

Construction of a Geographic Information System for Wildlife Refuge Planning:

Agassiz National Wildlife Refuge¹

by

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February, 2003

Staff Paper Series No. 164

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¹ Research supported by Cooperative Agreement USDI/1434-HQ-97-RU-01566 WO 49 between the University of Minnesota and the U.S. Fish and Wildlife Service.

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Background

Under the National Wildlife Refuge System Improvement Act of 1997 (<http://refuges.fws.gov/policymakers/mandates/HR1420/index.html>) the U.S. Fish and Wildlife Service (USFWS) is required to develop Comprehensive Conservation Plans (CCP) for the management of lands under its jurisdiction. Section 7 of the Committee Report from the Act (<http://refuges.fws.gov/policymakers/mandates/HR1420/Part4.html>) describes the following five areas, which must be addressed in each national wildlife refuge CCP:

- The purposes of the refuge
- The fish, wildlife and plant populations, their habitats, and the archaeological and cultural values found on the refuge
- Significant problems that may adversely affect wildlife populations and habitats and ways to correct or mitigate those problems
 - Areas suitable for administrative sites or visitor facilities
 - Opportunities for fish- and wildlife-dependent recreation

This legislation has introduced the need for more complete, geo-referenced digital data coverage for each of the USFWS National Wildlife Refuges. Region 3 of the USFWS, which comprises an eight-state area (figure 1) and includes approximately fifty refuges, is working cooperatively with the University of Minnesota to acquire and create geographic information system (GIS) data for each refuge. These data sets are invaluable for the analysis and visualization of refuge resources and alternative management scenarios.



Figure 1. Region 3 of the U.S. Fish and Wildlife Service.

Common Procedures

Working cooperatively with the USFWS, the University of Minnesota Department of Forest Resources has been compiling geo-referenced data for each national wildlife refuge in USFWS Region 3 since the fall of 1997. A standardized list of data sets, at three different spatial extents, has been developed (Appendix A). The regional extent includes several counties, and

general, small-scale data layers such as vegetation, counties and highways are collected which place the refuge in human and ecological contexts. More detailed data layers, such as streams, wetlands, and roads, are kept at the watershed extent (covering the watershed in which the refuge lies). These layers can be used for map production, spatial reference, and analysis. Finally, refuge-specific layers such as management plans, wildlife habitat, and real property inventory, are collected only within the refuge boundaries. Actual data layers acquired differ between individual refuges depending on availability and specific needs of the refuge. Student research assistants collect data from various local, state and federal agencies, academic, professional and government Internet sites, and some private companies. In some instances, students and/or refuge staff have gathered data using a global positioning system (GPS). Much of the data have been available at no cost, and other data have been purchased by the USFWS. Students process the data using GIS and imaging software programs including ESRI's Arc/Info, Arcview, and ArcGIS, and ERDAS Imagine on both NT and Unix workstations.

In addition to the spatial data layers, students also create metadata text files, which describe each data set, its sources, and processing procedures. Either simple text editors or specialized metadata tools such as that found in ESRI's ArcCatalog may be used to create the metadata files. The final text file, however, must be FGDC compatible, and is checked for errors using the U.S. Geological Survey's MetaParser program (available at <http://geology.usgs.gov/tools/metadata/tools/doc/mp.html>).

Final data and corresponding metadata are delivered to the USFWS on CD-ROM. A text file with brief descriptions is included on each CD. (Text descriptions of Agassiz National Wildlife Refuge data are provided in Appendix B.)

All of the GIS data layers and metadata files created for the USFWS Region 3 are intended to be operationally useful, and the refuge boundaries adhere to specifications of the U.S. Fish and Wildlife Service Lands Boundary Data Standard Operating Procedures (SOP Number 97-01). Data sets specific to the refuge require field verification by refuge staff familiar with the refuge lands. As noted in the corresponding metadata files, the intended application of the boundary data is to serve as a spatial reference for other data layers in GIS and mapping applications. It is not intended to be used as a land survey or representation of land for conveyance or tax purposes. The data are not legal documents and are not intended to be used as such. It is the responsibility of the user to use the data appropriately and consistently, recognizing its limitations.

Agassiz National Wildlife Refuge

Agassiz National Wildlife Refuge (<http://midwest.fws.gov/Agassiz/index.html>) is located in Marshall County, in northwestern Minnesota. The refuge lies in the bed of glacial Lake Agassiz, in the transition zone between prairie regions to the west and coniferous bogs and

forests to the east. The current refuge area is 61,500 acres, including 4,000 acres of Wilderness Area. Agassiz was established as Mud Lake Migratory Waterfowl Refuge in 1937, at a time when much of the surrounding land was being drained for agriculture. The name was changed to Agassiz National Wildlife Refuge in 1961. Agassiz provides important wildlife habitat for the region. The refuge supports 280 bird species (including both migratory and nesting waterfowl) and 49 mammal species (including two resident packs of eastern gray wolves and a resident moose herd). Public uses and amenities include wildlife observation, environmental education, an auto tour route, big game hunting, hiking, and a visitor's center. There are approximately 20,000 visitors annually. The management objectives for the refuge are to provide resting, nesting and feeding habitat for waterfowl and other migratory birds, provide habitat for resident wildlife, protect endangered and threatened species, provide for biodiversity, provide public opportunities for outdoor recreation and environmental education, conduct research, manage wetland vegetation, water, and grasslands, and restore wetlands.

The GIS data collected for Agassiz National Wildlife Refuge span three spatial extents. The regional extent covers 11 counties and was chosen to show the regional ecological context of the refuge with prairie regions to the west, and forested regions to the east (Figure 2). The watershed extent includes a group of conterminous 7.5-minute quadrangle boundaries covering the major watershed in which Agassiz lies (Figure 3). Refuge specific layers lie mainly within the refuge boundaries. A list of data layers that were collected for Agassiz National Wildlife

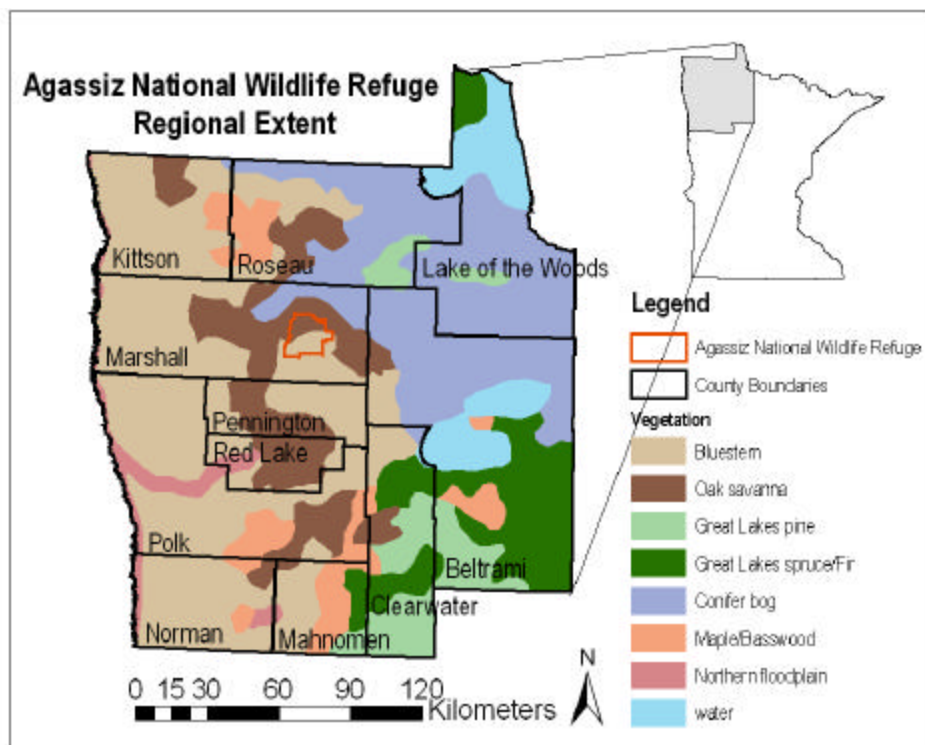


Figure 2. The 11 -county regional extent for Agassiz National Wildlife Refuge GIS data.

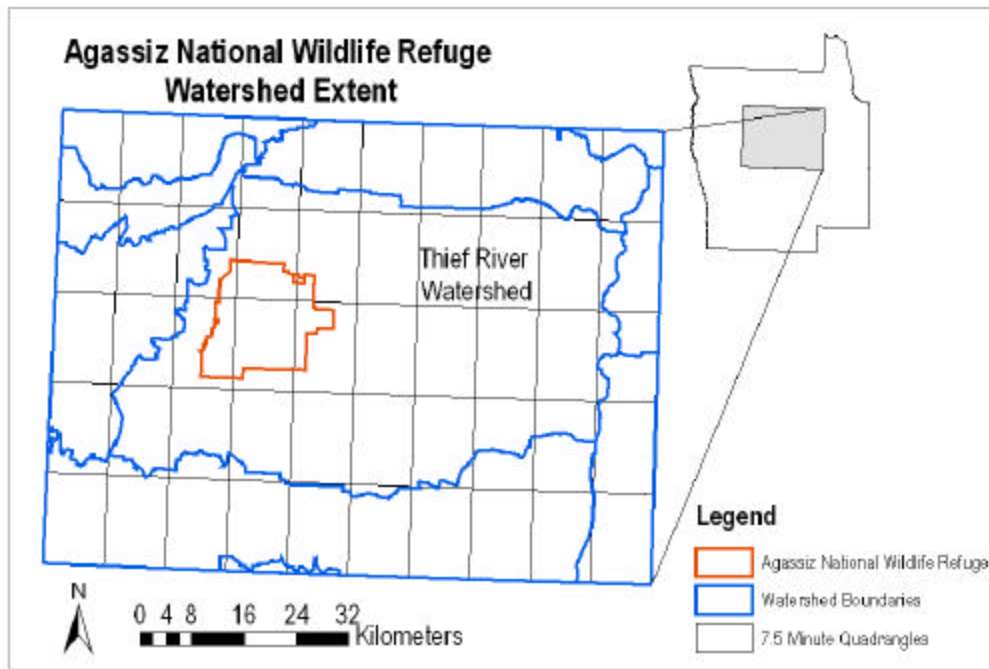


Figure 3. The watershed extent for Agassiz National Wildlife Refuge GIS data.

Refuge is found in Appendix C, with brief descriptions of each layer. The data file structure and file names, based on a naming standard developed for the National Wildlife Refuge project, are also listed.

The data layers collected for Agassiz can be combined and analyzed in different ways, greatly enhancing the conservation planning process. Managers can use the data to visualize the spatial relationships between refuge resources and the potential effects of different management activities. Some maps of Agassiz National Wildlife Refuge data are included here as examples. Figure 4 shows the major hydrologic features of the regional extent overlaying the land ownership layer. Analysis of such a map might include determining which agencies own land upstream and/or downstream from Agassiz National Wildlife Refuge. In Figure 5, prescribed burning units are overlaying the vegetation layer. This might help the refuge manager determine burn frequencies for the various units. Photos are always useful for understanding the properties of a given area; figure 6 shows the wilderness area boundaries overlaying the digital orthophoto quadrangle mosaic. Other GIS analyses could include studies of various wetland types, sizes, and shapes in and around the refuge, or looking at soils and historical vegetation layers to determine appropriate vegetation restoration goals. As refuge staff becomes more familiar with GIS, many maps and analyses can be produced to enhance natural resource management activities at the Agassiz National Wildlife Refuge.

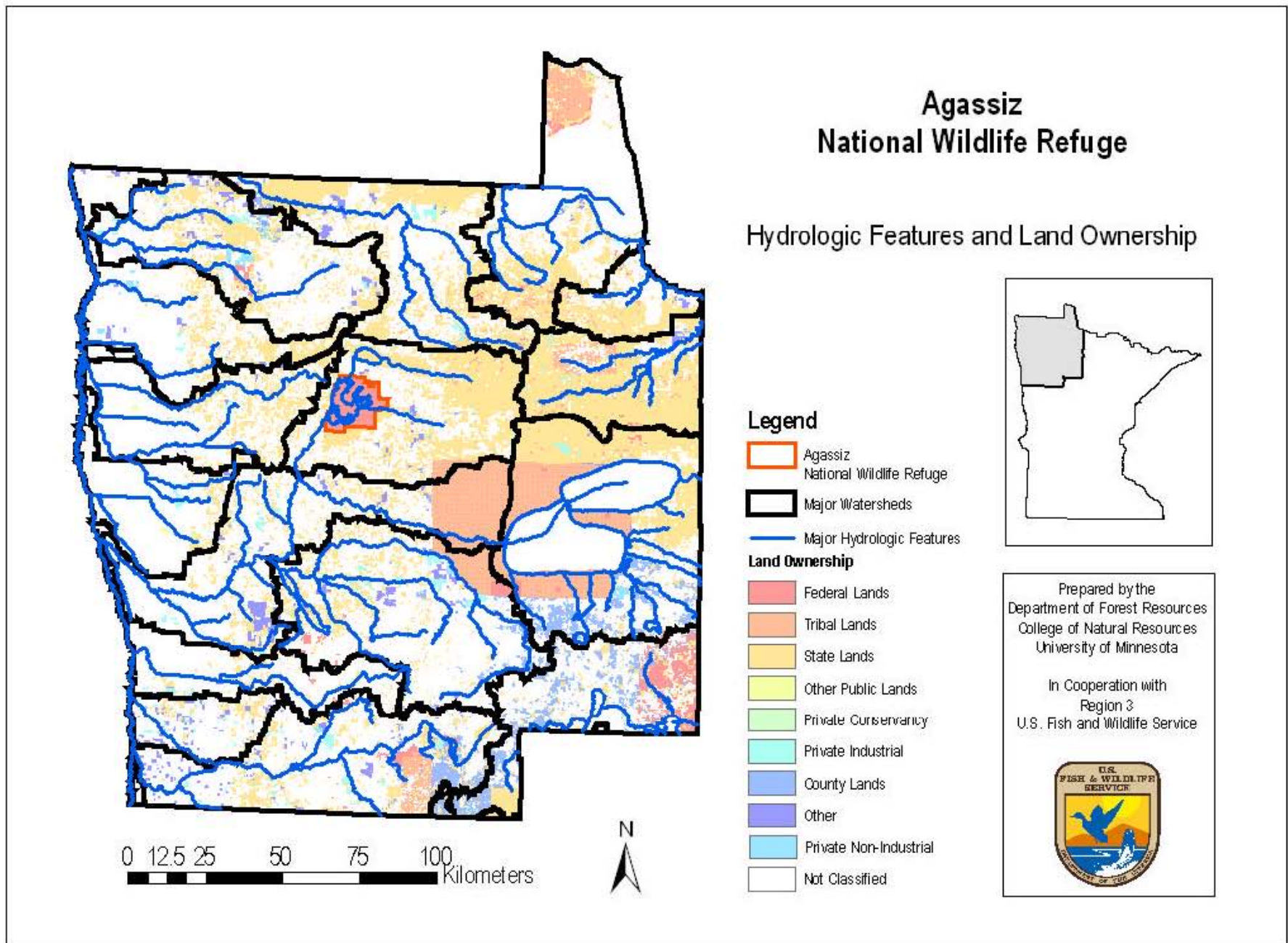


Figure 4. Agassiz National Wildlife Refuge regional extent, major hydrologic features and land ownership

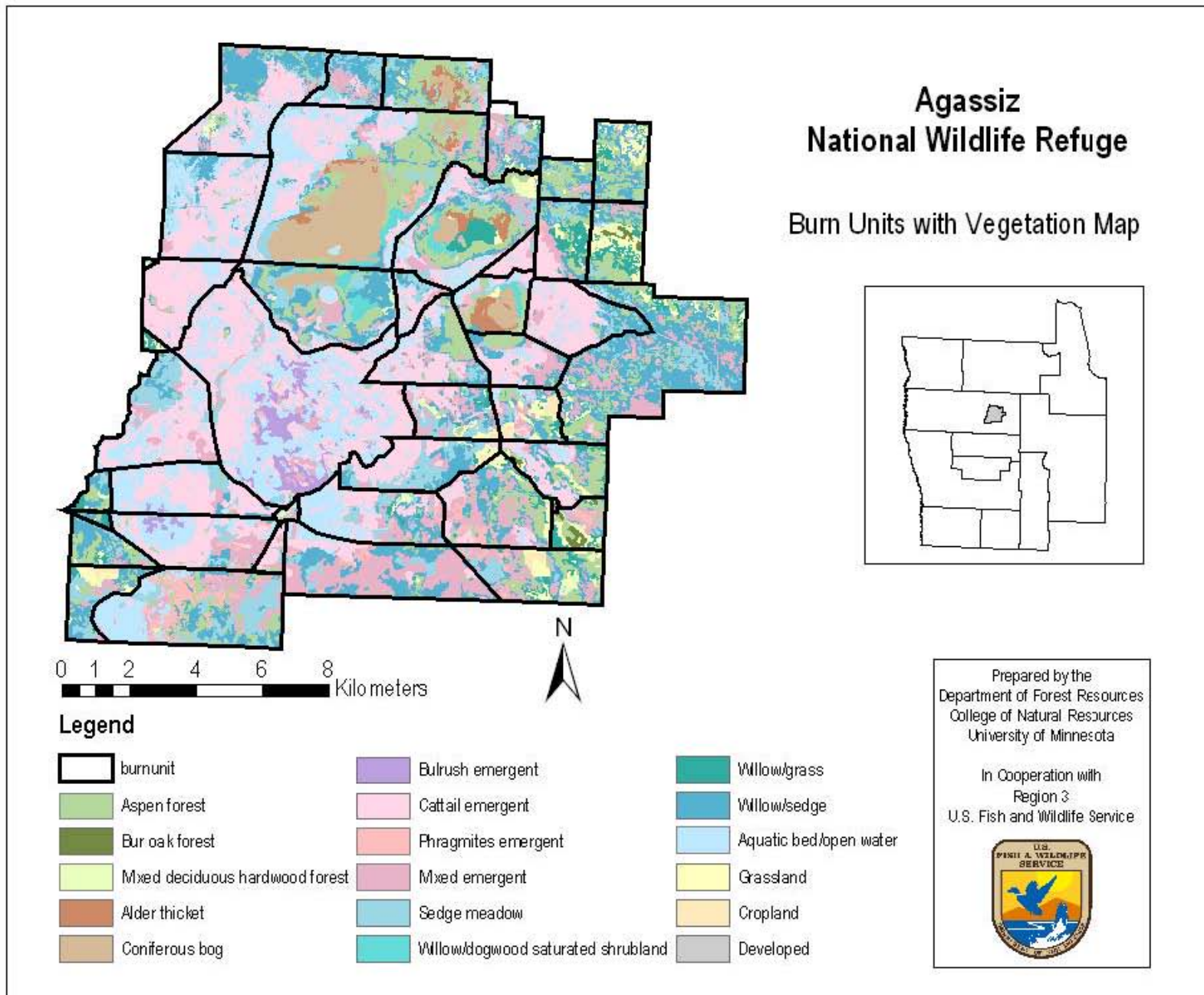
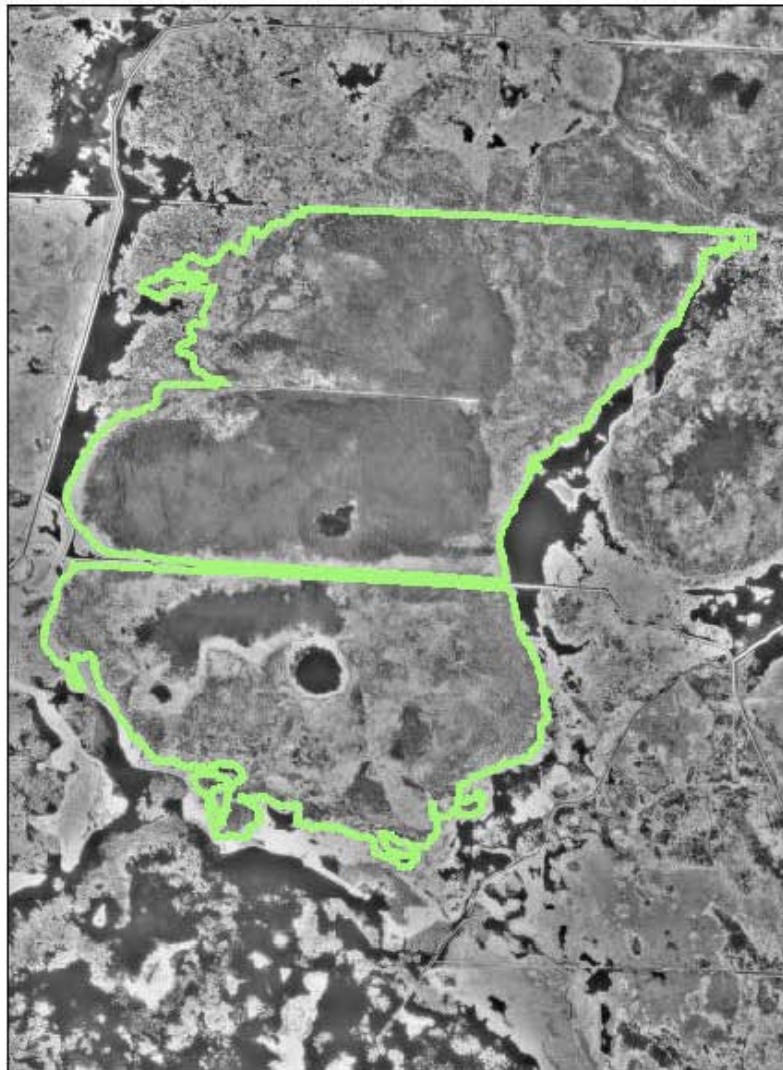
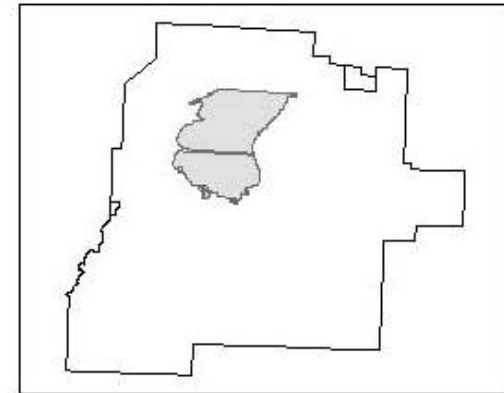


Figure 5. Agassiz National Wildlife Refuge, prescribed burn units and vegetation.



Agassiz National Wildlife Refuge

Wilderness Area
with Digital Orthophoto Quad Mosaic



0 0.5 1 2 3 4 Kilometers



Legend

 Wilderness Area

Prepared by the
Department of Forest Resources
College of Natural Resources
University of Minnesota

In Cooperation with
Region 3
U.S. Fish and Wildlife Service



Figure 6. Agassiz National Wildlife Refuge wilderness area boundaries with digital orthophoto quads.

Appendix A. A National Wildlife Refuge GIS data inventory (December, 2002).

Data Set Name	Status / Notes	Source	Resolution	Extent	MetaData
REGIONAL BASEMAP DATA					
DRG's 1:250,000					
Hydrography - Lakes and streams					
Historical Vegetation					
Potential Vegetation - Kuchler					
Land Ownership (Other Public Lands)					
Land Use/Land Cover					
Political Boundaries					
Congressional Districts					
County					
State					
Transportation					
Roads - major					
Watersheds					
Watersheds - major					
WATERSHED BASEMAP DATA					
Digital Elevation Models (DEMs)					
DRG's 1:24,000					
Floodplain Boundaries (100yr and 500yr - FEMA)					
Hydrography - Lakes					
Hydrography - Streams					
Natural Heritage Data					
National Wetlands Inventory (NWI)					
Political Boundaries					
Cities / Municipal Boundaries					
Civil Townships					
Zoning					
Public Land Survey					
Township/Range					
PLS Sections					
PLS 40's					
Soils: STATSGO					
Transportation					
Airports					
Railroads					
Roads - minor					
Watersheds					
Watersheds - minor					

Appendix A. A National Wildlife Refuge GIS data inventory (December, 2002).

Data Types from USFWS	Status / Notes	Source	Resolution	Extent	MetaData
PROJECT DATA (SPECIFIC TO REFUGE)					
Digital Orthophoto Quadrangles (DOQs)					
Cultural					
Archeological Sites					
Fish Habitat					
Critical Habitat					
Stormwater Sewers					
Land cover (more detailed than above)					
Soils: SSURGO					
Tracts (Internal tract boundaries)					
Management plans					
Burn Units					
Cropland Management Plan					
Future Planning					
Photos					
Mosaic of most recent photos					
Project Boundary					
Refuge Boundary (Authorized Expansion)					
WPAs, Easements, etc.					
Public Recreation					
Fish Access, Boat Access, Parks, etc.					
Real Property Inventory					
Signs, Structures, Water Control Structures, etc.					
Hiking Trails, Dikes, Drainage Ditches, etc.					
Parking Areas ...					
Transportation					
Refuge roads					
Wildlife Habitats					
Eagles, Herons, etc					

Appendix B. Text file description for Agassiz National Wildlife Refuge GIS data (December, 2002).

Documentation:

This CD contains GIS data for the Agassiz National Wildlife Refuge in Marshall County, Minnesota.

Overall Description:

This CD contains basemap layers at regional and watershed extents, and refuge specific layers. The data exist either as ArcView shapefiles, or any of a variety of image files (TIFF, JPG, IMG, or other file types). All spatial data are geo-referenced to UTM Zone 15, using the North American Datum of 1983. There are also metadata TXT files with a detailed description of each data layer. These metadata files are found in the same directory and with the same name as the spatial data files.

Agassiz National Wildlife Refuge Data

Directory

Description

/ags/document/

This directory contains the summary document and the filenames document for Agassiz National Wildlife Refuge.

/ags/graphics/

This directory contains the Adobe Illustrator files for the CD labels and case inserts for Agassiz National Wildlife Refuge.

/ags/basemap_regional/drqs/

This directory contains the compressed TIFF file format file **drq250k**, of the 1:250,000 scale USGS Digital Raster Graphics (DRG's) for the region surrounding Agassiz National Wildlife Refuge.

/ags/basemap_regional/hydro/

This directory contains the ArcView shapefile **hydro**, of the major hydrographic features for the region surrounding Agassiz National Wildlife Refuge.

/ags/basemap_regional/landown/

This directory contains the ArcView shapefile **publand**, of the public land owners for the region surrounding Agassiz National Wildlife Refuge.

/ags/basemap_regional/lulc/

This directory contains a variety of land use and land cover files for the region surrounding Agassiz National Wildlife Refuge. The ArcView shapefile **histveg** is a digital version of Marshner's historical vegetation map. This map was made from original Public Land Survey notes. The ArcView shapefile **potveg** shows Kuchler's map of potential natural vegetation of the conterminous United States. This map represents natural vegetation that would occur today if urban, agricultural, and other human influences were removed. The Imagine IMG file **landuse** is rasterized land use data made from 1990's land census data. This data incorporates and simplifies to just eight categories a variety of data sets from different regions of the state. The more detailed data that was used to create this layer is also included. The ArcView shapefile **lulc** is more detailed land use/land cover data for most of the counties in the region surrounding Agassiz National Wildlife Refuge. The Imagine IMG file **lulc_clb** is detailed land use/land cover data for Clearwater and Beltrami Counties, and the Imagine IMG file **lulc_itw** is detailed land use/land cover data for Lake of the Woods county.

Appendix B. Text file description for Agassiz National Wildlife Refuge GIS data (December, 2002).

/ags/basemap_regional/polbnds/

This directory contains political boundary data. The state (ArcView shapefile **state**) and congressional district (ArcView shapefile **congdist**) boundaries are given for the state of Minnesota, and the county boundaries (ArcView shapefile **county**) are given for the region surrounding Agassiz National Wildlife Refuge.

/ags/basemap_regional/trans/

This directory contains the ArcView shapefile **hwys**, representing the major highways for the state of Minnesota.

/ags/basemap_regional/wsheds/

This directory contains the ArcView shapefile **ws_major**, showing the major watershed boundaries for the region surrounding Agassiz National Wildlife Refuge.

/ags/basemap_watershed/dems/

This directory contains the TIFF file **dems** with a 30 meter Digital Elevation Model (DEM) for the watershed in which Agassiz National Wildlife Refuge lies.

/ags/basemap_watershed/drgrs/

This directory contains compressed TIFF file format file **drgr24k**, of the 1:24,000 scale USGS Digital Raster Graphics (DRG's) for the watershed in which Agassiz National Wildlife Refuge lies.

/ags/basemap_watershed/floodpl/

This directory contains the ArcView shapefile **floodbnd** of Federal Emergency Management Agency (FEMA) floodplain boundaries for the watershed in which Agassiz National Wildlife Refuge lies.

/ags/basemap_watershed/hydro/

This directory contains the ArcView shapefiles **streams** and **lakes** showing streams, and lakes, respectively, in the watershed in which Agassiz National Wildlife Refuge lies.

/ags/basemap_watershed/nwi/

This directory contains the ArcView shapfile **nwi** of National Wetland Inventory (NWI) polygon data for the watershed in which Agassiz National Wildlife Refuge lies.

/ags/basemap_watershed/pls/

This directory contains the ArcView shapefiles **twprge**, **plssec**, and **pls40** showing Public Land Survey (PLS) township and range, section, and 40 -acre parcel boundaries for the watershed in which Agassiz National Wildlife Refuge lies.

/ags/basemap_watershed/polbnds/

This directory contains political boundaries. The ArcView shapefiles **civtwp** and **munbnd** show civil townships and municipal boundaries for the watershed in which Agassiz National Wildlife Refuge lies.

/ags/basemap_watershed/soils/

This directory contains the ArcView shapefile **statsgo** of State Soil Geographic Database (STATSGO) data for the watershed in which Agassiz National Wildlife Refuge lies.

/ags/basemap_watershed/trans/

This directory contains transportation information for the watershed in which Agassiz National Wildlife Refuge lies. The ArcView shapefiles **roads**, **railroad**, and **runway** show roadways, railroad tracks, and airport runways.

Appendix B. Text file description for Agassiz National Wildlife Refuge GIS data (December, 2002).

/ags/basemap_watershed/wsheds/

This directory contains the ArcView shapefile **ws_minor**, showing the minor watershed boundaries for the major watershed in which Agassiz National Wildlife Refuge lies.

/ags/agsmap/cultural/

This directory contains the ArcView shapefiles **archeoln**, **archopt**, and **archopey**, representing archeological features in line, point, and polygon formats, respectively, for Agassiz National Wildlife Refuge.

/ags/agsmap/doqq/

This directory contains the compressed Mr. Sid file **doqq**, which is a mosaic of Digital Orthophoto Quarter Quads (DOQQ's) for Agassiz National Wildlife Refuge.

/ags/agsmap/lulc/

This directory contains detailed land cover data for Agassiz National Wildlife Refuge. The ArcView shapefile **landcov** shows all polygons and classifications that were digitized, while the shapefile **lc_ags** shows the data dissolved on a refuge specific vegetation classification, and **lc_nvcs** shows the data dissolved on the National Vegetation Classification Standard (NVCS) codes.

/ags/agsmap/mgmtplns/

This directory contains ArcView shapefiles for a variety of management activities for Agassiz National Wildlife Refuge. The following files are included: **burnunit** - prescribed burning units, **cropunit** – cropland management units, **pools** – pools (hydrologic management units) **trapunit** - trapping units, **wfmunit** - wildfire management units, and **wildarea** - the wilderness area.

/ags/agsmap/photos/

This directory contains the compressed Mr. Sid file **ags1997**, which is a mosaic of aerial photographs of the Agassiz National Wildlife Refuge. The photos were flown in 1997.

/ags/agsmap/prjbnd/

This directory contains ArcView shapefiles for a variety of project boundary data types. **Agsbnd** contains refuge land ownership status boundaries, **agsleg** contains refuge legislative boundaries, and **eamts** contains boundaries for easements managed by Agassiz NWR.

/ags/agsmap/puprec/

This directory contains ArcView shapefiles showing public recreation opportunities in and around Agassiz NWR. At the time of publication, only one shapefile is available, **autotour**, showing an auto tour route on the refuge.

/ags/agsmap/realprop/

This directory contains the ArcView shapefile **realprop**, with location data for a variety of real property entities such as building, bridges, signs, etc.

/ags/agsmap/soils/

This directory contains Soil Survey Geographic Database (SSURGO) data for Agassiz National Wildlife Refuge. The spatial data are contained in the ArcView shapefile **ssurgo**, and the attribute data are contained in a variety of DBF files. The file Adobe Acrobat PDF file **ssurgo_db** contains a database manual that explains the various attributes.

/ags/agsmap/trans/

This directory contains the ArcView shapefile **ags_road** of detailed roadway data for the Agassiz National Wildlife Refuge.

Appendix B. Text file description for Agassiz National Wildlife Refuge GIS data (December, 2002).

/ags/agsmap/wildlife/

This directory contains ArcView shapefiles depicting a variety of wildlife data for Agassiz National Wildlife Refuge. The following files are included: **bcnheron** - nesting areas of the Black-crowned night-heron, **bit_nest** - point locations for bittern nests, **bit94-95** - point locations of radio-tracked bitterns for 1994 and 1995, **bit96-97** - point locations of radio-tracked bitterns for 1996 and 1997, several **cnbs(yyyy)** files – Colonial Nesting Bird Survey data for the indicated year, including birds such as Franklin’s gull, Black-crowned night-heron, and Eared grebe (also includes a .tif image of the same name, containing a scanned image of a summary table of survey data), **eagnest** – point locations for bald eagle nests, **frgull** - general nesting areas of the Franklin’s gull, **frogs** - listening locations along the Minnesota Frog and Toad Survey conducted at Agassiz National Wildlife Refuge, **wlvs_e98** - adaptive kernel home range estimate for the Elm Lake Wolf pack for the year 1998, **wlvs_e99** - adaptive kernel home range estimate for the Elm Lake Wolf pack for the year 1999, **wlvs_g98** - adaptive kernel home range estimate for the Golden Valley Wolf pack for the year 1998, and **wlvs_g99** - adaptive kernel home range estimate for the Golden Valley Wolf pack for the year 1999.

Appendix C. Summary list of data layers for Agassiz National Wildlife Refuge, with data file structure and names.

Dataset Name	Directory Name	Datafile name (8 char limit)	Brief Description
Root Directory (3-character refuge code name)	/ags		
Graphics	/graphics		
Documents	/document		
Basemap data, regional level	/basemap_regional		
1:250,000 DRG's	/drgs	drg250k	USGS topographic maps, scanned, rectified, and mosaiced
Hydrography	/hydro	hydro	Lines, major hydrographic features (lakes and rivers) from US EPA BASINS data.
Land Ownership	/landown	publand	Polygons, land ownership information from MN DNR Data Deli.
Land Use/Land Cover	/lulc		
Land Use/Land Cover		landuse	Raster image of 8-class land use/land cover data from MN LMIC.
Land Use/Land Cover (More detailed)		lulc	Polygon layer of land use/land cover data for most regional counties, used to create "landuse", above. From MN LMIC.
Land Use/Land Cover (More detailed)		lulc_clb	Raster layer of land use/land cover data for Clearwater and Beltrami counties, used to create "landuse", above. From MN LMIC.
Land Use/Land Cover (More detailed)		lulc_ltw	Raster layer of land use/land cover data for Lake of the Woods county, used to create "landuse", above. From MN LMIC.
Historical Vegetation		histveg	Polygons, Marshner's map, created from original land survey notes, from MN DNR Data Deli.
Potential Vegetation		potveg	Polygons, Kuchler's map of potential natural vegetation, from NGDC website.
Political Boundaries	/polbnds		
Congressional Districts		congdist	Polygons, congressional districts for the state of Minnesota, from MN legislature website.
County		county	Polygons, county boundaries for the regional extent, from MN DNR Data Deli.
State		state	Polygons, state boundaries for the state of Minnesota, from MN DNR Data Deli.
Transportation - major roads	/trans	hwys	Lines, a subset of the MN DOT road coverage
Watersheds - major	/wsbnds	ws_major	Polygons, major watershed boundaries, from MN DNR Data Deli.

Appendix C. Summary list of data layers for Agassiz National Wildlife Refuge, with data file structure and names.

Dataset Name	Directory Name	Datafile name (8 char limit)	Brief Description
Basemap data, watershed level	/basemap_watershed		
Digital Elevation Models (DEMs)	/dems	dems	Raster data, 30 meter DEM's from MN DNR Data Deli.
1:24,000 DRG's	/drgs	drg24k	USGS topographic maps, scanned, rectified, and mosaiced
Floodplain Boundaries	/floodpl	floodbnd	Polygons, FEMA floodplain boundaries, from MN DNR Data Deli.
Hydrography	/hydro		
Lakes		lakes	Polygons, 1:100,000 scale water body data downloaded from MN DNR Data Deli.
Streams		streams	Lines, 1:24,000 scale stream data downloaded from MN DNR Data Deli.
National Wetlands Inventory (NWI)	/nwi	nwi	Polygons, NWI data downloaded from MN DNR Data Deli.
Public Land Survey	/pls		
Township/Range		twprng	Polygons, public land survey township/range boundaries, from MN DNR Data Deli.
Sections		plsec	Polygons, public land survey section boundaries, from MN DNR Data Deli.
40's		pls40	Polygons, public land survey 40 -acre parcel boundaries, from MN DNR Data Deli.
Political Boundaries	/polbnds		
Municipal boundaries		munbnd	Polygons, municipal boundaries, from MN DOT.
Civil Townships		civtwp	Polygons, civil township boundaries, from MN DOT.
Soils	/soils	statsgo	Polygons, state-level soil data compiled by the Natural Resources Conservation Service (NRCS).
Transportation	/trans		
Airports		runway	Lines, airport runways, from MN DOT
Railroads		railroad	Lines, railroads, from MN DOT.
Roads (may have different types)		roads	Lines, MN DOT road coverage.
Watersheds - minor	/wsheds	ws_minor	Polygons, minor watershed boundaries, from MN DNR Data Deli.

Appendix C. Summary list of data layers for Agassiz National Wildlife Refuge, with data file structure and names.

Dataset Name	Directory Name	Datafile name (8 char limit)	Brief Description
Project data (specific to refuge)	/agsmap		
Cultural resources	/cultural		
Archeological Sites - points		archoept	Points, archeological resources (ei homestead locations).
Archeological Sites - polygons		archoepy	Polygons, archeological resources (experimental peat farm).
Archeological Sites - lines		archoeln	Lines, archeological resources (historic roads/trails).
Digital Orthophoto Quadrangles (DOQs)	/doqs	doqq	USGS orthorectified black and white photos, mosaiced.
Land cover (more detailed than above)	/lulc	landcov	Polygons, land cover, created by interpretation of 1997 photos.
Land cover (more detailed than above)		lc_ags	Polygons, landcov layer, dissolved on major Agassiz cover types.
Land cover (more detailed than above)		lc_nvcs	Polygons, landcov layer, dissolved on NVCS cover types.
Management plans	/mgmtplns		
Burn Units		burnunit	Polygons, prescribed burning management units.
Cropland Management Units		cropunit	Polygons, management units for active agricultural areas in the refuge.
Pools		pools	Polygons, pools (hydrologic management units).
Trapping Units		trapunit	Polygons, trapping units assigned to individual trappers.
Wildfire Management Units		wfmunit	Polygons, management units for planning response to wildfires.
Wilderness Area		wldarea	Polygons, federally designated wilderness area within refuge.
Photos	/photos	ags1997	1997 color-infrared photos, scanned, rectified, and mosaiced.
Project Boundaries	/prjbnd		
Refuge Boundary		agsbnd	Polygons, current land ownership boundaries of Agassiz NWR.
Refuge Boundary		agsleg	Polygons, legislative boundaries of Agassiz NWR.
Easements		easmts	Polygons, boundaries for easements managed by Agassiz NWR.
Public Recreation	/pubrec		
Auto tour route		autotour	Lines, recreational auto tour route within Agassiz NWR
Real Property Inventory	/realprop	realprop	Points, locations for real property entities at Agassiz NWR.
Soils	/soils	ssurgo	Polygons, digitized county soil survey information from the NRCS.
Transportation			
Refuge Roads		ags_road	Lines, gravel and grass roads within Agassiz NWR.

Appendix C. Summary list of data layers for Agassiz National Wildlife Refuge, with data file structure and names.

Dataset Name	Directory Name	Datafile name (8 char limit)	Brief Description
Project data (specific to refuge), cont'd	/agsmap		
Wildlife Habitats	/wildlife		
Black-crowned night heron		bcnheron	Polygons, black-crowned night heron nesting areas.
American Bittern		bit_nest	Points, bittern nest locations.
American Bittern		bit94-95	Points, radio-tracked bittern locations for 1994 and 1995.
American Bittern		bit96-97	Points, radio-tracked bittern locations for 1996 and 1997.
Colonial Nesting Birds		cnbs1992	Polygons, colonial nesting bird survey data for 1992.
Colonial Nesting Birds		cnbs1993	Polygons, colonial nesting bird survey data for 1993.
Colonial Nesting Birds		cnbs1994	Polygons, colonial nesting bird survey data for 1994.
Colonial Nesting Birds		cnbs1995	Polygons, colonial nesting bird survey data for 1995.
Colonial Nesting Birds		cnbs1996	Polygons, colonial nesting bird survey data for 1996.
Colonial Nesting Birds		cnbs1997	Polygons, colonial nesting bird survey data for 1997.
Colonial Nesting Birds		cnbs1998	Polygons, colonial nesting bird survey data for 1998.
Colonial Nesting Birds		cnbs1999	Polygons, colonial nesting bird survey data for 1999.
Colonial Nesting Birds		cnbs2001	Polygons, colonial nesting bird survey data for 2001.
Eagles		eagnest	Points, eagle's nest locations.
Franklin's gull		frgull	Polygons, Franklin's gull nesting areas.
Frogs and Toads		frogs	Points, frog and toad survey locations.
Wolves		wlvs_e98	Polygons, home range for the Elm Lake wolf pack for 1998.
Wolves		wlvs_e99	Polygons, home range for the Elm Lake wolf pack for 1999.
Wolves		wlvs_g98	Polygons, home range for the Golden Valley wolf pack for 1998.
Wolves		wlvs_g99	Polygons, home range for the Golden Valley wolf pack for 1999.