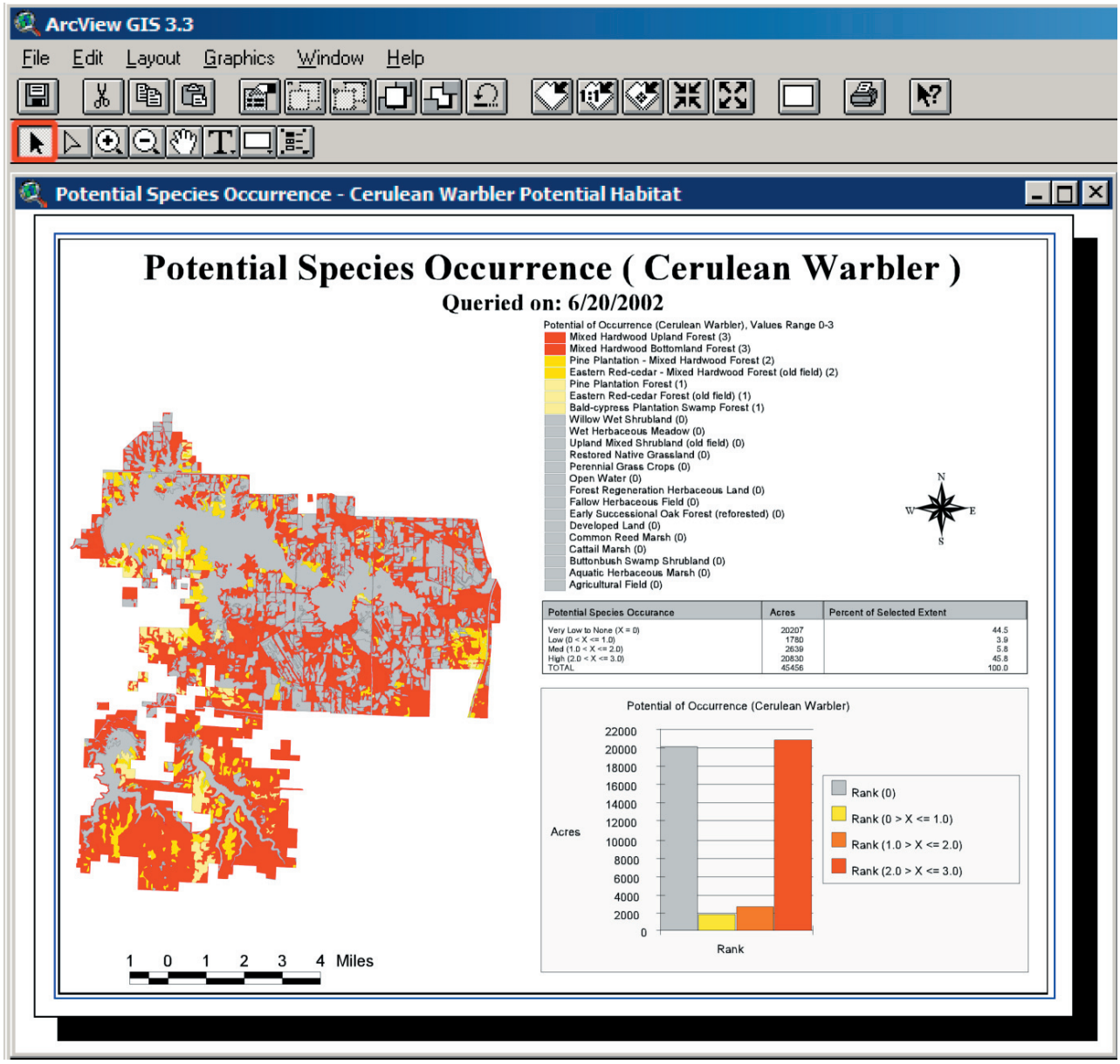


Figure A6-1. Selecting elements from the layout

5. Select **Copy** from the **Edit** menu. Wait a few seconds when copying large complex map elements.
6. Minimize **ArcView** and start **Microsoft PowerPoint**.
7. Insert a **new blank slide** (if needed) in Microsoft PowerPoint.
8. Select **Paste** from the **Edit** menu. The map elements are on the Microsoft PowerPoint slide. They may be moved and resized as necessary.
9. Minimize **Microsoft PowerPoint**.
10. The entire map can also be exported as a digital image file by selecting **Export** from the **File** menu in ArcView.
11. In the dialog box that appears, the user can select an **image type**, **file destination**, and **file name**.

Tabular products may be moved from ArcView to Microsoft Excel using the following procedure:

1. Start **ArcView**.
2. Open a **Table** window and make it active.
3. Select **Export** from the **File** menu (fig. A6-2).

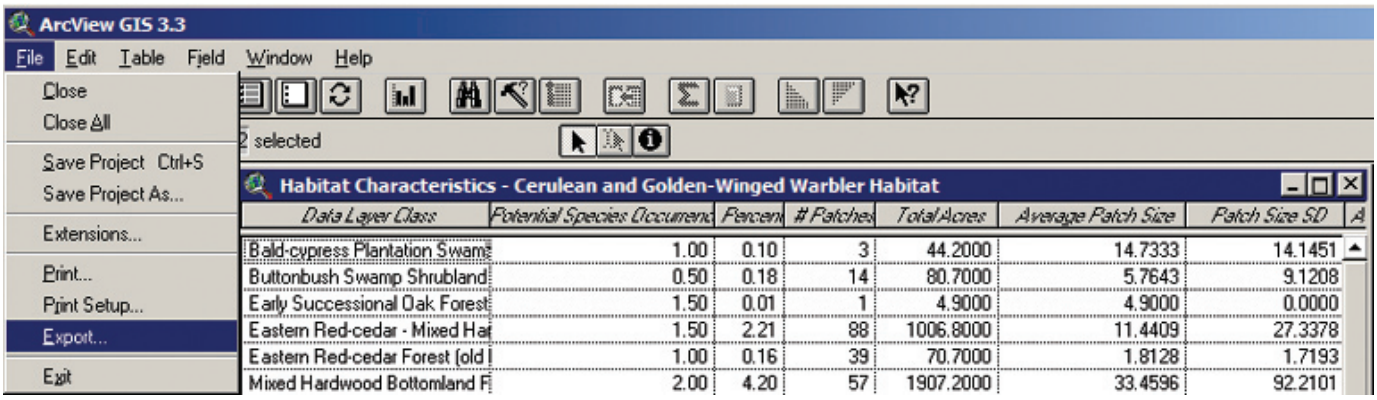


Figure A6-2. Exporting tables

4. Select **Delimited Text** format from the Export Table window and click the **OK** button. This tells ArcView to save the table as a comma-delimited text file.
5. Choose a **file name** and **directory** and save the file by clicking the **OK** button.
6. Close or minimize **ArcView** and start **Microsoft Excel**.
7. Select **Open** from the **File** menu to bring up the Open Files window. Set the ***Files of Type: to All Files*** (*.*).
8. Navigate to the directory used in step 5, select the **exported table file**, and click the **Open** button.
9. The Text Import Wizard window is now displayed.
10. Choose **Delimited** as the original data type and click the **Next>>** button.
11. Click the box by **Comma** and click the **Finish** button. The table is now loaded and can be further manipulated with the Microsoft Excel analytical tools.

Using ArcView GIS Tools

ArcView GIS tools may be used to further query and enhance products generated with the Query Tool. They are accessed through the buttons and menus provided in ArcView's graphical user interface (fig. A6-3). Some of the more useful tools are discussed below. Load the ArcView theme *amre_hab.shp* from the directory *sample_data* that the user copied from the CCP GIS Tools CD-ROM. Use this theme in the following examples:

The **Zoom In**, **Zoom Out**, and **Pan** tools (fig. A6-4) allow you to quickly move around the graphical areas displayed in a View window. The **Zoom to Active Themes** button magnifies the view to the full extent of the active themes.

The **Identify** Tool (fig. A6-5) provides tabular information about a graphic feature when it is selected.

Figure A6-3. ArcView's graphical user interface for View documents

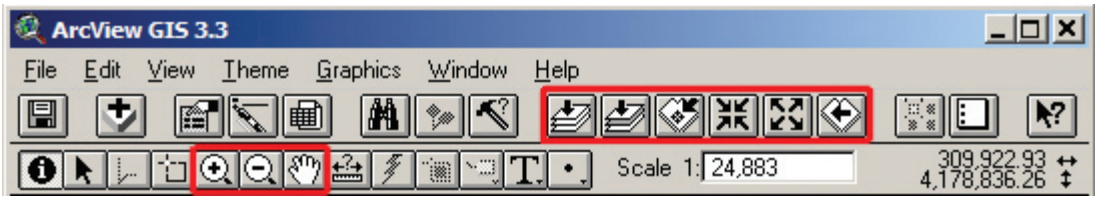


Figure A6-4. Zoom In, Zoom Out, and Pan to Active Themes tools

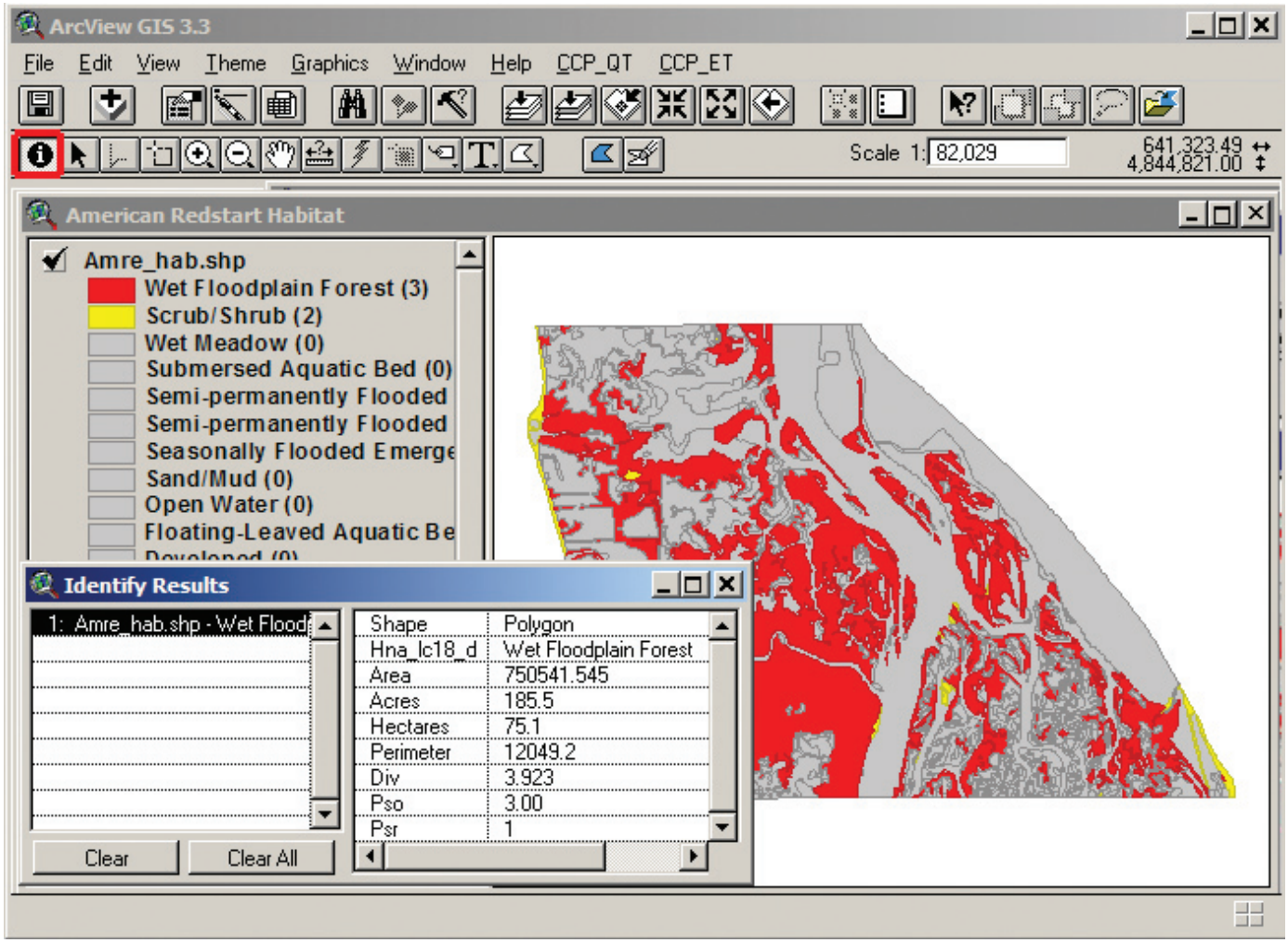


Figure A6-5. Identify Tool

The **Label** Tool (fig. A6-6) provides information about a graphic feature by creating a label that points to it in the View window.

Measure and **Draw** tools (fig. A6-7) provide the ability to perform spatial measurements in the View window.

The **Query Builder** (fig. A6-8) selects graphic and tabular features by using logical expressions.

The **Query Builder** button could further query and enhance the Query Tool results by identifying potential habitat areas that are of a certain size. For example, after running the **Query Tool**, the red habitat areas in fig. A6-9 were identified as having high potential (PSO = 3) for species occurrence.

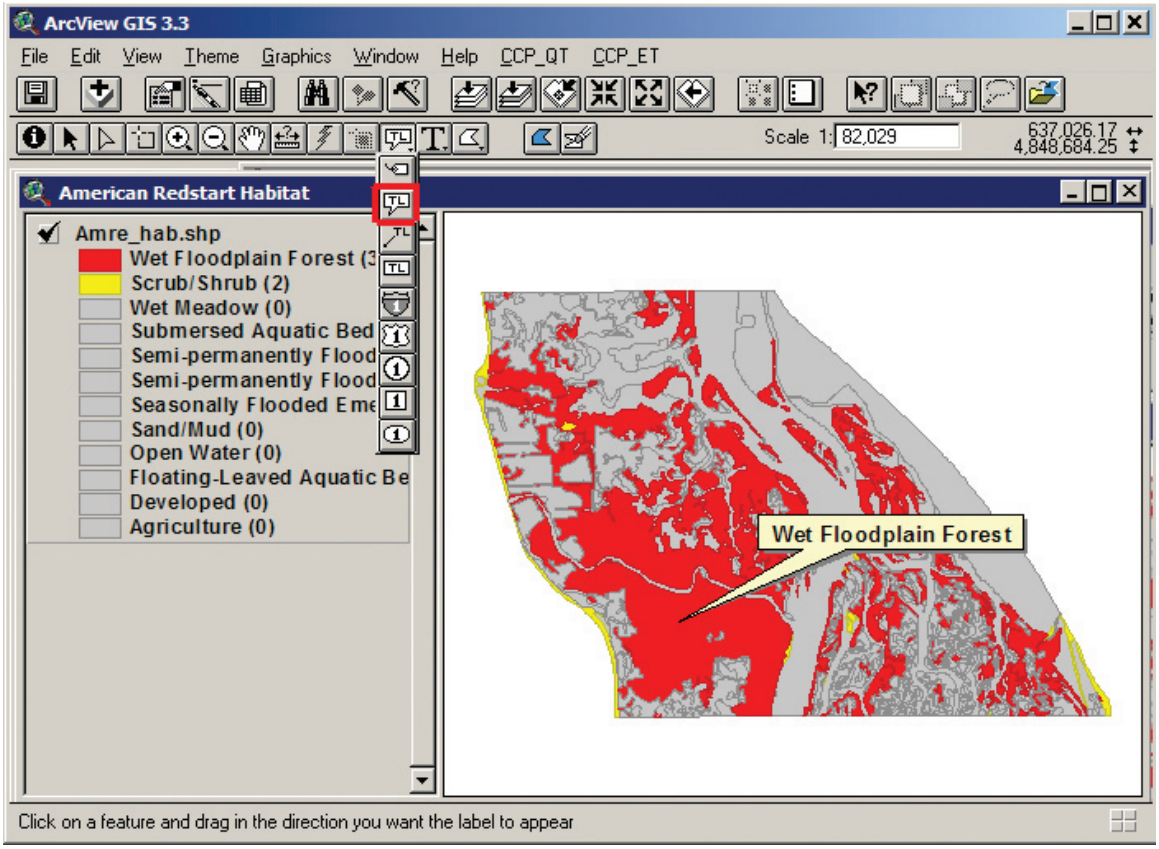


Figure A6-6. Label Tool

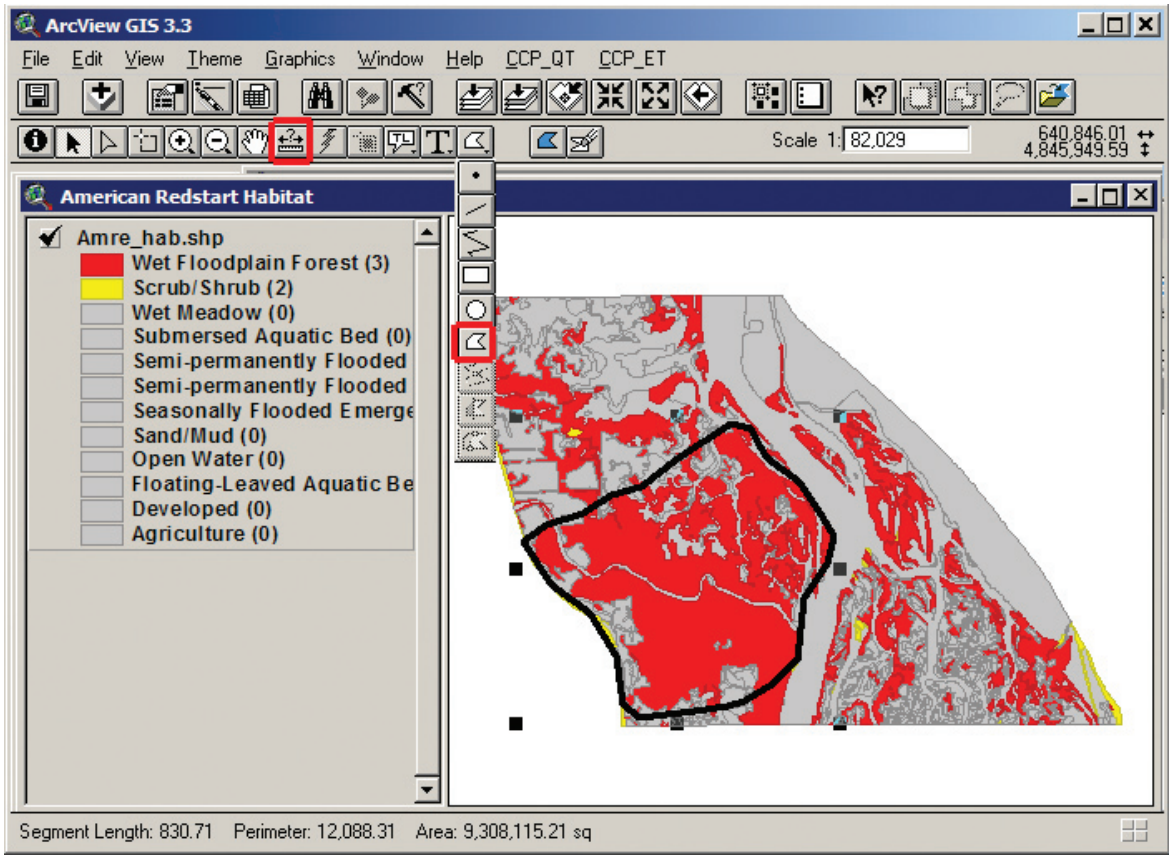


Figure A6-7. Measure and Draw Tools

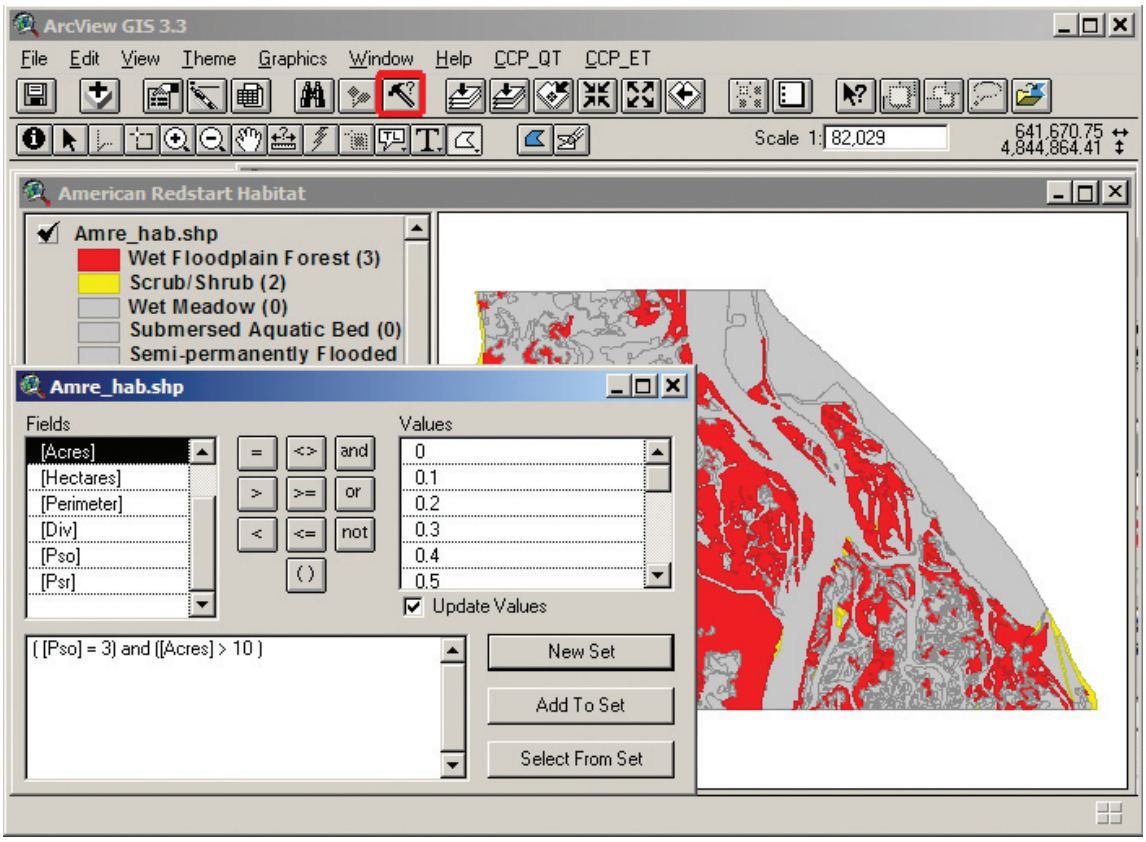


Figure A6-8. Query Builder Button

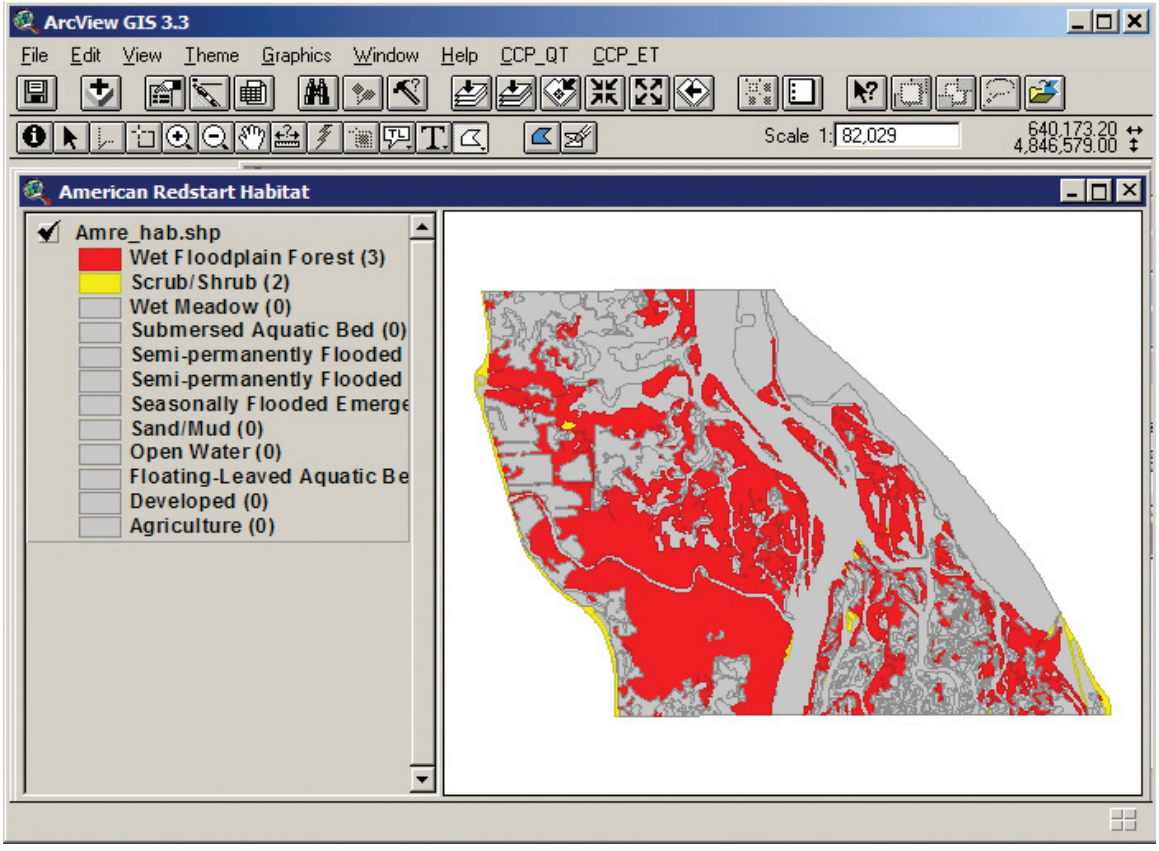


Figure A6-9. Habitat areas with high potential for species occurrence

The **Query Builder** was then run with a user-specified logical expression (fig. A6-10) to identify highly ranked habitat patches ([PSO] = 3) with at least 10 acres of habitat ([Acres] > 10). The dark gray polygons in fig. A6-10 represent habitat areas with high potential for species occurrence that are at least 10 acres in size.

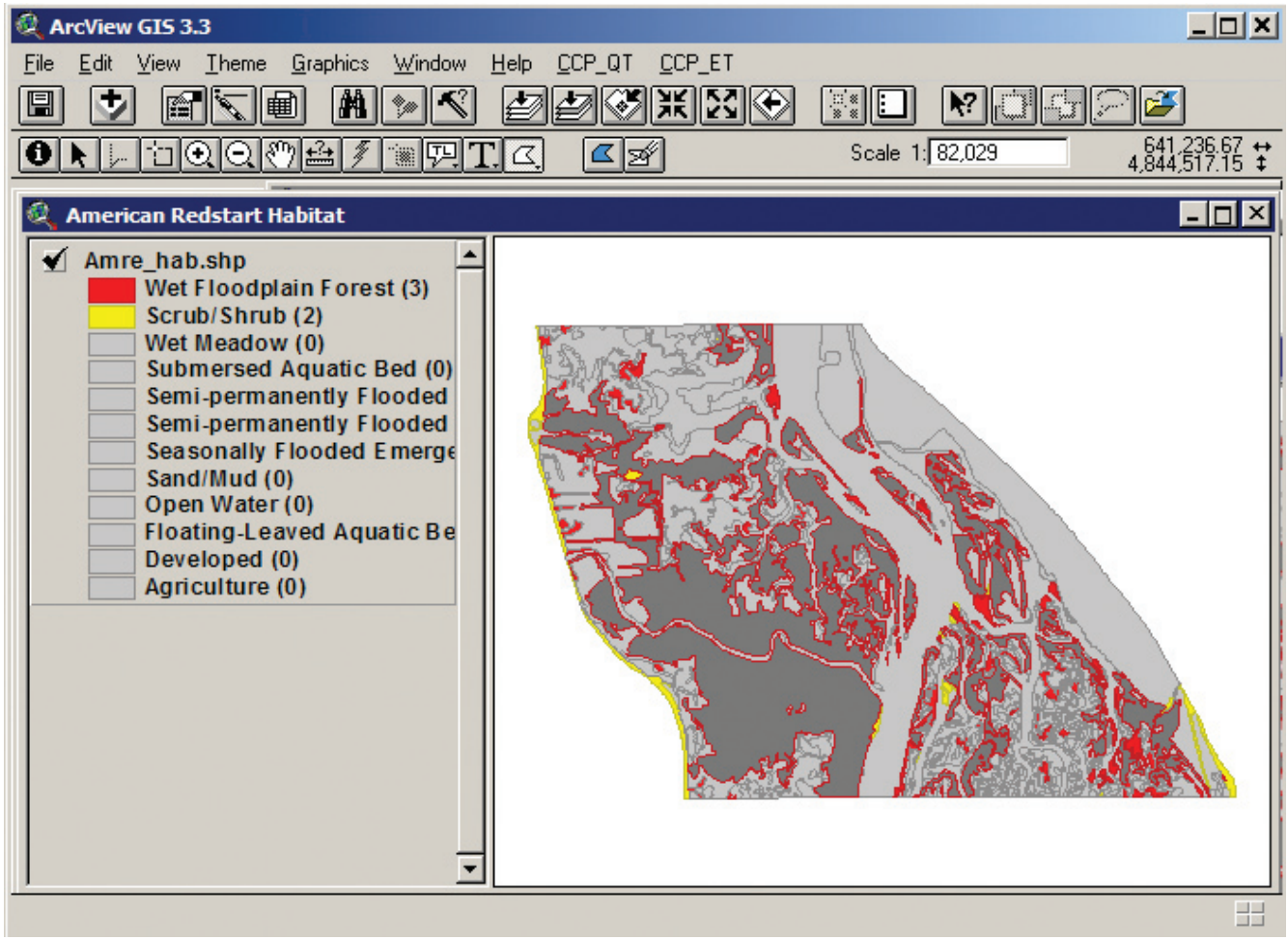


Figure A6-10. Areas selected by the Query Builder (selected areas in dark gray)

Incorporating User Data

Your data (e.g., tables, GIS themes) may be incorporated and used with the Query Tool. Though your files cannot be directly accessed by the Query Tool for species or habitat queries, they can verify and enhance the query results (fig. A6-11).

The GIS data, in an ARC/INFO coverage or ArcView shapefile format, may be brought into ArcView using the following procedure:

1. Start **ArcView**.
2. Open a **View** window (that will receive your data) and make it active.
3. Select **Add Theme** from the View menu.
4. Navigate to the *sample_data* directory you copied from the CCP GIS Tools CD-ROM, select the theme *bird_pts.shp*, and click the **OK** button. The theme is now loaded into the active View window. Multiple data themes may be selected by holding down the **Shift** key.

ArcView can read tables in dBASE, INFO, and comma-delimited text file formats. Incorporating tabular data is accomplished using the following process:

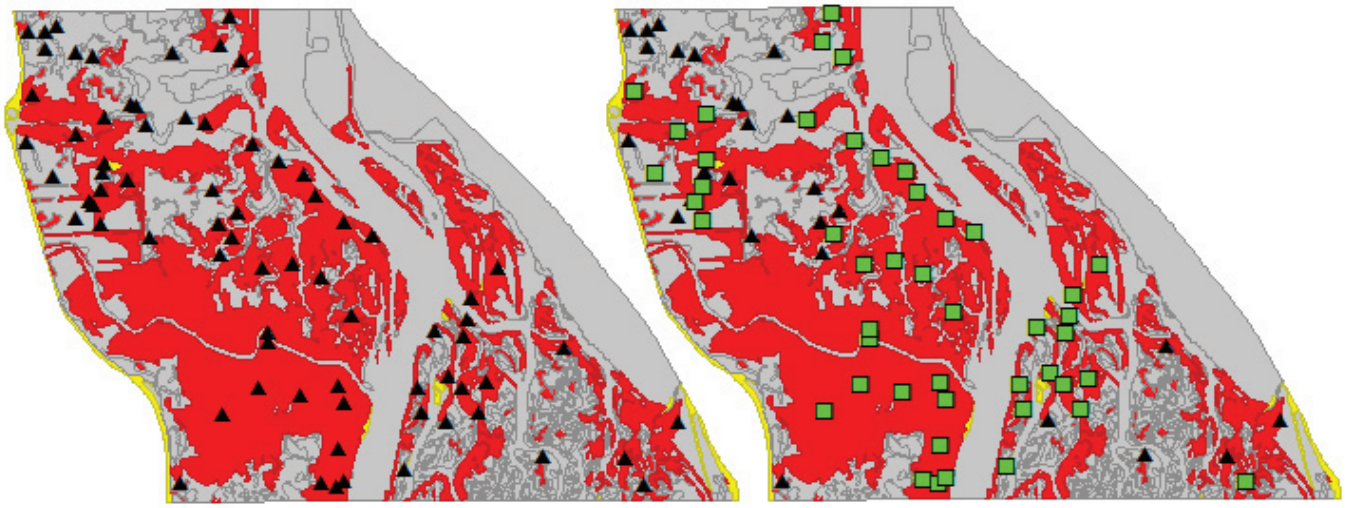


Figure A6-11. American Redstart Potential Species Occurrence theme overlaid with U.S. Geological Survey 1995 Breeding Passerine Bird Survey data queried for presence (AMRE > 0) of American Redstarts (selected points in green)

1. Start **ArcView**.
2. Select the **Tables** icon from the Project window (fig. A6-12).

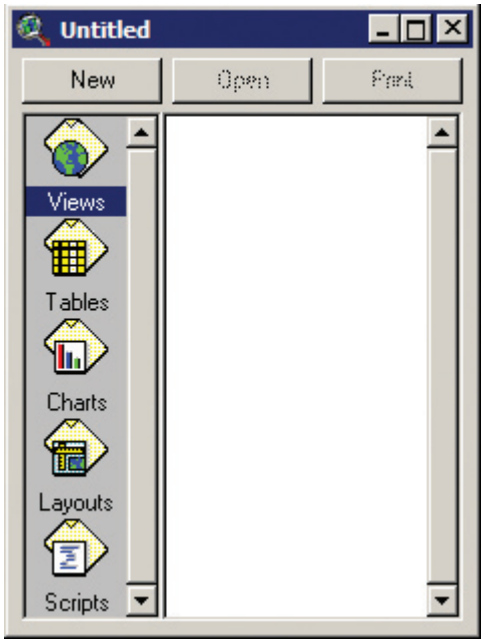


Figure A6-12. ArcView's Project window

3. Click the **Add** button to bring up the Add Table window.
4. Select the type of the tabular data to add (i.e., **dBASE**, **INFO**, **Delimited Text**).
5. Navigate to your data directory, select the **desired table** file, and click the **OK** button. The data are loaded and displayed in a Table window.

   Note: Tables loaded as text files (.txt*) cannot be edited in ArcView, although tables loaded as (**.dbf*) files may be edited.**

Section 7: CCP GIS Clipping Tool

Background

The CCP GIS Clipping Tool (Clipping Tool) is an additional ArcView extension provided with the CCP GIS Tools CD-ROM. The Clipping Tool allows you to clip data themes and then view summary statistics of the clipped region. What makes the Clipping Tool a powerful analytical tool is its ability to cut through multiple themes and compare those themes using a common attribute.

To activate the Clipping Tool, start **ArcView**, select **Extensions** from the **File** menu. Scroll through the list of available extensions, click the box by **CCP GIS Clipping Tool**, and click the **OK** button (fig. A7-1). A new View window appears with a new button and a new tool. The Clipping Tool (Clip with theme) button allows you to load a clipping region from a preexisting data theme. The Clipping Tool allows you to interactively clip a region from a data theme(s). You will need to set the View's map units. Select **Properties** from the **View** menu. Once the dialog window opens, set ***Map Units: to meters***.

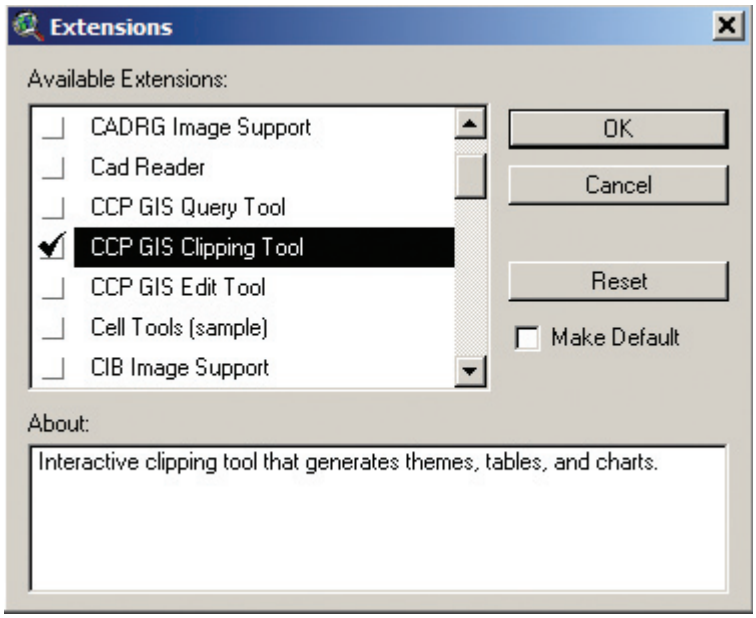


Figure A7-1. Check box by CCP GIS (Comprehensive Conservation Plan Geographic Information System) Clipping Tool activates the tool

Tutorial Exercise

Scenario: A refuge manager is interested in how land cover composition has changed over the years in a backwater area of Pool 8 on the Mississippi River. You clip an area by drawing a polygon around the area of interest.

1. Define the Area of Analysis

Five data themes (*lcu75.shp*, *lcu89.shp*, l*cu91.shp*, l*cu94.shp*, *lcu98.shp)* that cover the same spatial extent are in the directory *sample_data* that you copied to the computer's hard drive in Section 2. Load these files into a View window. While holding down the **Shift** key, click the **legend of each theme** that you want to analyze to make them active. All of the active themes should possess at least one attribute in common. This attribute (attribute = field in theme's data table) should have the same name or alias and the same data type. Click the **Clipping Tool** and **draw a polygon** around the region to be clipped (fig. A7-2). Click **once** for each vertex and **double-click** to finish the polygon.

2. Fill in Output Specifications Created by the Clipping Tool

Once a polygon is created to clip the selected themes, a dialog box appears on the screen (fig. A7-3). This dialog box has user input areas to (1) specify a ***Basename for Output Docs*** created by the Clipping Tool, (2) select an ***Output Directory*** to place the generated files, (3) ***Select Field to Summarize*** common to all active themes on which summary statistics will be

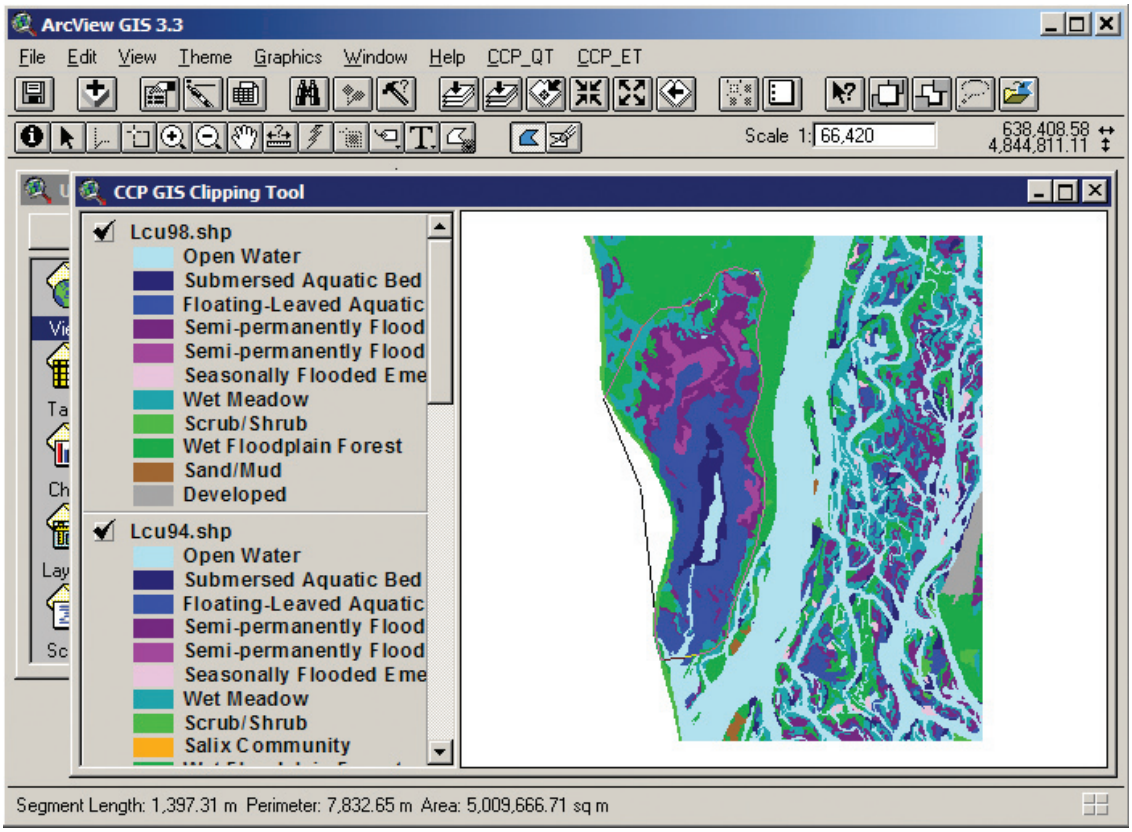


Figure A7-2. Use the Comprehensive Conservation Plan Geographic Information System Clipping Tool to create a clipping polygon

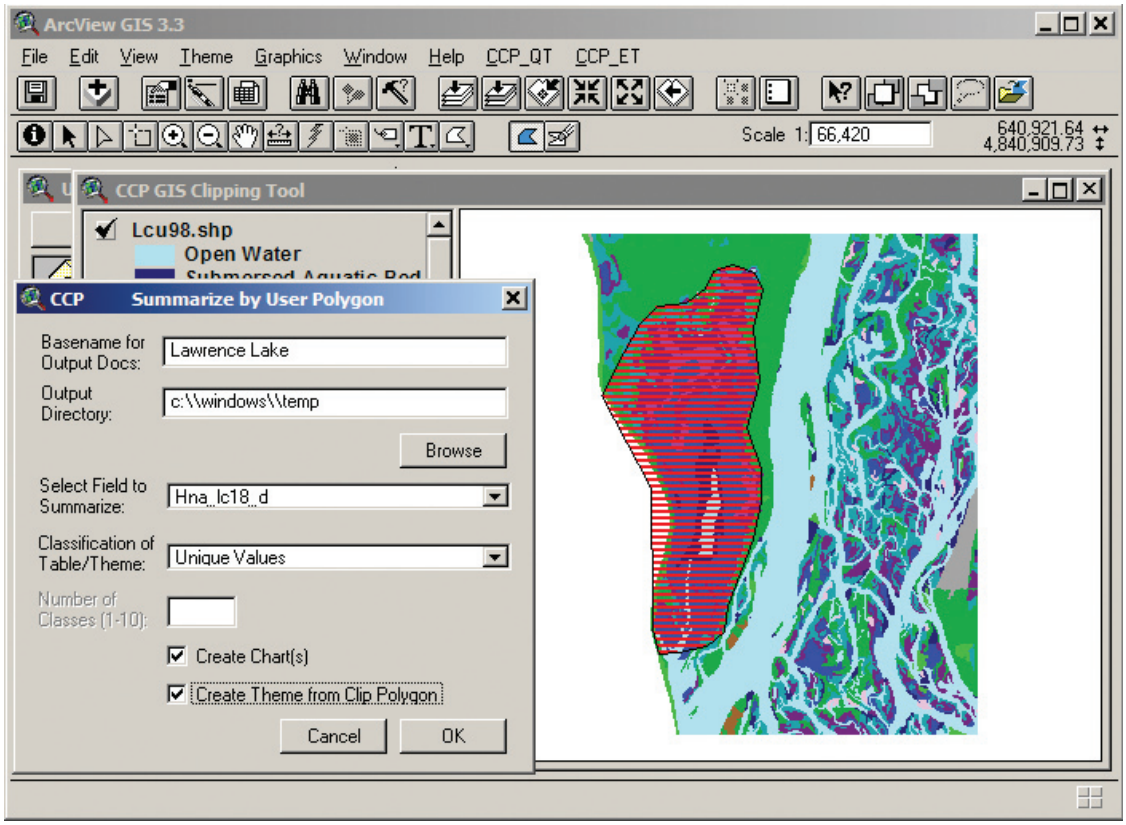


Figure A7-3. Dialog box used to designate output specifications of the clipping procedure

performed, (4) select the type of ***Classification of Table/Theme*** used with the tables and themes, (5) click the box to ***Create Charts*** as an output, and (6) click the box to ***Create Themes from the Clip Polygon***. If the field being summarized is numerical, the dialog box will also prompt you to specify the ***Number of Classes*** to use in grouping the resulting numbers. If the field being summarized is a character-string, you will only be able to designate the ***Classification of Table/Theme*** as **Unique Values** and the ***Number of Classes*** option will be deactivated. After filling in the information and clicking the **OK** button in the dialog box, the Clipping Tool proceeds with using the clipping polygon to extract data from the active themes and create a new graphic and tabular output.

3. Examine Outputs

Once the process is finished, the areas that overlapped the clipping polygon are added to the active View window (fig. A7-4). The associated tables and charts are also added to the project and can be accessed from ArcView's Project window (fig. A7-5).

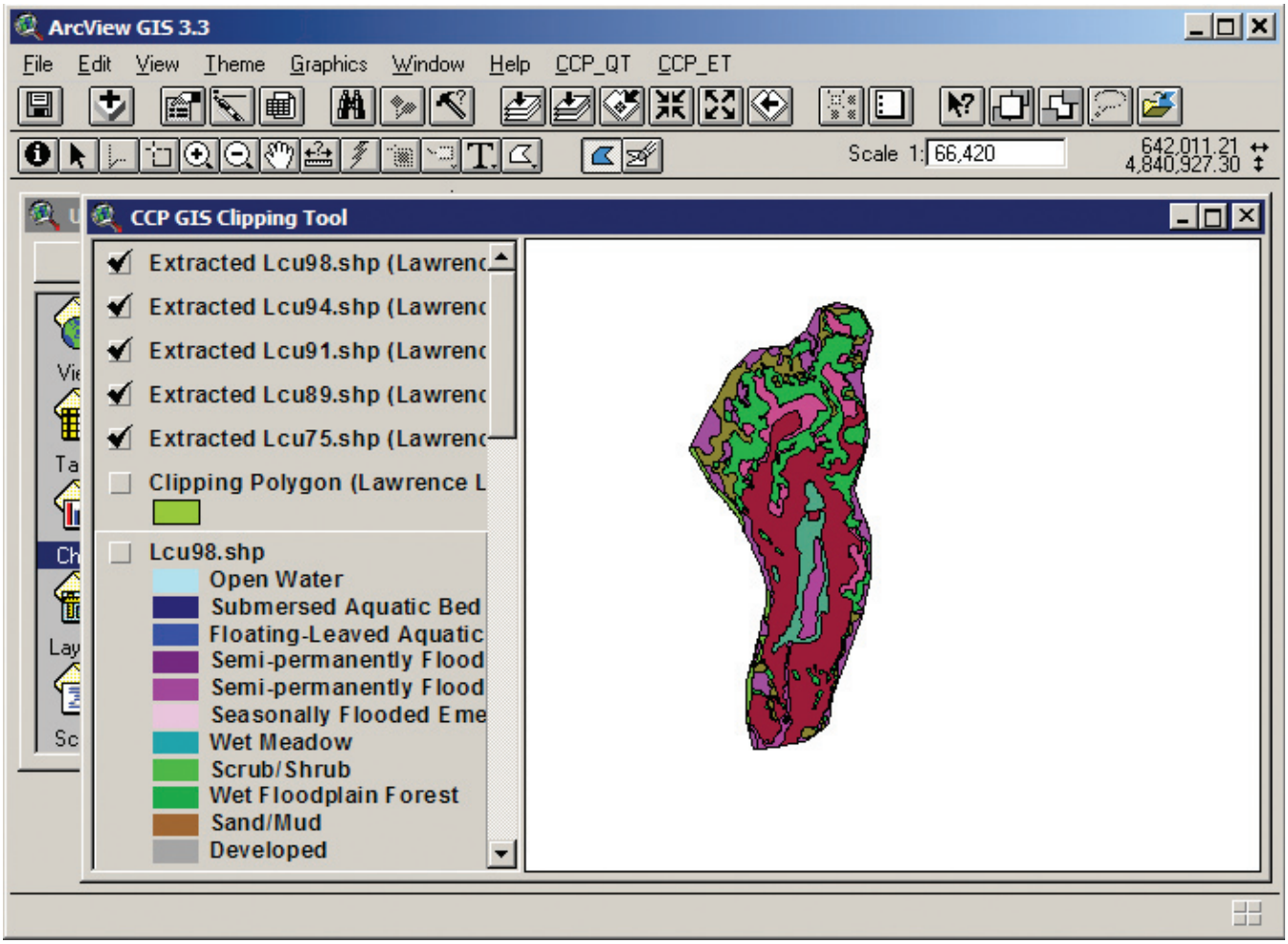


Figure A7-4. Extracted files drawn in the View window after the clipping procedure

All the charts created have the area calculation along the y axis (fig. A7-6). If the map units were specified in the View properties dialog box before running the Clipping Tool, acres are calculated for the output themes. Acres are also used in the summary statistics. The classes that the data were summarized on are located along the x axis of the chart. A chart is created for each data theme that was clipped. A comparison chart is also created so you can identify trends in the data (fig. A7-7).

Note: If the user opens a chart and gets a message that says, "There is not enough space to plot the chart…" just increase the size of the window and the chart will display. If the chart still does not display, there are too many columns in the chart to view.

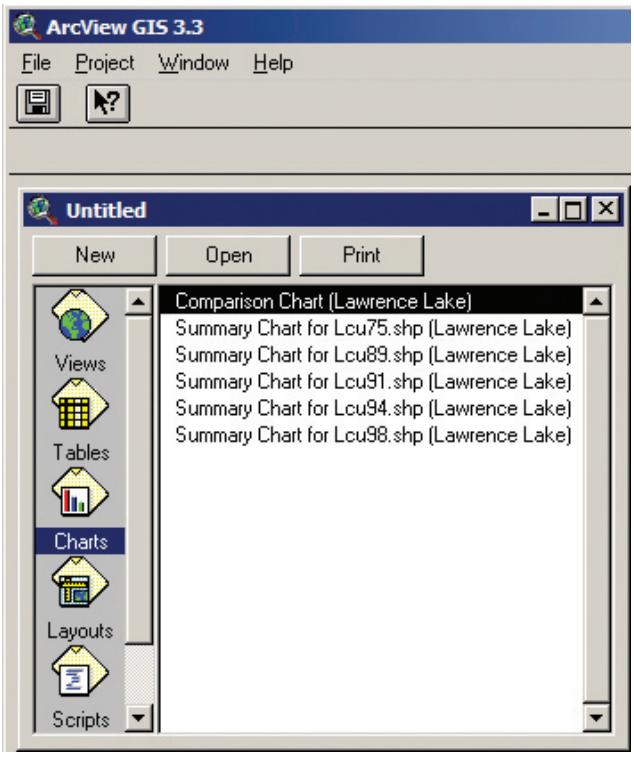


Figure A7-5. Charts created when the example clipping procedure is completed

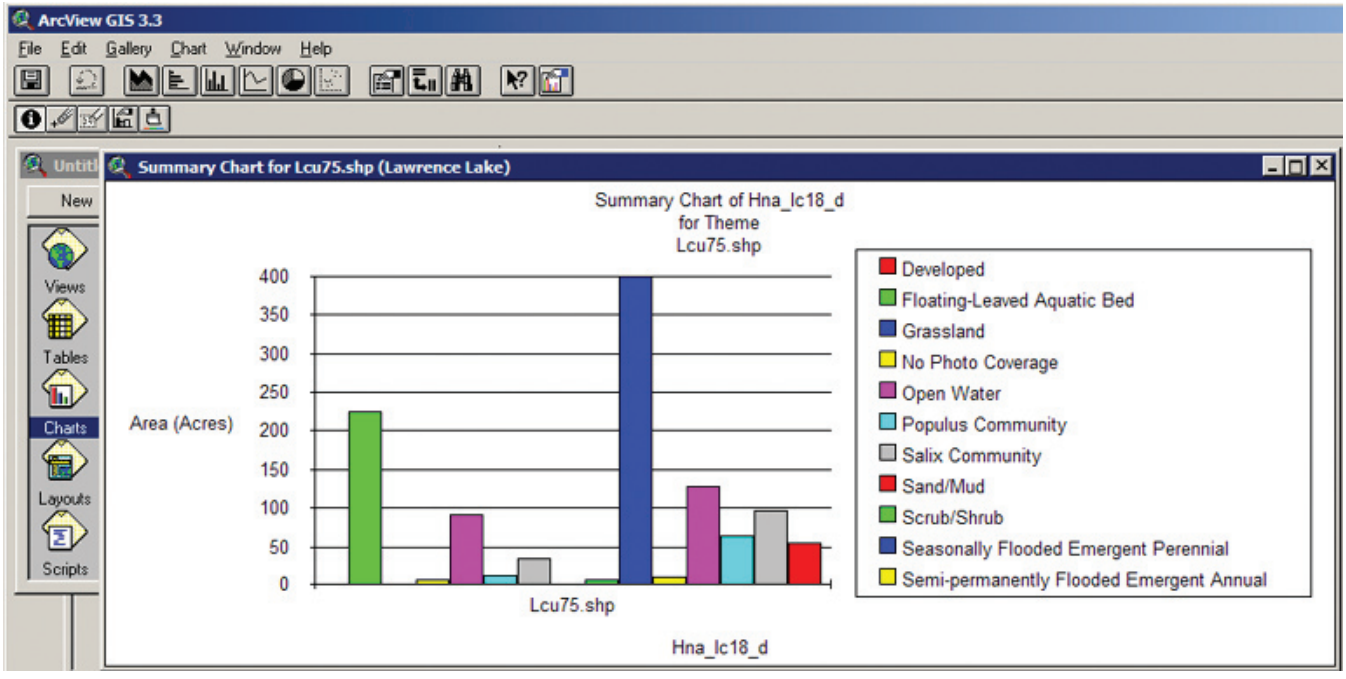


Figure A7-6. Summary chart for one of the clipped themes

The charts can be altered to look at the relations among different classes. To do this, select the **Chart Tool** button (fig. A7-7). Clicking this button opens a dialog box that allows you to select any combination of available classes and revise the graph showing only those classes.

Besides creating charts with the Clipping Tool, summary tables are automatically created for each theme that is clipped (fig. A7-8). Tables for the individual themes have a field for the class description, the number of polygons for each class description, the total acres of that class in the clip area, and the percentage of that class in the clip area.

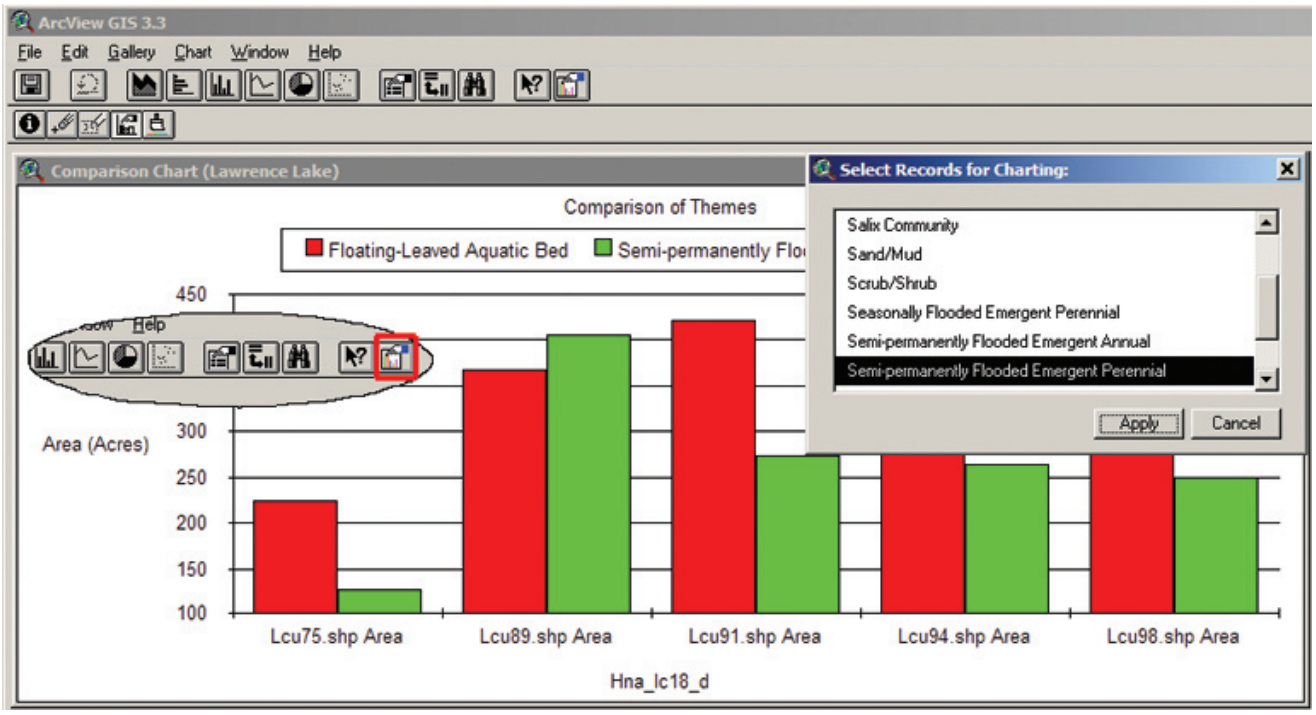
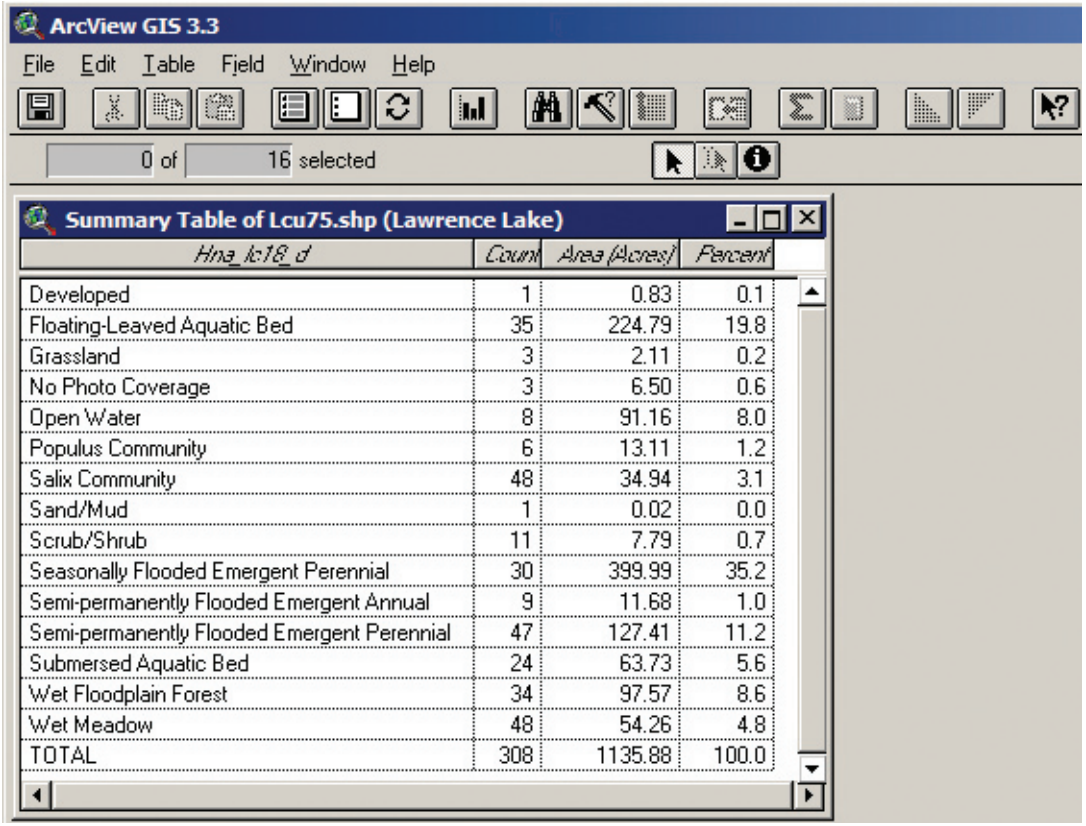


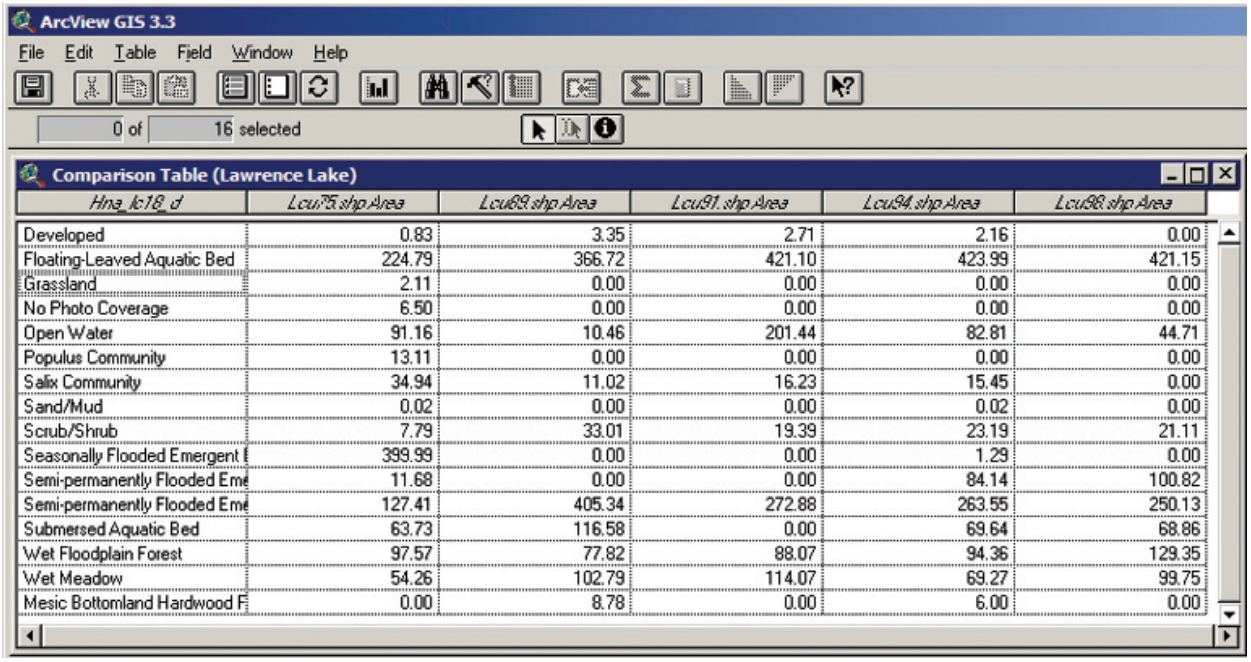
Figure A7-7. Comparison chart for all clipped themes showing the floating-leaved aquatic bed and semi-permanently flooded emergent perennial classes



Hna_lc18_d	Count	Area (Acres)	Percent
Developed	1	0.83	0.1
Floating-Leaved Aquatic Bed	35	224.79	19.8
Grassland	3	2.11	0.2
No Photo Coverage	3	6.50	0.6
Open Water	8	91.16	8.0
Populus Community	6	13.11	1.2
Salix Community	48	34.94	3.1
Sand/Mud	1	0.02	0.0
Scrub/Shrub	11	7.79	0.7
Seasonally Flooded Emergent Perennial	30	399.99	35.2
Semi-permanently Flooded Emergent Annual	9	11.68	1.0
Semi-permanently Flooded Emergent Perennial	47	127.41	11.2
Submersed Aquatic Bed	24	63.73	5.6
Wet Floodplain Forest	34	97.57	8.6
Wet Meadow	48	54.26	4.8
TOTAL	308	1135.88	100.0

Figure A7-8. Summary table for one of the clipped themes

If multiple data themes are clipped, a comparison table is also created (fig. A7-9). This table has a field for the common class description and for each data theme that represents the total area of each class type.



Hna_lc18_d	Lcu75.shp Area	Lcu89.shp Area	Lcu91.shp Area	Lcu94.shp Area	Lcu98.shp Area
Developed	0.83	3.35	2.71	2.16	0.00
Floating-Leaved Aquatic Bed	224.79	366.72	421.10	423.99	421.15
Grassland	2.11	0.00	0.00	0.00	0.00
No Photo Coverage	6.50	0.00	0.00	0.00	0.00
Open Water	91.16	10.46	201.44	82.81	44.71
Populus Community	13.11	0.00	0.00	0.00	0.00
Salix Community	34.94	11.02	16.23	15.45	0.00
Sand/Mud	0.02	0.00	0.00	0.02	0.00
Scrub/Shrub	7.79	33.01	19.39	23.19	21.11
Seasonally Flooded Emergent	399.99	0.00	0.00	1.29	0.00
Semi-permanently Flooded Eme	11.68	0.00	0.00	84.14	100.82
Semi-permanently Flooded Eme	127.41	405.34	272.88	263.55	250.13
Submersed Aquatic Bed	63.73	116.58	0.00	69.64	68.86
Wet Floodplain Forest	97.57	77.82	88.07	94.36	129.35
Wet Meadow	54.26	102.79	114.07	69.27	99.75
Mesic Bottomland Hardwood F	0.00	8.78	0.00	6.00	0.00

Figure A7-9. Comparison table for all clipped themes showing acreages for each class

Using a Preexisting Polygon as a Clipping Region

Besides making a polygon interactively to clip themes, the Clipping Tool also provides the option to clip themes by using an existing data theme. You may clip with a subset or an entire data theme using selected polygons. A theme, *aqua89.shp*, that covers the same extent as the themes added previously is in the directory *sample_data* that you copied to the computer's hard drive in Section 2. This theme separates the study area into different aquatic area classifications. Load this theme into a View window. Use the **Select Feature Tool** to select the polygon in yellow in fig. A7-10.

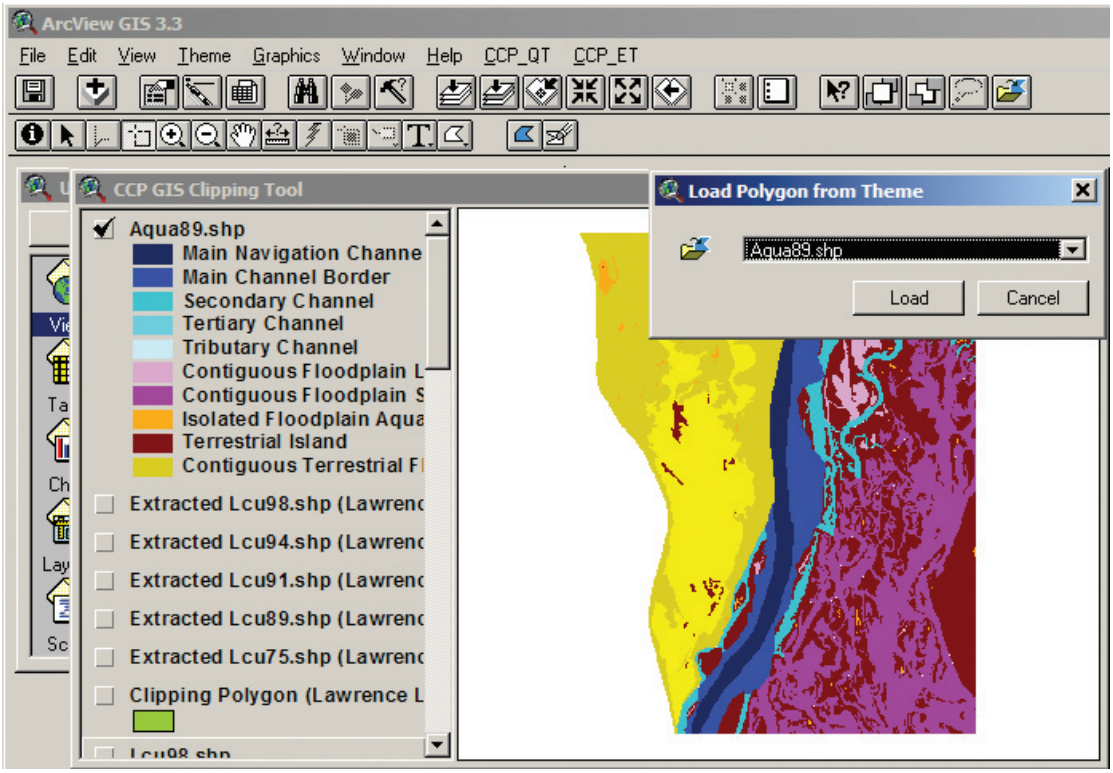


Figure A7-10. Using a preexisting data theme to clip other data

Make all of the themes to clip active. Make sure the theme you are going to clip with (*aqua89.shp*) is not active because you do not want to clip this theme with itself. Click the **Clipping Tool** (**Clip with Theme**) button . This brings up the **Load Polygon from Theme** dialog box (fig. A7-10). In this dialog box, select **the name of the data theme** to use for clipping the other theme(s) that are active. Once you select the data theme, click the **Load** button. This takes you to the same dialog box that was used when you clipped with an interactively created polygon (fig. A7-3). This operation generates products similar to the previous example (i.e., themes, charts, and tables). Fig. A7-11 is an example of output generated by the Clipping Tool using the data theme from fig. A7-10.

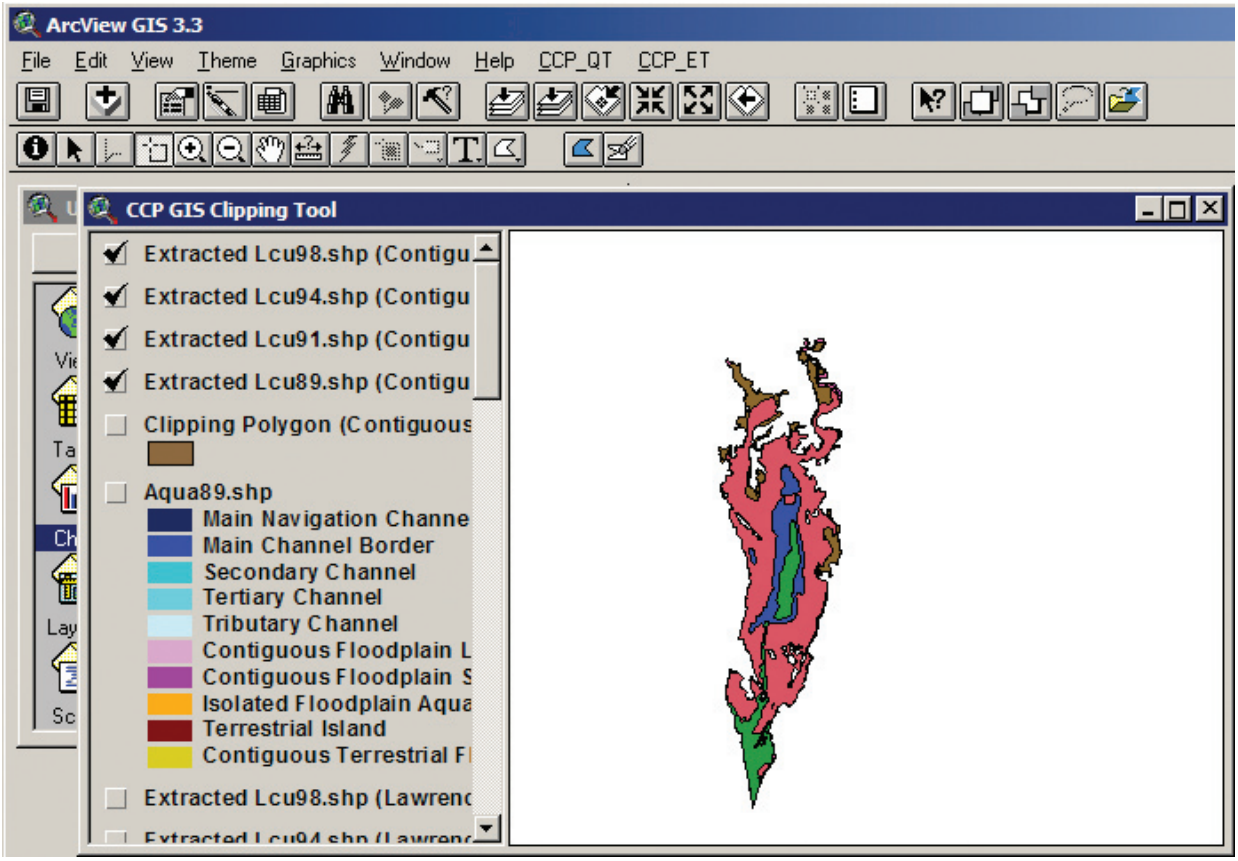
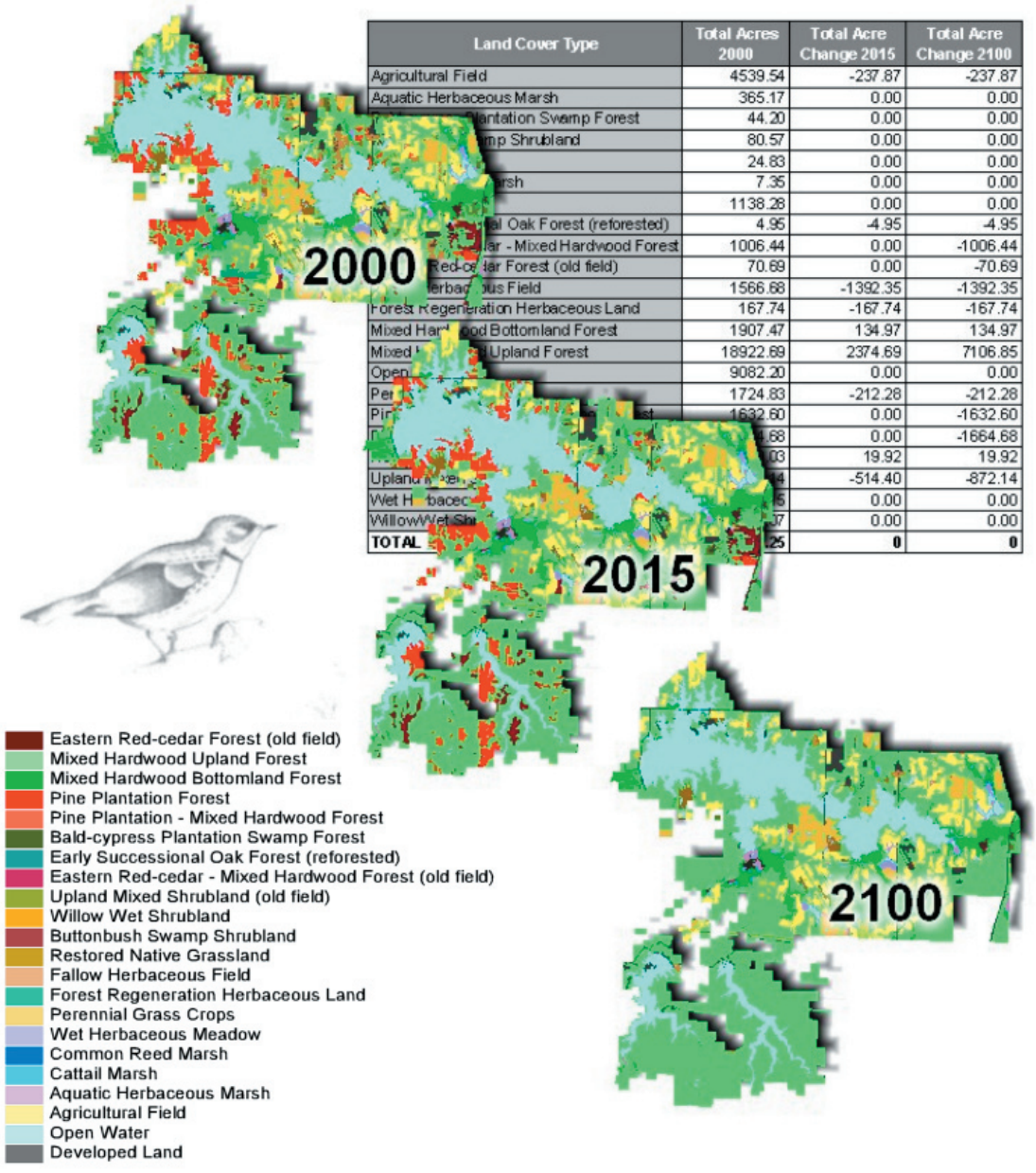


Figure A7-11. Data extracted by using a preexisting data theme

Section 8: CCP GIS Edit Tool

Background

The CCP GIS Edit Tool (Edit Tool) is an additional ArcView extension provided with the latest version of the CCP GIS Tools CD-ROM. The Edit Tool allows you to change the attributes for a selected land cover theme or other polygonal ArcView theme. The Edit Tool also has the ability to calculate several different shape metrics for the features in the selected theme. As you consider various management alternatives, you can graphically depict changes resulting under each alternative scenario using the Edit Tool. Examples of products created for Crab Orchard National Wildlife Refuge CCP using the Edit Tool are provided in fig. A8-1.



Land Cover Type	Total Acres 2000	Total Acre Change 2015	Total Acre Change 2100
Agricultural Field	4539.54	-237.87	-237.87
Aquatic Herbaceous Marsh	365.17	0.00	0.00
[illegible]lantation Swamp Forest	44.20	0.00	0.00
[illegible]mp Shrubland	80.57	0.00	0.00
[illegible]	24.83	0.00	0.00
[illegible]rsh	7.35	0.00	0.00
[illegible]	1138.28	0.00	0.00
[illegible]al Oak Forest (reforested)	4.95	-4.95	-4.95
[illegible]ar - Mixed Hardwood Forest	1006.44	0.00	-1006.44
[illegible]Red-ce[illegible]ar Forest (old field)	70.69	0.00	-70.69
[illegible]erbac[illegible]us Field	1566.68	-1392.35	-1392.35
Forest Regeneration Herbaceous Land	167.74	-167.74	-167.74
Mixed Har[illegible]od Bottomland Forest	1907.47	134.97	134.97
Mixed [illegible]Upland Forest	18922.69	2374.69	7106.85
Open [illegible]	9082.20	0.00	0.00
Per[illegible]	1724.83	-212.28	-212.28
Pi[illegible]	1632.60	0.00	-1632.60
[illegible]	[illegible].68	0.00	-1664.68
[illegible]	[illegible].03	19.92	19.92
Upland[illegible]pen[illegible]	[illegible]4	-514.40	-872.14
Wet H[illegible]baceo[illegible]	[illegible]5	0.00	0.00
Willow[illegible]Wet Shr[illegible]	[illegible]7	0.00	0.00
TOTAL	[illegible]25	0	0

Figure A8-1. Example of products created with the Comprehensive Conservation Plan Geographic Information System Edit Tool

To activate the Edit Tool, start **ArcView**, select **Extensions** from the **File** menu. Scroll through the list of available extensions, click the box by **CCP GIS Edit Tool** , and click the **OK** button (fig. A8-2). In the Project window, select the **Views**

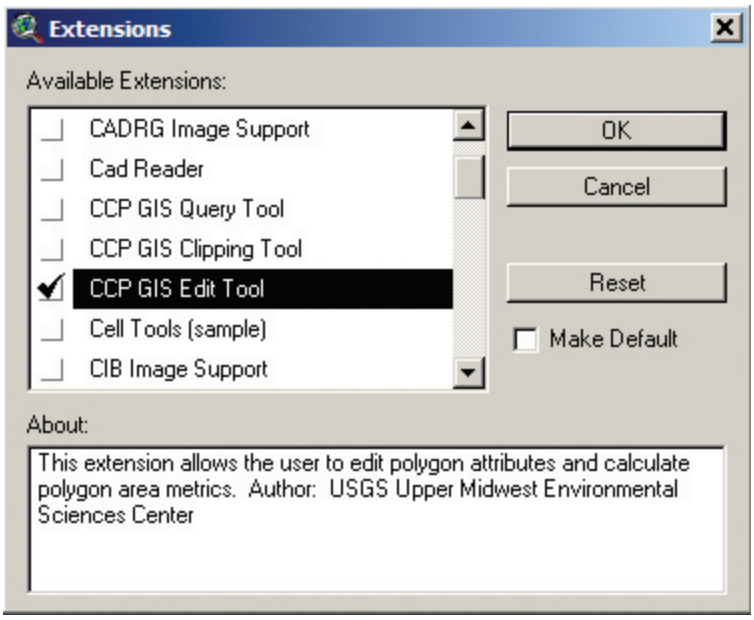


Figure A8-2. Check box by CCP GIS (Comprehensive Conservation Plan Geographic Information System) Edit Tool activates the tool

icon and click the **New** button. A new View window opens and the **Edit Tool** and the **CCP_ET** menu appear. Before you can access the tools, the View's map units must be set by selecting **Properties** from the **View** window and choosing a **map unit** (i.e., meters). A sample land cover theme, *cro_edit.shp*, is in the directory *sample_data* that you copied to the computer's hard drive in Section 2. Load this file into a new ArcView View window for this example.

If there is an active theme in the View window and you click the **CCP_ET** menu, three menu options appear (fig. A8-3). If the menu options are faded and difficult to read, this means the active theme in the View window does not have read/write permission for the user. To make the theme editable, follow the directions in Section 2, Copying sample data/matrix from the CD-ROM, step 2.

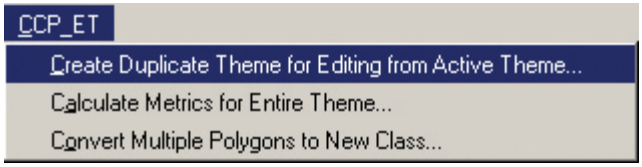


Figure A8-3. CCP_ET menu options

Creating a Duplicate Theme for Editing

The first option **Create Duplicate Theme for Editing from Active Theme** converts the active theme to a new theme that is ready for editing. This creates a backup copy of the theme you want to edit and also prepares the new theme for editing. Selecting this option with a theme active brings up a window prompting you to select an edit field (fig. A8-4). The edit field is in the land cover theme's database table that will be used for editing and also will be used later as the unique identifier in the CCP GIS Query Tool. Select ***Map_desc*** for this example.

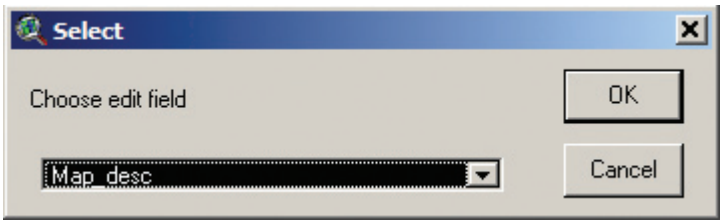


Figure A8-4. Choose Edit Field window

Next, you will be prompted to select a location and file name for the new shapefile created (fig. A8-5). Click the **OK** button to add the new theme to the View window.

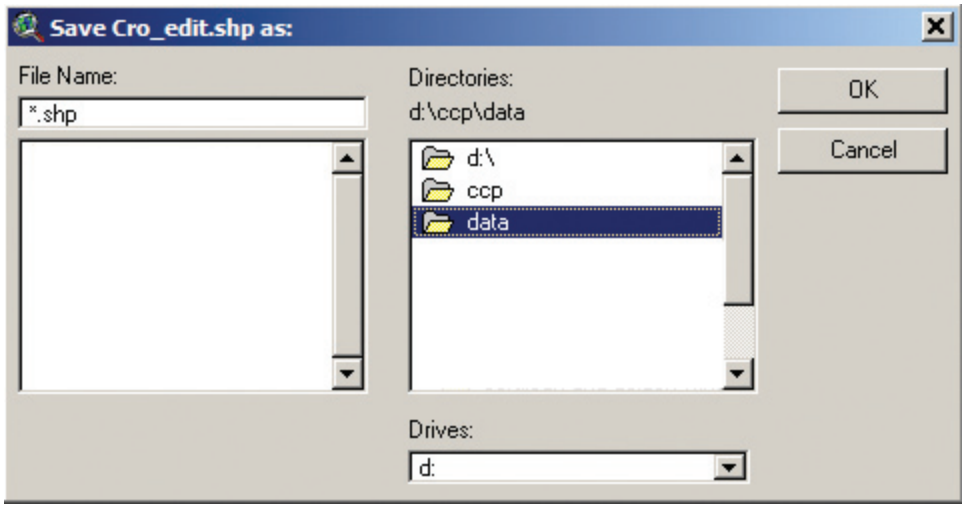


Figure A8-5. Save Data Theme as: window

Once the program adds the new shapefile, you can click any polygon with the **Identify Tool** and a window opens with the associated attributes in the file's database table. The only field that was kept from the original shapefile was ***Map_desc*** (fig. A8-6). Two fields are also added called ***Area*** and ***Perimeter***.

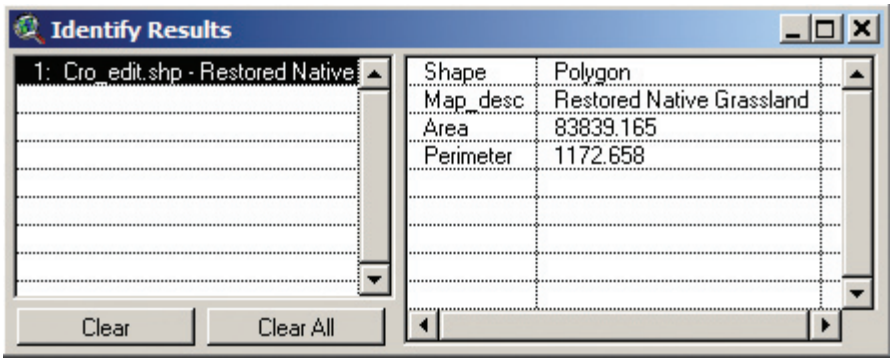


Figure A8-6. Identify results

The reason extra fields are deleted is to alleviate any possible confusion later. For example, if a polygon's attribute for the field ***Map_desc*** is changed from Mixed Upland Forest to Restored Native Grassland that particular field is updated but the extra fields will now have erroneous data. For instance, if there was a field ***Dom_species***, it might still indicate *Quercus rubra* when the field ***Map_desc*** has already been changed to Restored Native Grassland. The extra fields attribute information is now irrelevant.

This menu option removes boundaries among adjacent polygons that have the same values for the edit field (e.g., ***Map_desc***). This ensures that all of the features in the theme are independent of one another and not connected. For example, if you use the Identify Tool to select a polygon of type open water, only the polygon that overlaps the cursor is selected rather than all polygons that are open water.

Calculating Metrics for the Active Theme

The second option under the **CCP_ET** menu is **Calculate Metrics for Entire Theme** (fig. A8-7). If you click this option, a window appears prompting you to select desired metric calculations for the land cover theme.

If the box by **Area, Perimeter, Area/Perimeter (AdivbyP), and Acres** is checked, all of these area and length measurements will be calculated and added as joined fields to the themes feature attribute table. The **Diversity of Shape** provides the polygon shape diversity where (Diversity = Perimeter/Circumference of perfect circle with same area). The **Core Area** has an

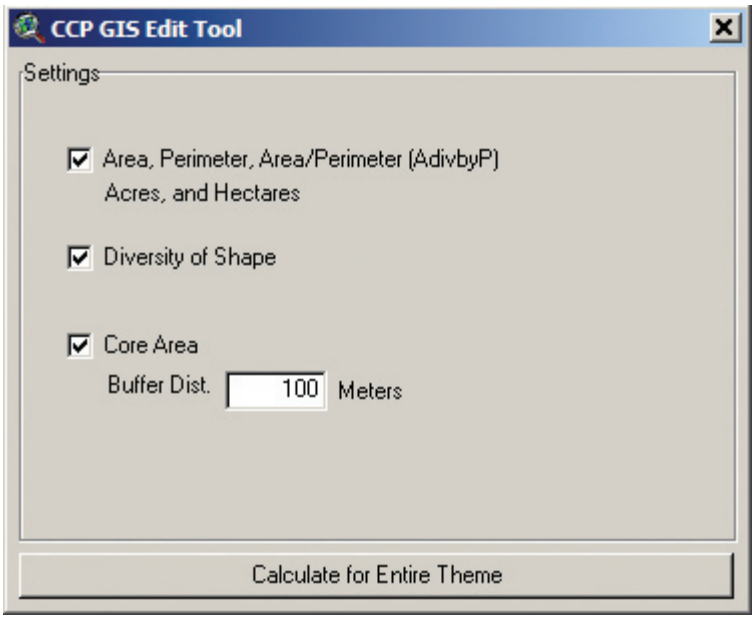


Figure A8-7. Calculate Metrics For Entire Theme dialog window

associated text box in which to enter a buffer distance value. Core area is calculated by buffering each individual polygon into itself by the ***Buffer Dist.*** (in **map units**). The core area is then the remaining area in the buffer (fig. A8-8).

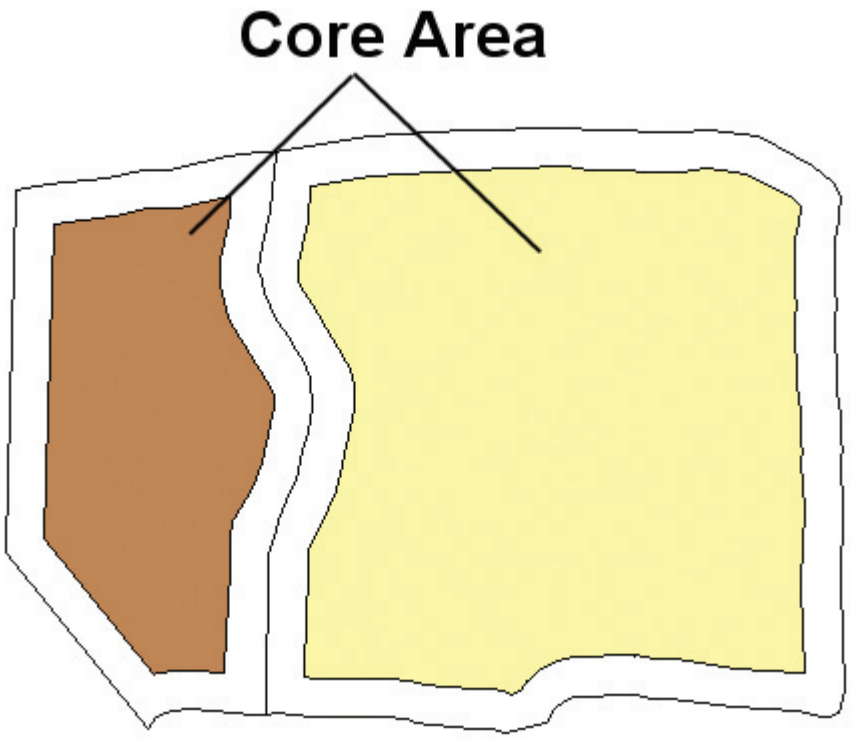


Figure A8-8. A graphic display of core area

Clicking in a polygon with the Identify Tool after all selected metrics are calculated brings up a window with the attributes of each field for that particular polygon (fig. A8-9). The **100** designates the core area buffer distance (in map units) in the field ***CA_100***.

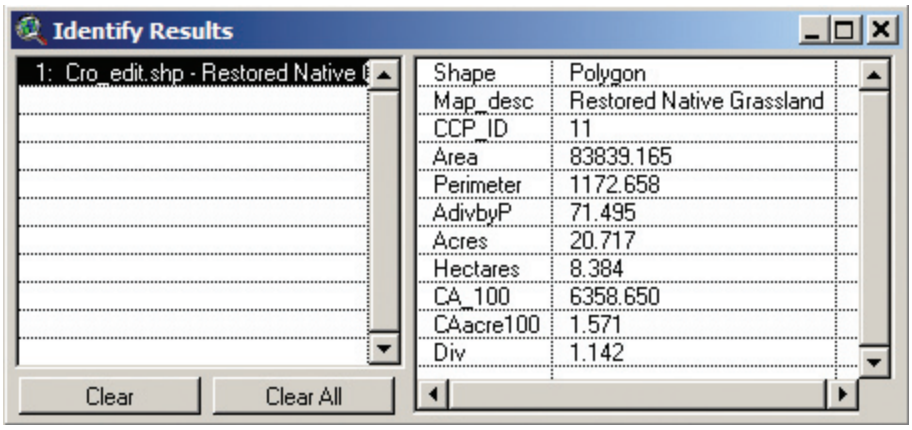


Figure A8-9. Identify results

Converting Multiple Polygons to a New Class

The third option under the **CCP_ET** menu is **Convert Multiple Polygons to New Class**, choosing this option will change the attribute values for all selected shapes in the active theme. Fig. A8-10 shows a sample land cover theme. If you use the Selection Tool or the Query Builder button to select a subset of the theme's features, the **Convert Multiple Polygons to New Class** will change the theme's attributes. In fig A8-11, all fallow fields are selected using the **Query Builder**. Fig. A8-12 shows all the selected areas in yellow (set in **Project -> Properties**). If you select **Convert Multiple Polygons to New Class** from the **CCP_ET** menu, a window appears prompting you to select an edit field.

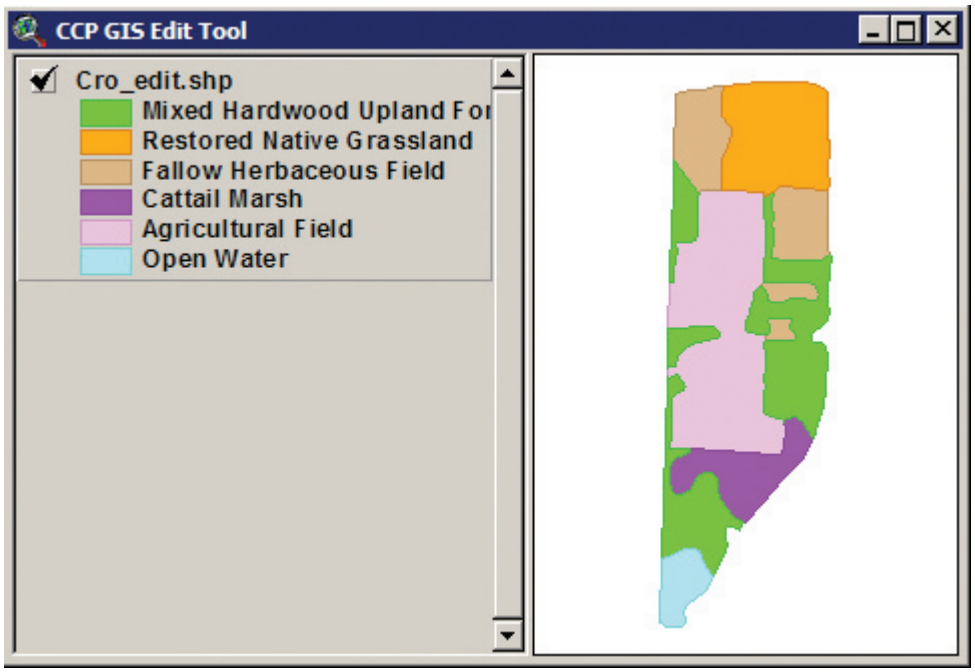


Figure A8-10. A sample data land cover theme

Once the edit field is selected, the user must choose an **existing unique value** already in the theme's attribute table or the user can also click the **User Supplied** radio button and enter a **new value** in the supplied text box (fig. A8-13). When the user clicks the **Apply** button, the selected polygons labels for the field ***Map_desc*** are changed from Fallow Herbaceous Field to Agriculture in the themes attribute table. Next, the program dissolves the boundaries among the polygons with similar attributes for ***Map_desc*** and calculates new area and perimeter measurements (fig A8-14).

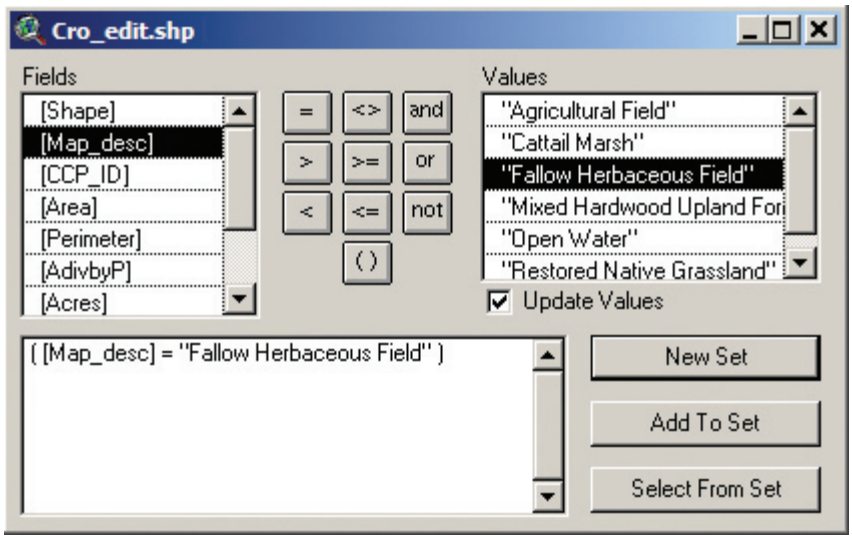


Figure A8-11. Using the Query Builder to select "Fallow Herbaceous Field"

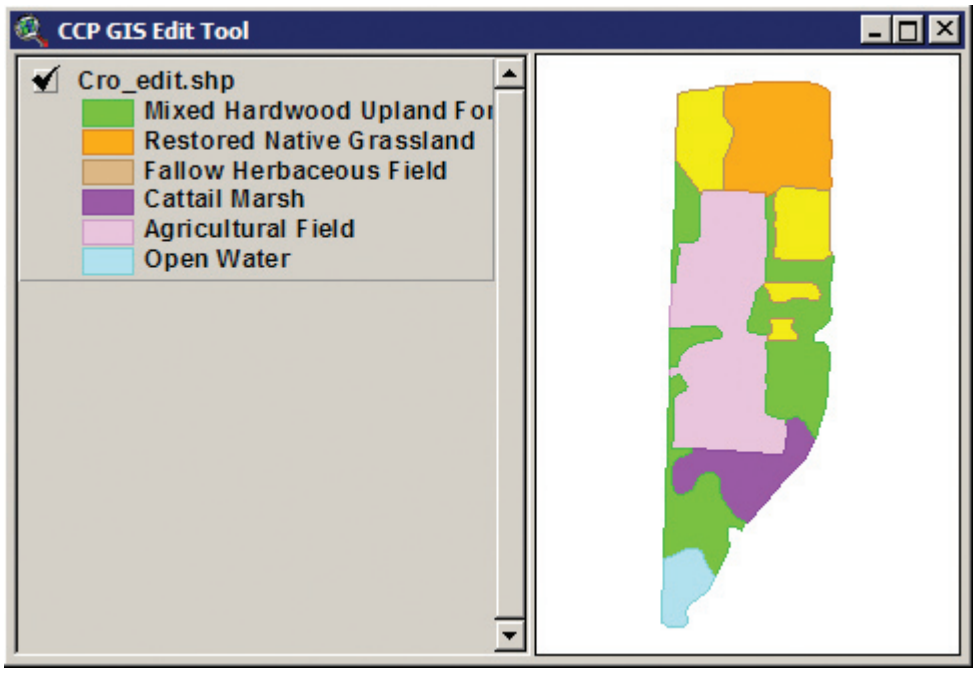


Figure A8-12. Selected fallow herbaceous fields are in yellow

Converting Individual Polygons to a New Class

Before using this option, use the **Create Duplicate Theme for Editing from Active Theme** menu option to create a backup copy of the active theme as described in fig. A8-3. Use this option so you do not lose any information in the original theme.

The **Edit Tool** allows you to interactively change individual polygon attributes in a data theme. When the tool is selected, the active theme goes into editing mode. Next, select a **polygon** in the View window and the Edit Tool window will appear (fig. A8-15).

In the Edit Tool window, you click the **Calculate Shape Metrics** button and a window appears that prompts you to choose the shape metrics to calculate for the selected polygon (fig. A8-16). This is similar to the Calculate Metrics for Entire Theme menu option described previously but only calculates metrics for one feature and brings up a text window displaying the results, instead of adding the values to the features table (fig. A8-17).

Clicking the **Identify** button in the window will bring up the Results text window.

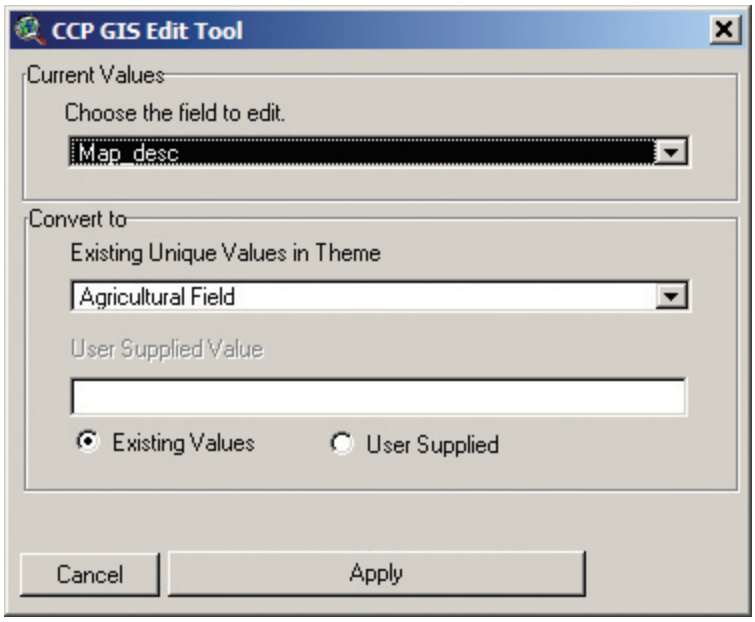


Figure A8-13. The CCP GIS (Comprehensive Conservation Plan Geographic Information System) Edit Tool Convert Multiple Polygons to New Class dialog window

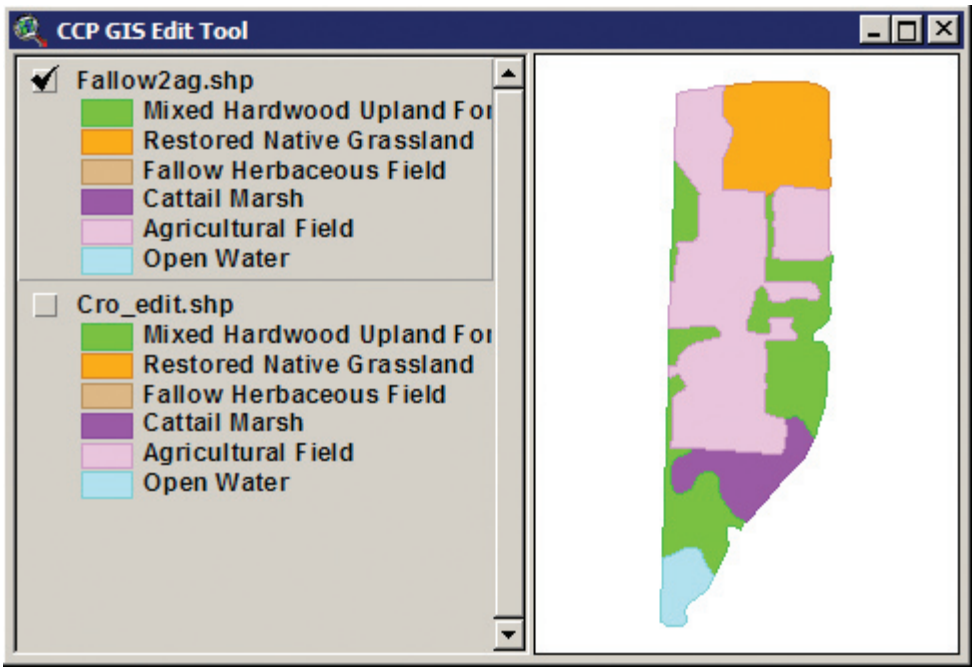


Figure A8-14. Output theme created by using the Convert Multiple Polygons to New Class menu

If you close the window, the Edit Tool window returns. In the first box, you are prompted to select the field and field value to edit (i.e., ***Map_desc: Fallow Herbaceous Field***). Once this is selected, you can either select **an existing unique value** in the theme to change the polygon's field value to, or click the **User Supplied** radio button and input a **text label** into the ***User Supplied Value*** box. Once these fields are filled in, you can click the **Apply** button to make the change. If the polygon's new label is similar to any polygons that are adjacent to the selected polygon, the boundary between the two polygons will be dissolved, and the area measurements will be recalculated for the theme (fig. A8-18).

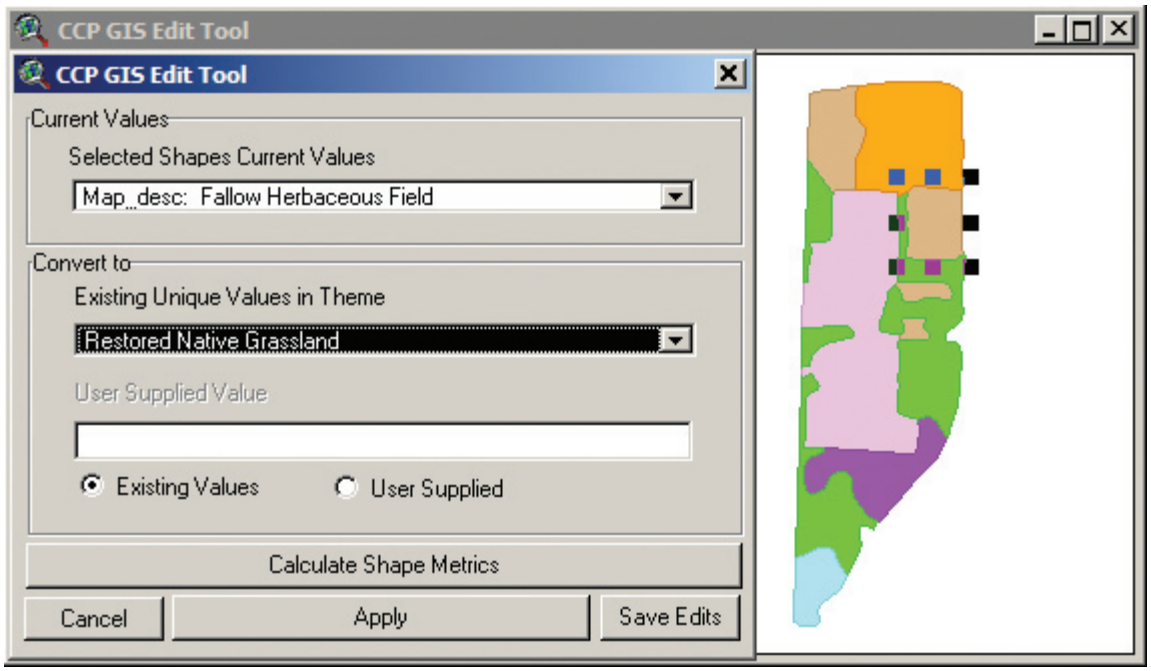


Figure A8-15. Converting individual polygons to a New Class dialog window

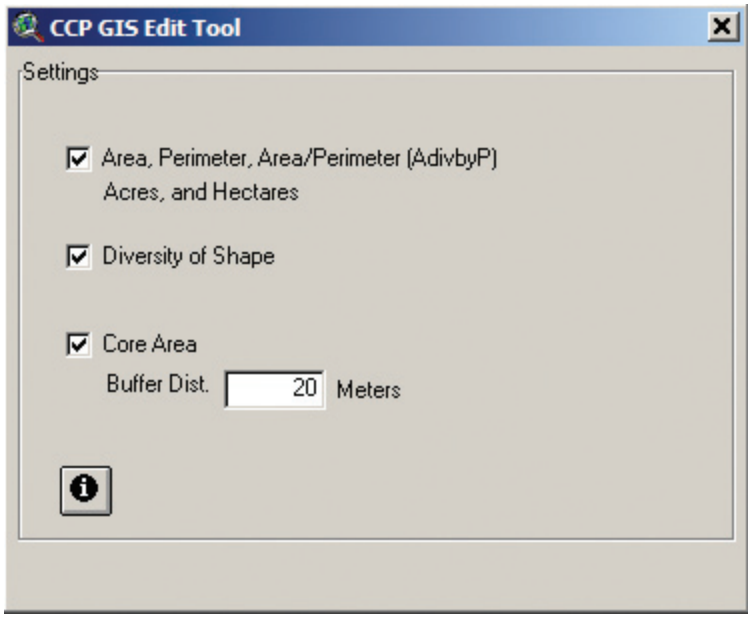


Figure A8-16. Calculate metrics for individual polygon

Once you are finished converting polygons, clicking the **Save Edits** button allows you to save any edits made to the theme. Fig. A8-19 shows the Save EDITS? window. By clicking **YES**, you save the changes to the theme, close the CCP GIS Edit Tool window, and take the theme out of edit mode.

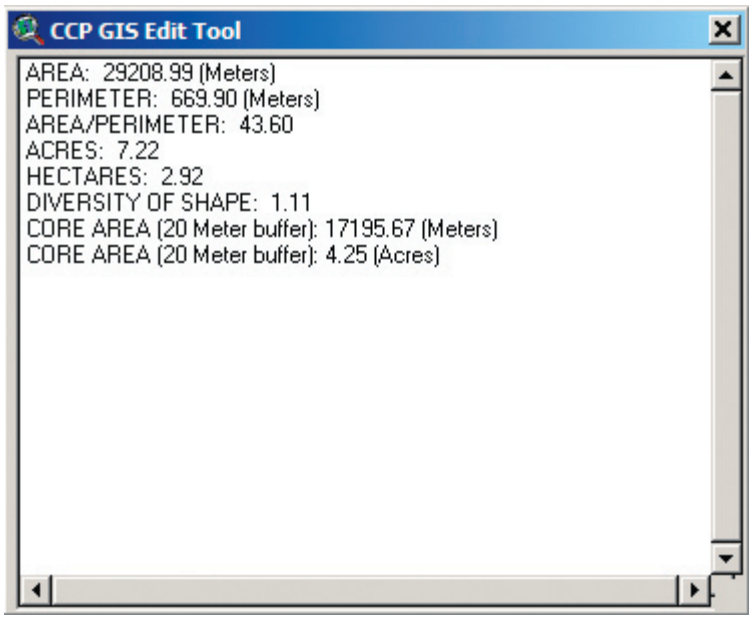


Figure A8-17. Individual polygon metrics results

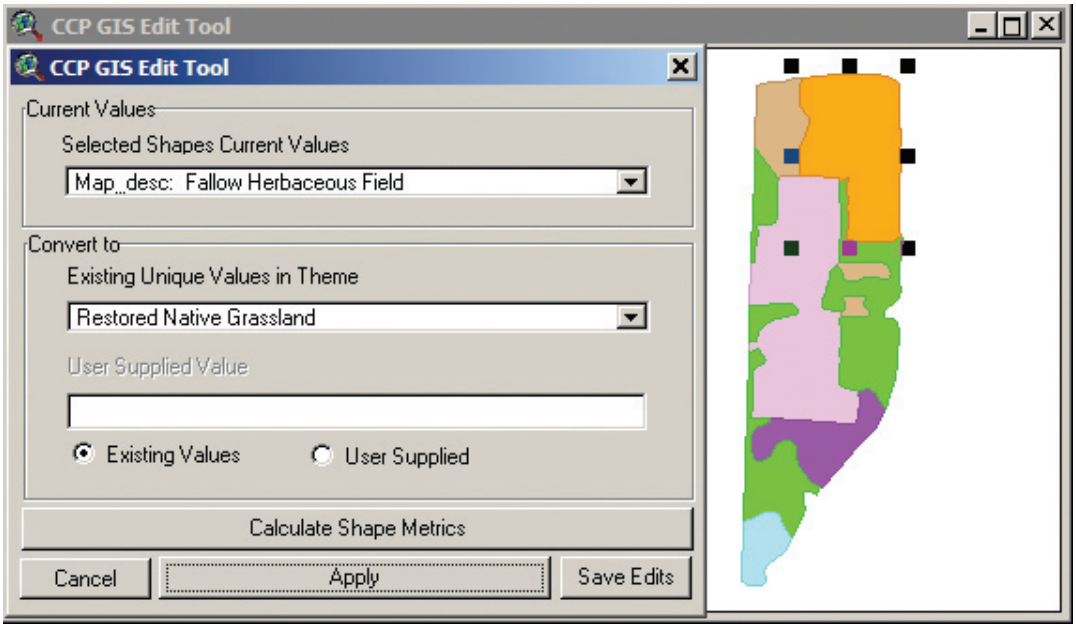


Figure A8-18. Dissolving similar boundaries

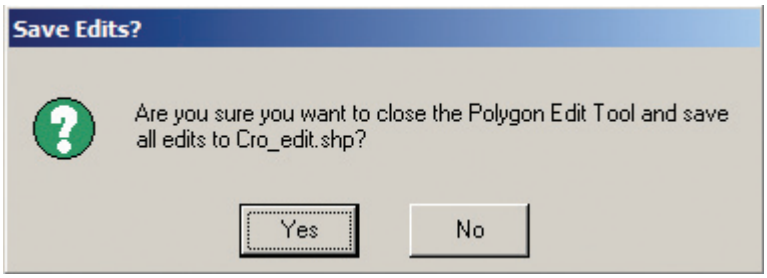


Figure A8-19. Comprehensive Conservation Plan Geographic Information System Edit Tool "Save Edits?" window

Editing Feature Geometry

In addition to changing a feature's attributes, you may also want to change the shape of a feature or add new features to a theme. ArcView supports several different methods for accomplishing this.

The first step in editing a feature's geometry is to put the theme in editing mode. Select the **Theme** menu option with a View window open, and then select **Start Editing**.

Scenario 1: Adding Features to Edit Theme

1. Click and hold the **Drawing and Editing Tool** .
2. When the Drawing and Editing Tools options are displayed (fig. A8-20), select the tool that allows you to draw multivertex polygons .

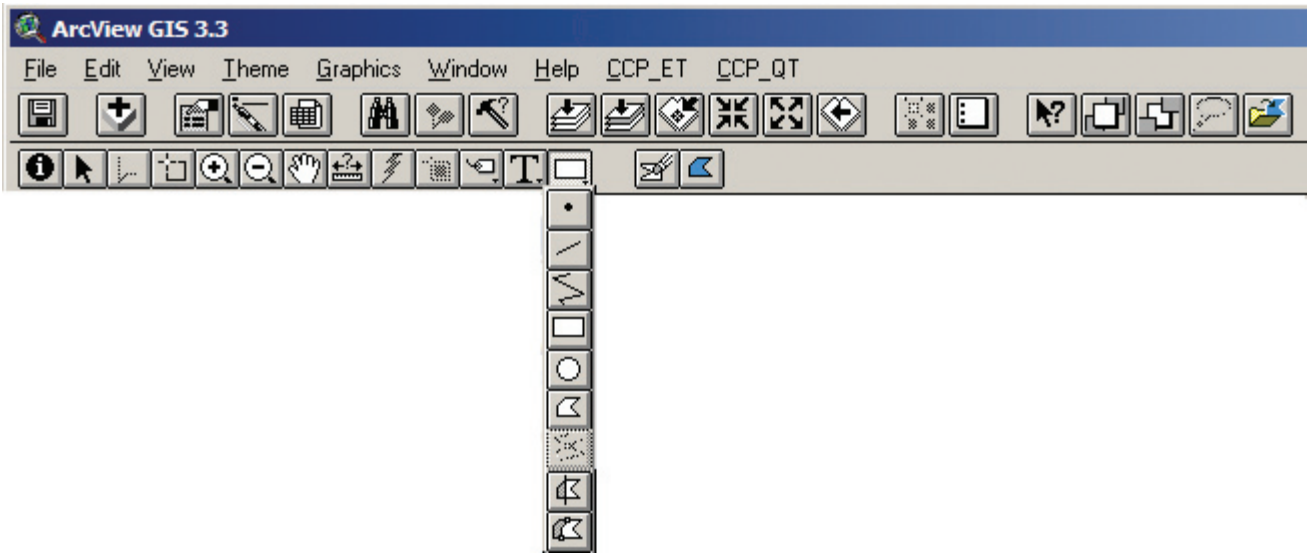


Figure A8-20. ArcView's Drawing and Editing Tools

3. Draw a polygon in the View window. Click **once** to start the polygon, then **once** for each vertice added, and **double-click** to finish the polygon.
4. If the polygon added overlaps another polygon, select the **added polygon** and click the **Shift** key and select the polygon it overlaps so two polygons are selected (fig. A8-21). Use the Pointer Tool to select **polygons** while the theme is in edit mode.

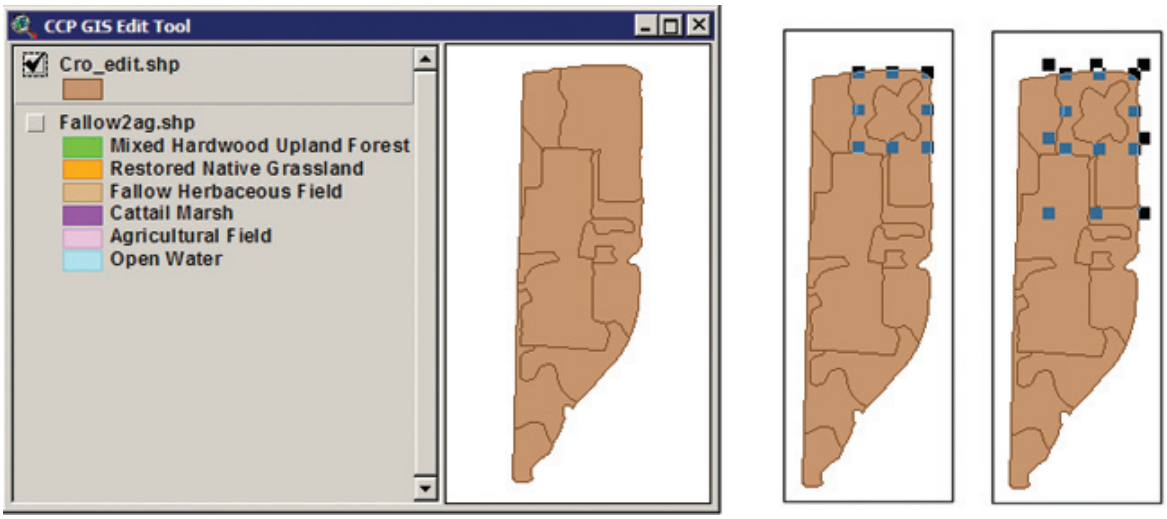


Figure A8-21. Adding a new feature to a theme

5. You need to create a seamless transition from the added polygon to the polygon that it overlaps. Make sure the two features are still selected from step 4. To create the seamless transition, select **Subtract Features** from the **Edit** menu (fig. A8-22).

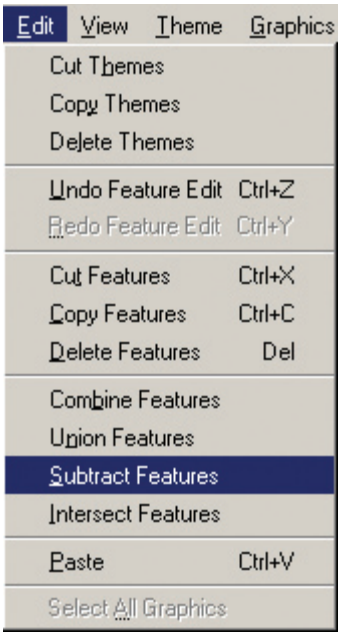


Figure A8-22. Subtract Features menu option

6. Use the **Convert Individual Polygons to New Class** tool to label the new polygon.

Scenario 2: Splitting a Polygon to Create Multiple Polygons

1. Click and hold the **Drawing and Editing Tool**.
2. When the Drawing and Editing Tools options are displayed (fig. A8-19), select the Split Polygons tool.
3. Making sure the theme is in editing mode, draw a line in the View window that completely bisects the polygon you want to split (fig. A8-23).

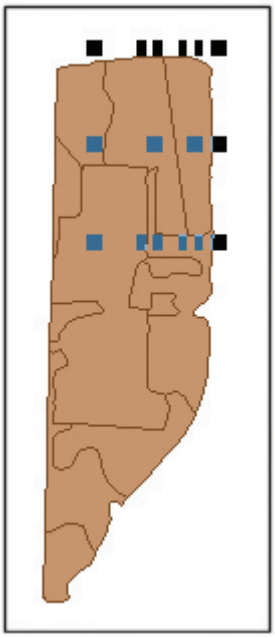


Figure A8-23. Splitting a polygon

4. Use the **Convert Individual Polygons to New Class** tool to label the new polygons.

Scenario 3: Adjusting Boundaries Among Polygons

1. Click the Vertex Edit Tool.
2. If you want to modify a common boundary between two polygons, click the common boundary. Make sure you click on the boundary and not the inside of the polygon. Square vertex handles will appear at each vertex of the shared boundary and round anchors will appear at the vertices at each end of the common boundary. You can click a vertex and drag to move the boundary (fig. A8-24).

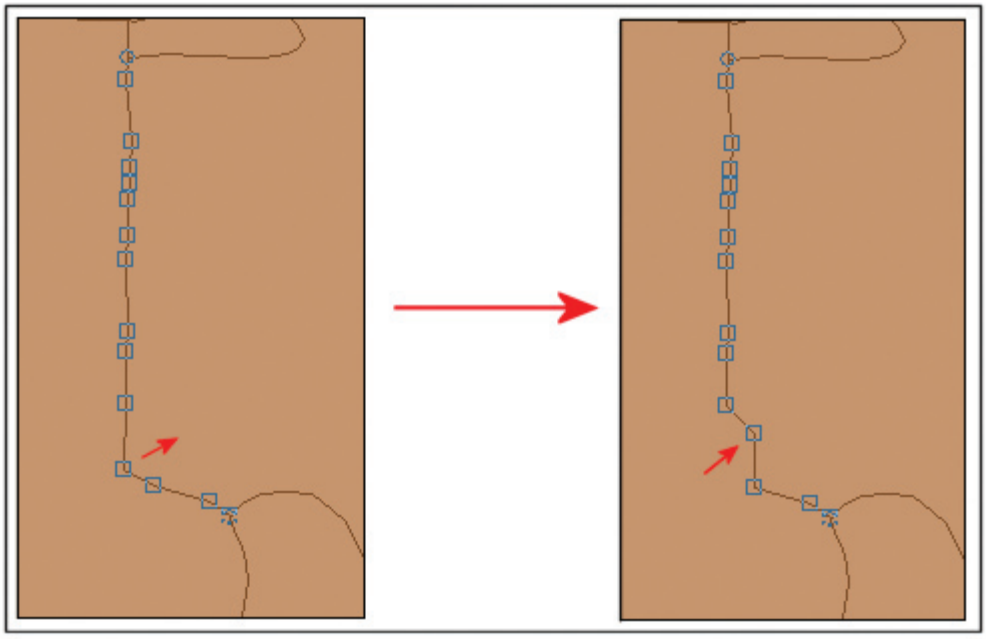


Figure A8-24. Editing vertices

3. Select the **Calculate Metrics for Entire Theme** menu option to update area measurements for the edited theme.

Summarizing Edited Habitats

After editing the land cover theme to depict a future habitat scenario, you can calculate some summary measurements to show area change.

Scenario 1: Create Summary Statistics for a Land Cover Theme

1. Open the land cover theme's attribute table by selecting **Table** from the **Theme** menu.
2. Select the **field** you want to summarize on with the Pointer Tool (***Map_desc***; fig. A8-25).
3. Click the **Summarize** button Σ to bring up the Summary Table Definition dialog window.
4. Select each **new field** to create summarizing the land cover theme. To add the average 20-m buffer core-area polygon size for each class in ***Map_desc***, you select **CAacre20** in the ***Field*** and **Average** in the ***Summarize by***. Click the **Add** button to add this variable to the summary table (fig. A8-26).
5. Click the **OK** button to finish the request. The field ***Count*** is added automatically (fig. A8-27).

Summary tables can also be created by using the CCP GIS Clipping Tool. Section 7 describes the Clipping Tool.

Attributes of Cro_edit.shp

Shape	Map_desc	Acres	CAacre20
Polygon	Agricultural Field	40.484	29.421
Polygon	Cattail Marsh	11.239	5.576
Polygon	Fallow Herbaceous Field	1.017	0.092
Polygon	Fallow Herbaceous Field	8.744	5.210
Polygon	Fallow Herbaceous Field	1.754	0.211
Polygon	Mixed Hardwood Upland Fores	3.588	1.022
Polygon	Mixed Hardwood Upland Fores	1.940	0.235
Polygon	Mixed Hardwood Upland Fores	10.623	4.765
Polygon	Mixed Hardwood Upland Fores	17.648	7.563
Polygon	Open Water	5.231	2.587
Polygon	Restored Native Grassland	27.935	20.724

Figure A8-25. Data theme attribute table

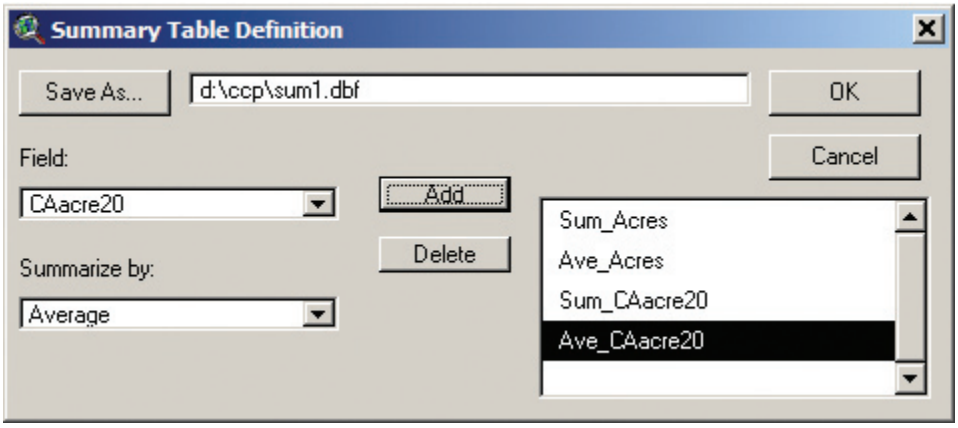


Figure A8-26. Summary Table Definition dialog box

sum1.dbf

Map_desc	Count	Sum_Acres	Ave_Acres	Sum_CAacre20	Ave_CAacre20
Agricultural Field	1	40.4840	40.4840	29.4210	29.4210
Cattail Marsh	1	11.2390	11.2390	5.5760	5.5760
Fallow Herbaceous Field	3	11.5150	3.8383	5.5130	1.8377
Mixed Hardwood Upland Fores	4	33.7990	8.4497	13.5850	3.3963
Open Water	1	5.2310	5.2310	2.5870	2.5870
Restored Native Grassland	1	27.9350	27.9350	20.7240	20.7240

Figure A8-27. Summary table

Appendix B. CCP GIS Query Tool Production Descriptions

The Query Report Part 1 (fig. B1-1) contains information about the query parameters and results. It includes the following sections:

Date: Date the query is run.

Results Directory: Location of files generated by the query.

Selected Query Parameters: Description of the parameters used in setting up the query.

Species Returned by Query: Species selected by the query.

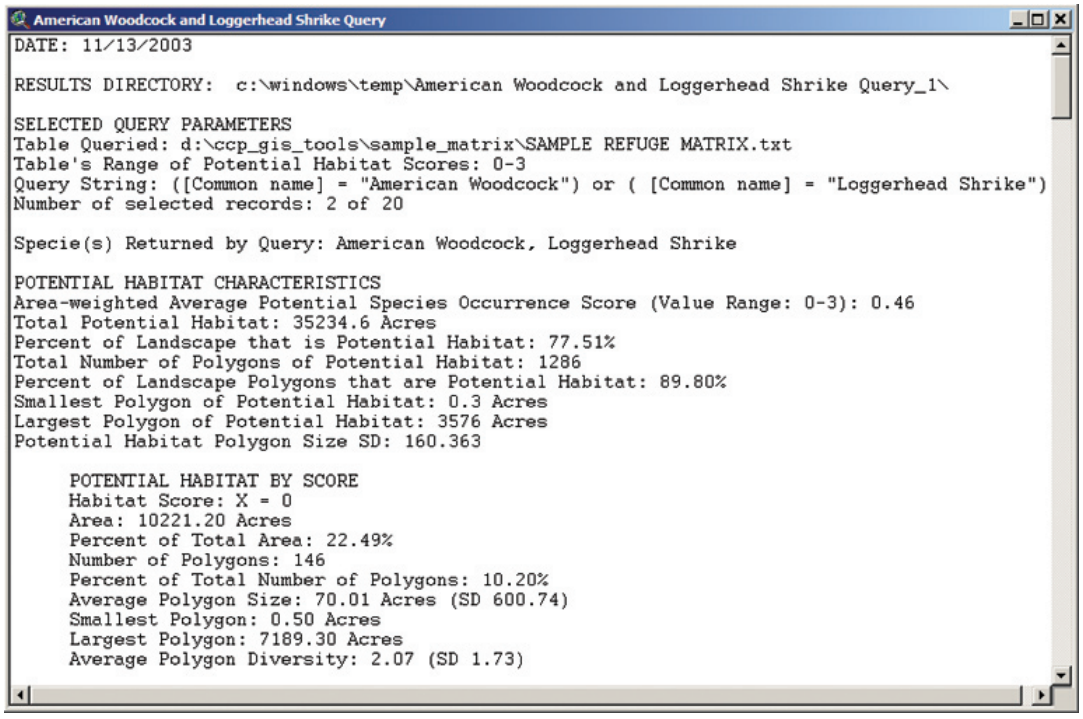


Figure B1-1. Query Report Part 1

Potential Habitat Characteristics: Breakdown of habitat characteristics for the queried refuge. Total Potential Habitat are those areas with a matrix value greater than zero. The Area-weighted Average Potential Species Occurrence (PSO) Score (fig. B1-2) is calculated using this formula:

Σ (Area of each habitat type * PSO value for each habitat type) / Total Area

Potential Habitat By Score: Potential habitat classified by score.

	Habitat A	Habitat B	Habitat C
Species 1	3	0	0
Species 2	1	2	3
Species 3	0	1	3
Species 4	0	3	2
	4	6	8
Ave PSO	4/4= 1.0	6/4= 1.5	8/4= 2.0

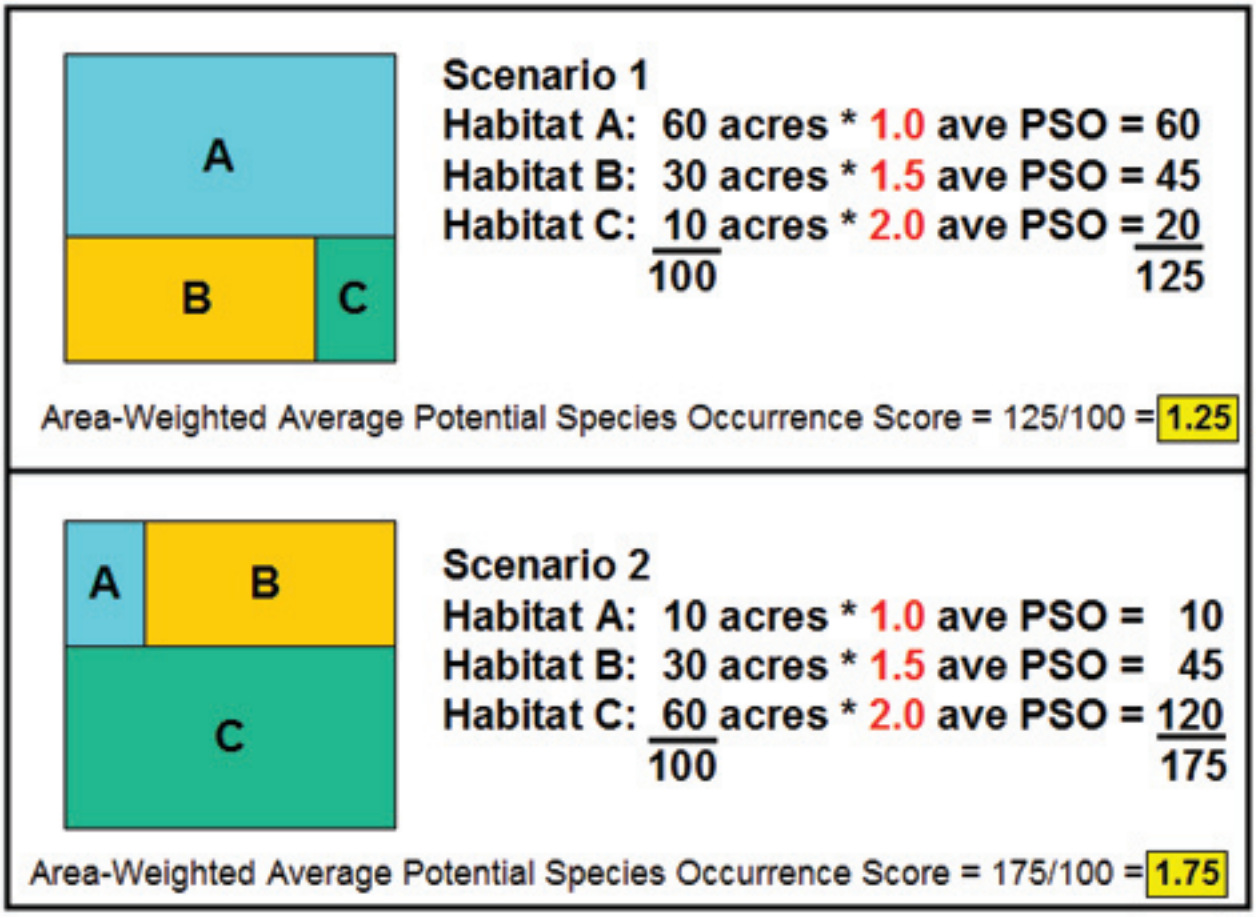


Figure B1-2. Area-weighted Average Potential Species Occurrence (PSO) Score

The Query Report Part 2 (fig. B1-3) includes the following sections:

Potential Habitat By Species: Breakdown of habitat area for each species/guild queried.

Landscape Characteristics: Breakdown of the different habitat types used in the query. Each habitat type in the matrix will be represented.

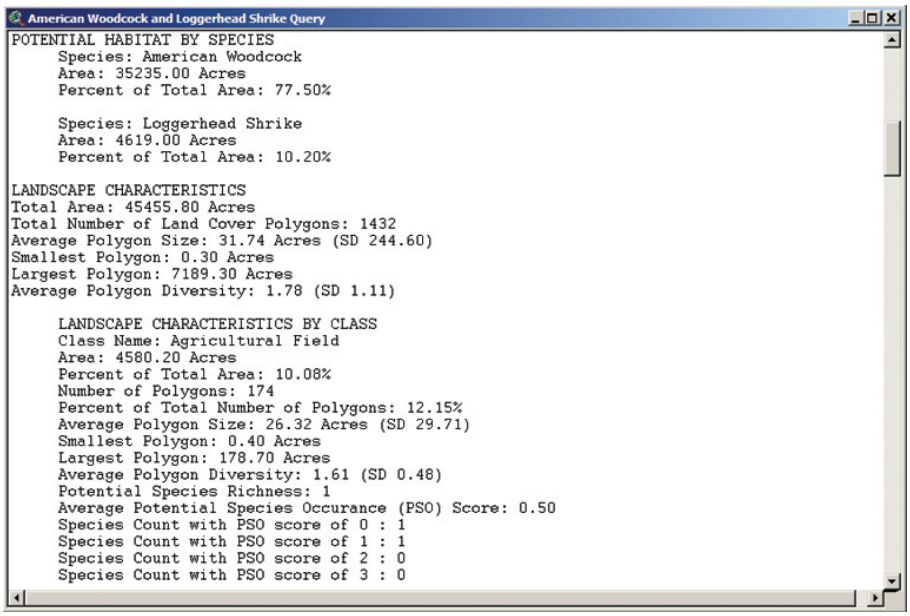


Figure B1-3. Query Report Part 2

The Potential Species Occurrence products (fig. B1-4) includes the following sections:

The Theme Comments box shown in fig. B1-4 displays query parameter information about an active theme. It is accessed by clicking the **Comments** button in the View window.

The Potential Species Occurrence theme, table, and chart products display habitat areas and ranking information for the selected species. The Potential Species Occurrence values for this query range from 0 to 3. Zero means there is no or low poten-

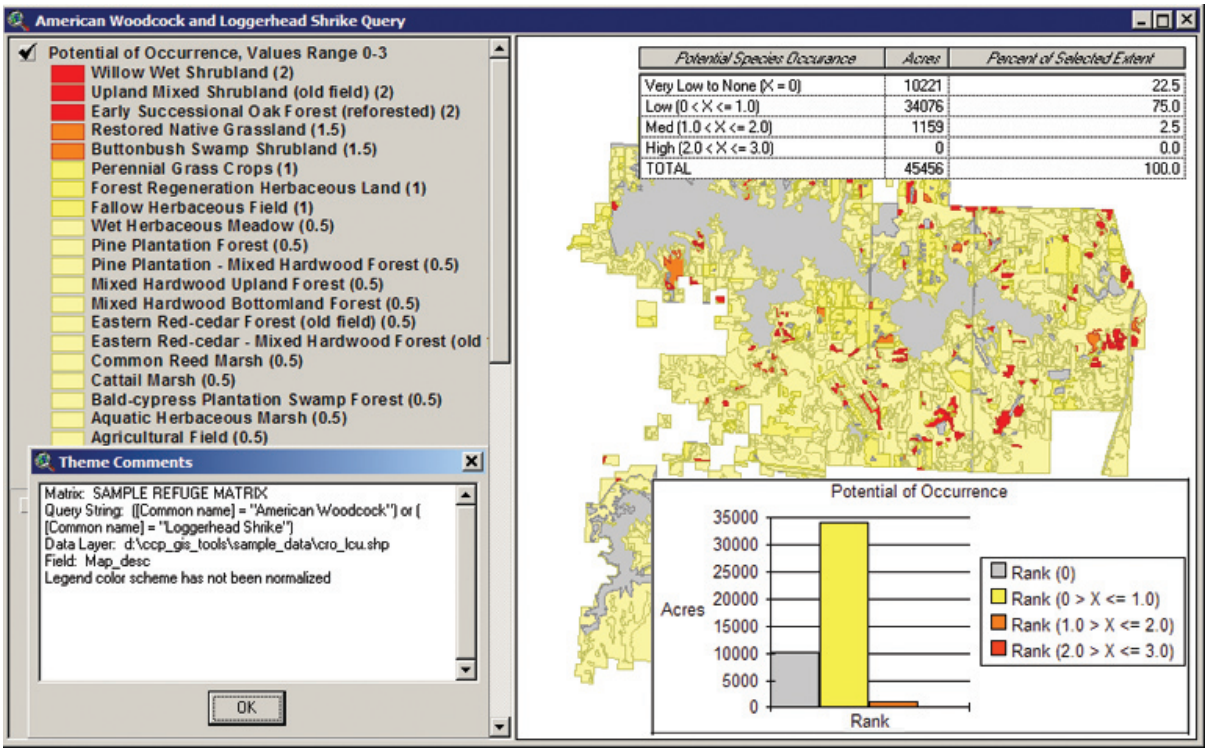


Figure B1-4. Potential Species Occurrence products

tial for species occurrence and 3 means there is high potential for species occurrence. Habitats with a rank of 0 are gray. Ranked habitat areas (i.e., rank > 0) are light yellow to red to represent low to high potential for species occurrence. The ranking values are averaged for habitat areas if multiple species are queried.

The layout (fig B1-5) brings together selected theme, table, and chart products and displays them in a 11" x 8.5" format.

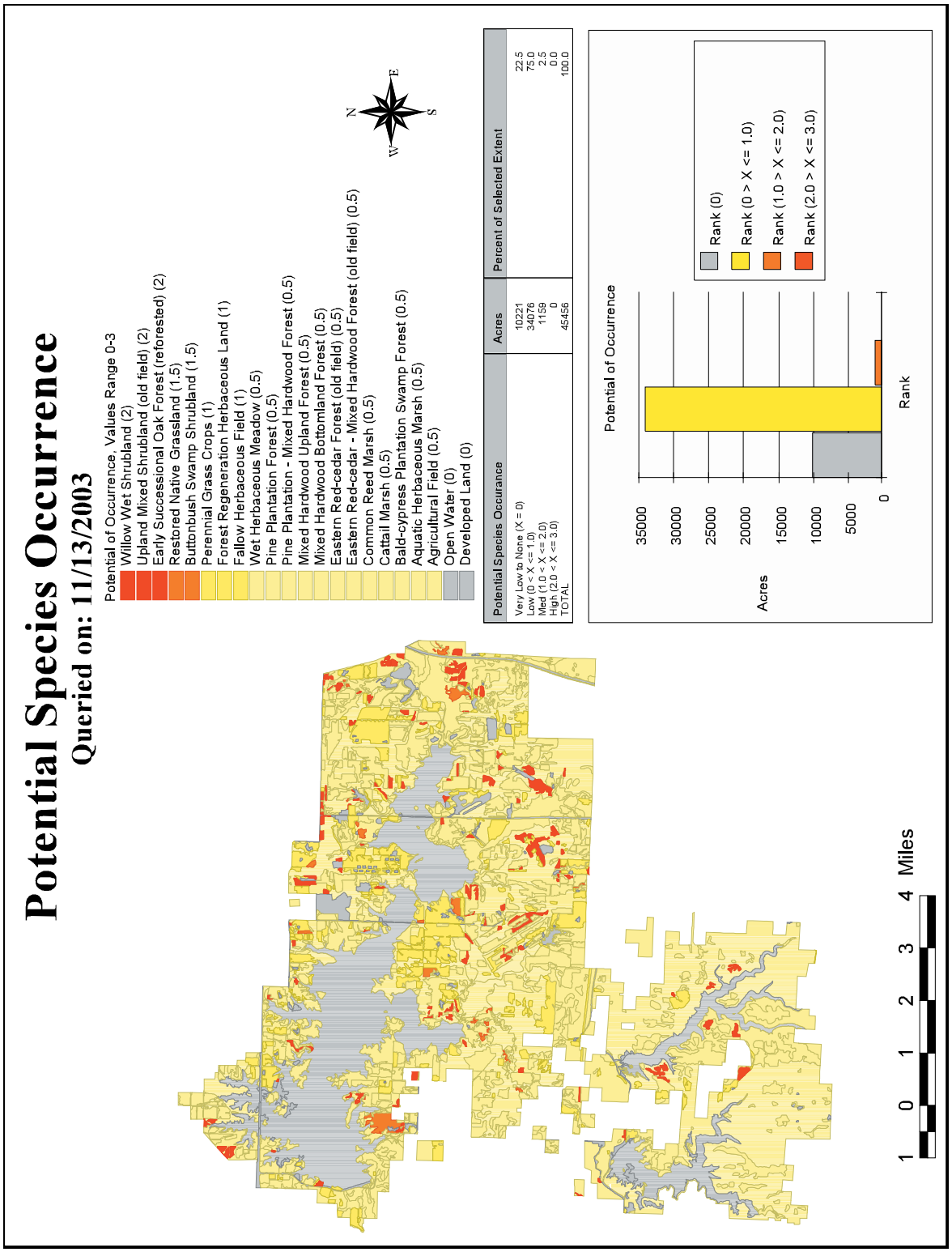


Figure B1-5. Potential Species Occurrence layout

The Potential Species Richness products (fig. B1-6) display the total number of species (selected by the user) that potentially exist in each habitat area. The ***Percent of Total Area*** field in the table represents the proportion of potential species habitat in the entire queried extent.

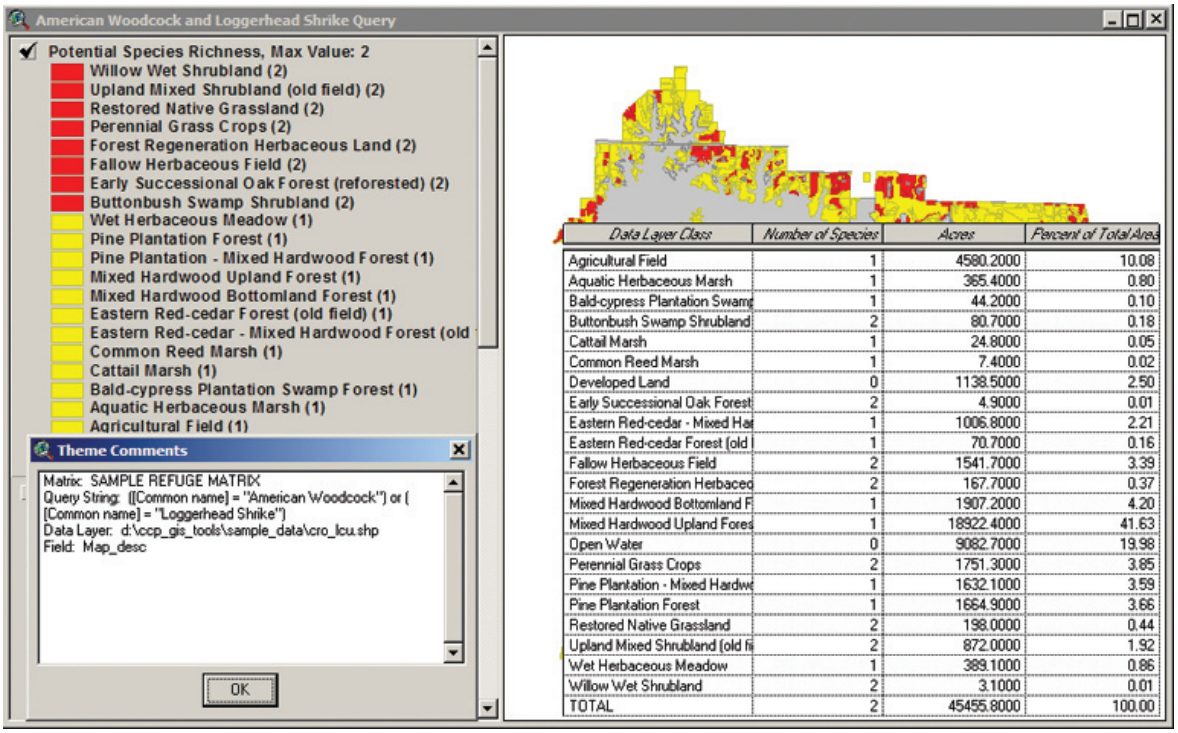


Figure B1-6. Potential Species Richness products

The Selected Habitat products (fig. B1-7) display only the specified habitats used by the selected species and related summary information.

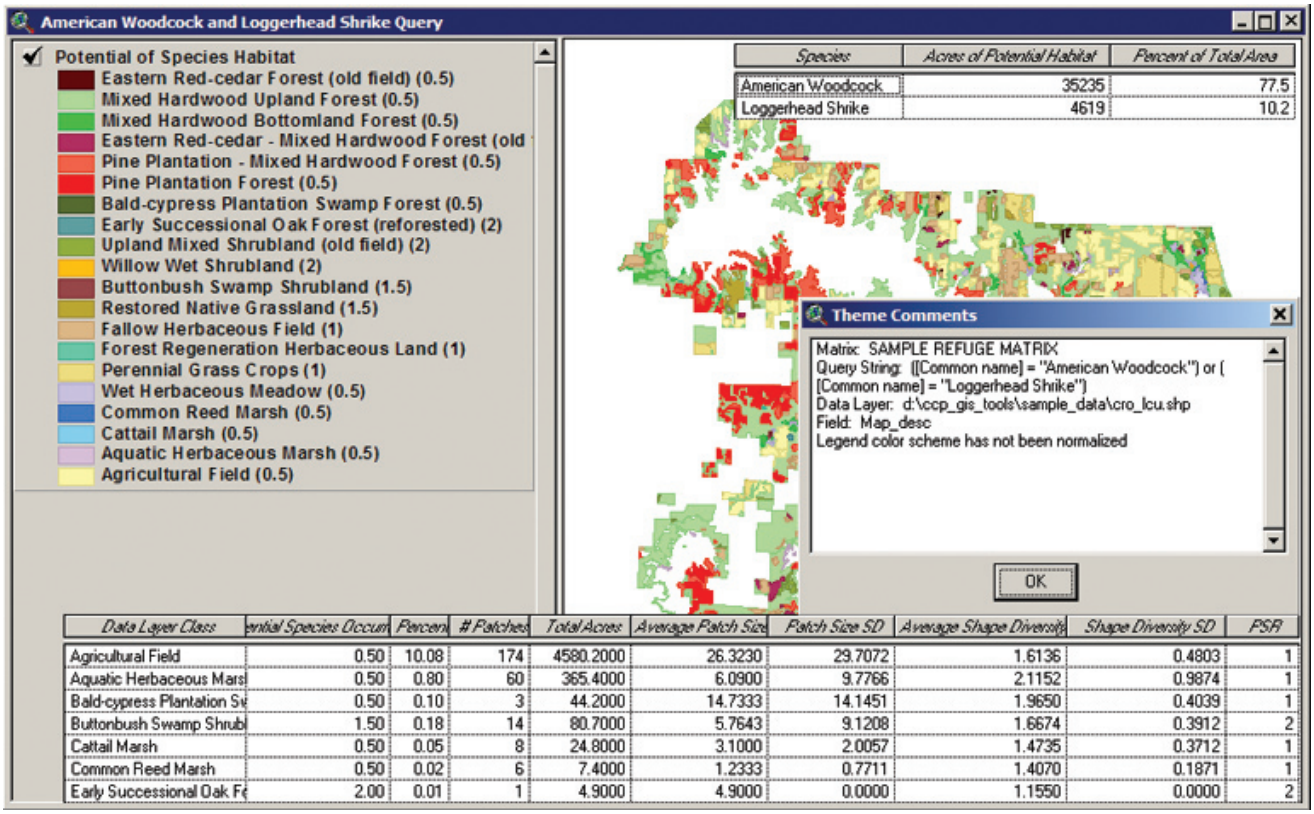


Figure B1-7. Selected habitat products

Fox, T. J., J. J. Rohweder, K. P. Kenow, C. E. Korschgen, and H. C. DeHaan—Geographic Information System Tools for Conservation Planning: User's Manual—Information and Technology Report USGS/BRD/ITR—2003-0005

Printed on recycled paper