

Construction of a Geographic Information System for Wildlife Refuge Planning:

Seney National Wildlife Refuge¹

by

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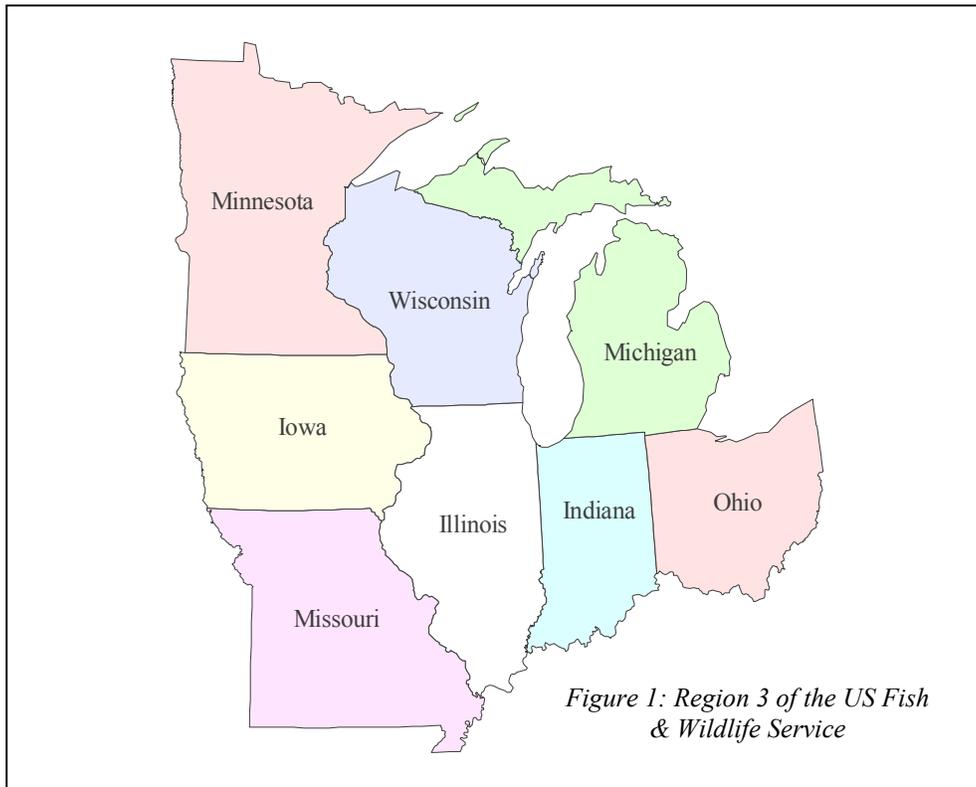
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Background

Under the National Wildlife Refuge System Improvement Act of 1997³ 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 Improvement Act⁴ 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



³ <http://refuges.fws.gov/policymakers/mandates/HR1420/index.html>

⁴ <http://refuges.fws.gov/policymakers/mandates/HR1420/Part4.html>

system (GIS) data for each refuge. These data sets are invaluable for the analysis and visualization of refuge resources and alternative management scenarios.

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). Not all data sets described on the list will be collected for each refuge, as refuge needs and data availability will vary between refuges. The regional extent typically covers multiple counties, and general, small-scale data layers such as vegetation, lakes, rivers 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, at a minimum, 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. The refuge data layers acquired differ between individual refuges depending on availability and specific needs of the refuge in question. 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 global positioning system (GPS) technologies. 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 Windows 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 program⁵. Metadata are provided in both text and xml formats. Projection files (.prj), which detail the projection specifics of the data layer, are also created for each data set.

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

⁵ <http://geology.usgs.gov/tools/metadata/tools/doc/mp.html>

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.

Seney National Wildlife Refuge

Seney National Wildlife Refuge⁶ is located in Schoolcraft County of Michigan's Upper Peninsula (see Figure 4 on page 5). The refuge lies in area known as the 'Great Manistique Swamp', and contains a large number of wetland vegetation species, as well as forest stands of various hardwoods, pines, spruce and firs (Figures 2 and 3). The current refuge area is 95,212 acres, which includes 25,150 acres of wilderness area, making Seney the 8th largest National



Figure 2: Impoundment at Seney National Wildlife Refuge. Impoundments cover approximately 5590 acres of the Refuge.

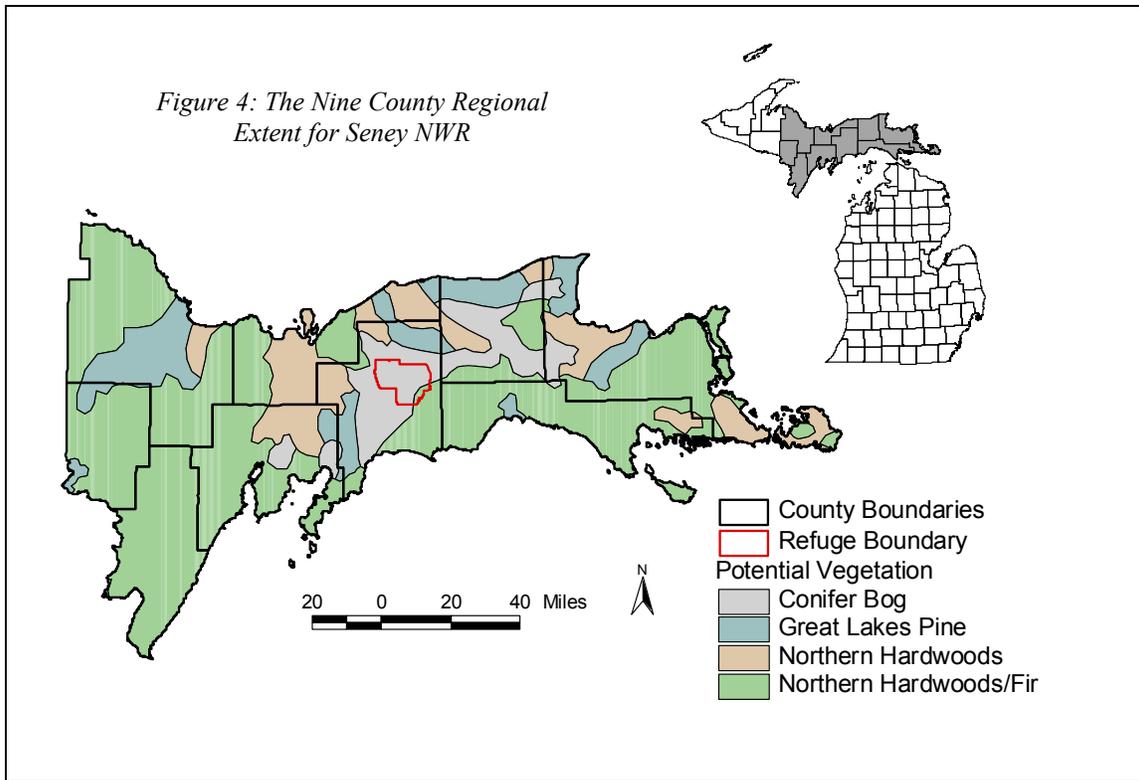
⁶ <http://midwest.fws.gov/Seney/index.htm>



Figure 3: Non-Forested area at Seney National Wildlife Refuge.
Approximately 2800 acres of the refuge are Non-Forested.

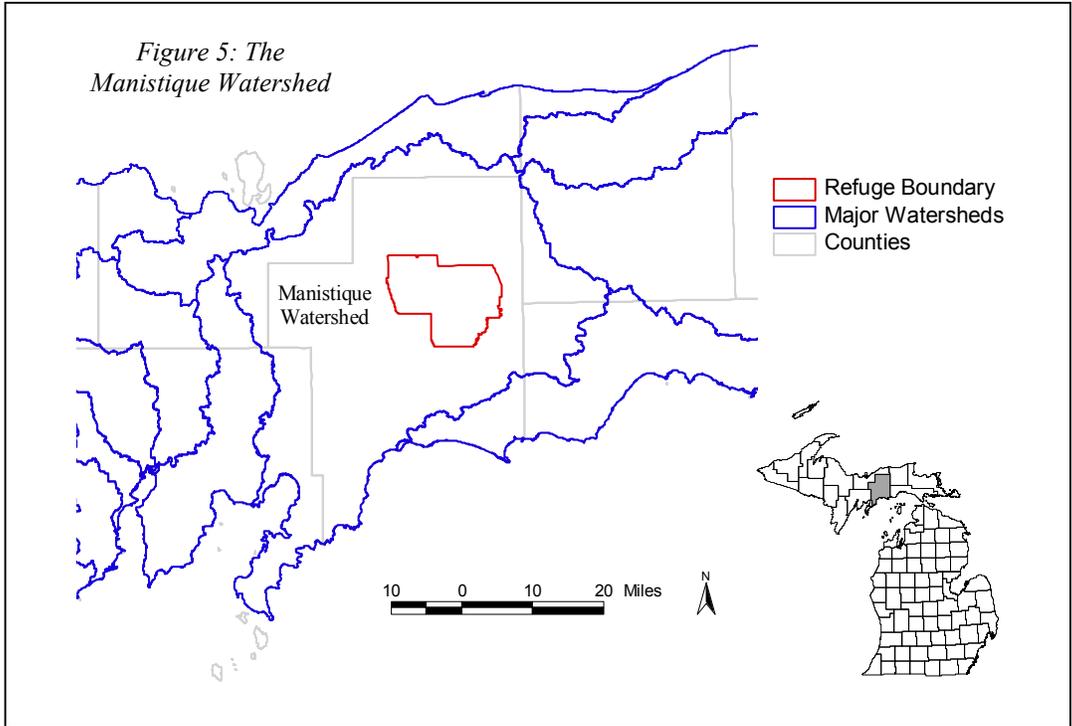
Wildlife Refuge east of the Mississippi River. Seney was established as a wildlife refuge in 1935, with the objective of providing breeding and migration habitat for migratory birds. Seney provides critical wildlife habitat for the region. The refuge supports over 200 species of bird (including ducks, bald eagles, osprey, loons, and trumpeter swans), 45 species of mammals (including otter, beaver, white-tailed deer, black bear, moose and wolves), 26 species of fish, 18 species of reptiles and amphibians, and 420 species of plants. Public use and amenities include wildlife observation, environmental education, an auto tour route, hunting and fishing, hiking and bicycling, and a visitor center. Seney National Wildlife Refuge is one of the major tourist attractions of the Upper Peninsula, attracting some 73,000 visitors annually. The management objectives for the refuge are to: 1) Provide breeding and migration habitat for migratory birds, 2) Provide habitat for resident wildlife, 3) Protect endangered and threatened species, 4) Provide for biodiversity, and 5) Provide public opportunities for outdoor recreation and environmental education.

The GIS data collected for Seney National Wildlife Refuge span three spatial extents. The regional extent covers 9 counties and was chosen to show the regional ecological context of the refuge within an area dominated by conifer bog, surrounded by hardwood forests (Figure 4). The watershed extent is limited to the boundaries of the Manistique watershed, which wholly



encompasses the refuge (Figure 5). Refuge specific layers lie mainly within the ownership boundaries of the refuge. A list of data layers that were collected for Seney National Wildlife Refuge can be found in Appendix C, along with brief descriptions of each layer. The data file structure and file names, based on a naming standard developed for this project, are also listed.

The data layers collected for Seney 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 Seney National Wildlife Refuge data are included here as examples. Figure 6 shows all the public land in the region in association with Seney NWR. Analysis of such a map might include determining cooperative use policies with those public lands surrounding the refuge. In Figure 7, fire management units are overlaying a general vegetation layer. A map of this sort may help refuge staff determine fire management policies for the different units. Photos are always useful for understanding the properties of a given area; Figure 8 shows the locations of aspen standings within a portion of the Walsh digital orthophoto quadrangle. 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 Seney National Wildlife Refuge.



Seney National Wildlife Refuge

Other Public Lands

Prepared by the
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University of Minnesota

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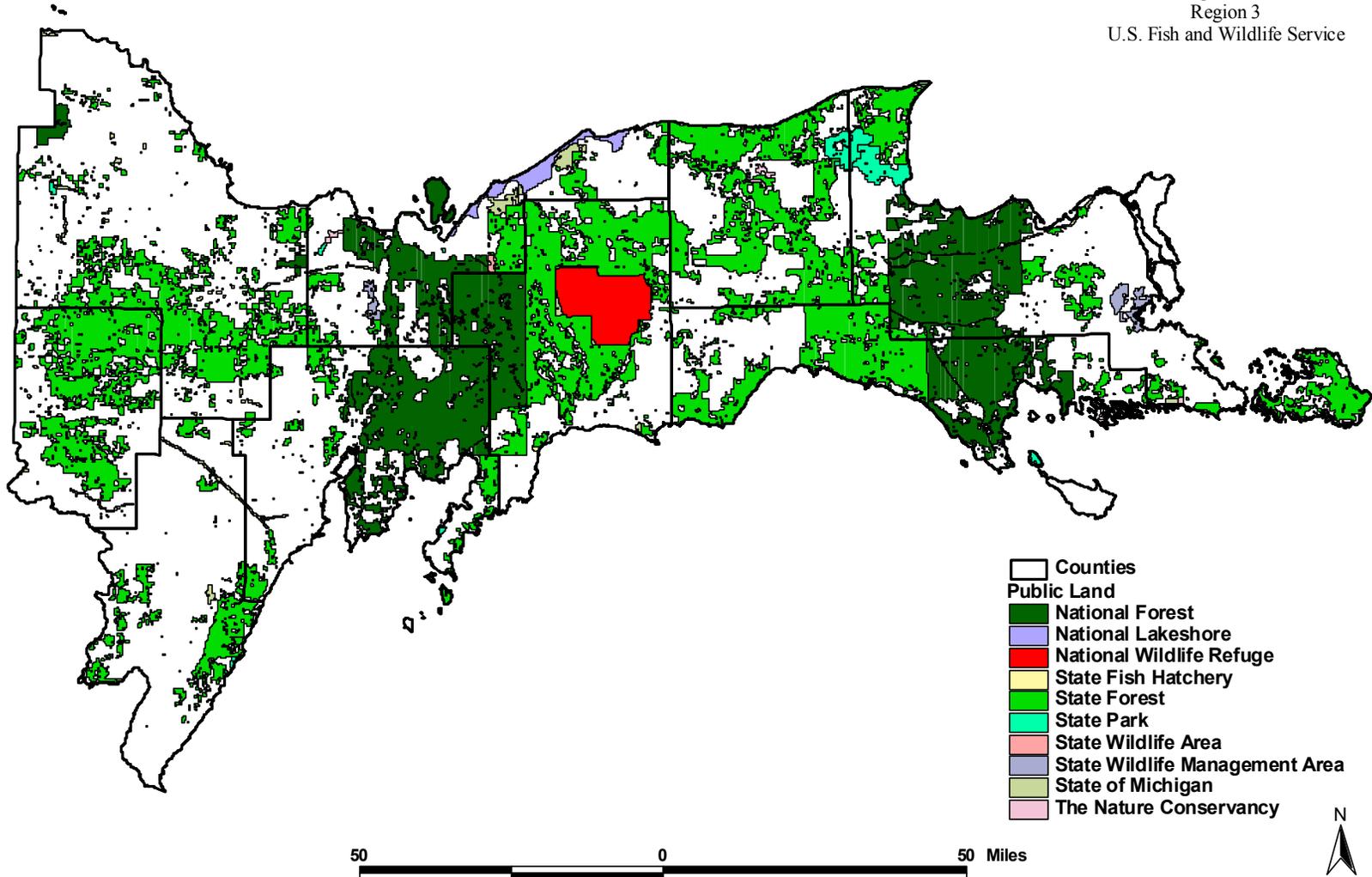


Figure 6: Regional Extent Map

Seney National Wildlife Refuge

Fire Management Units
with Vegetation Map

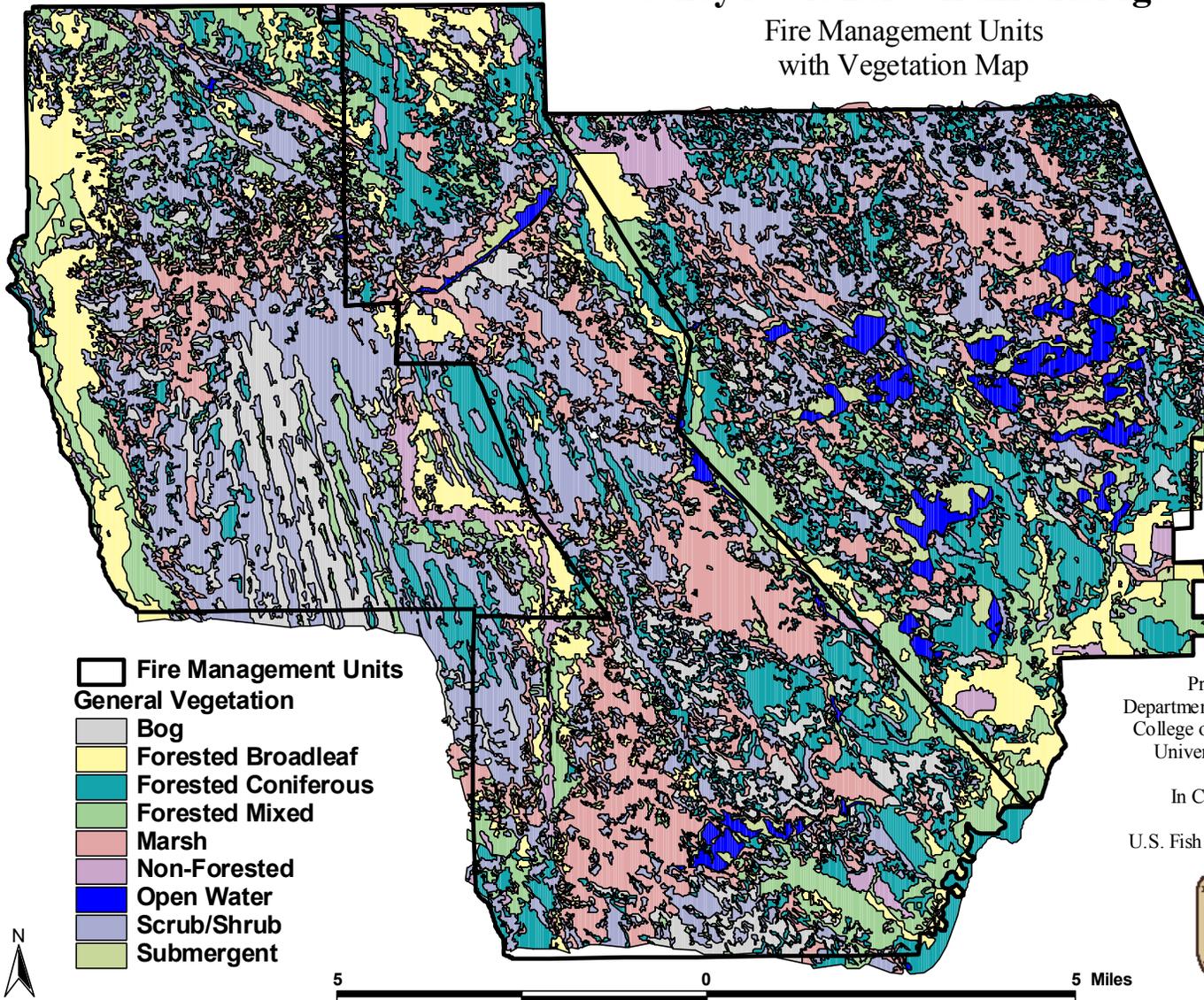
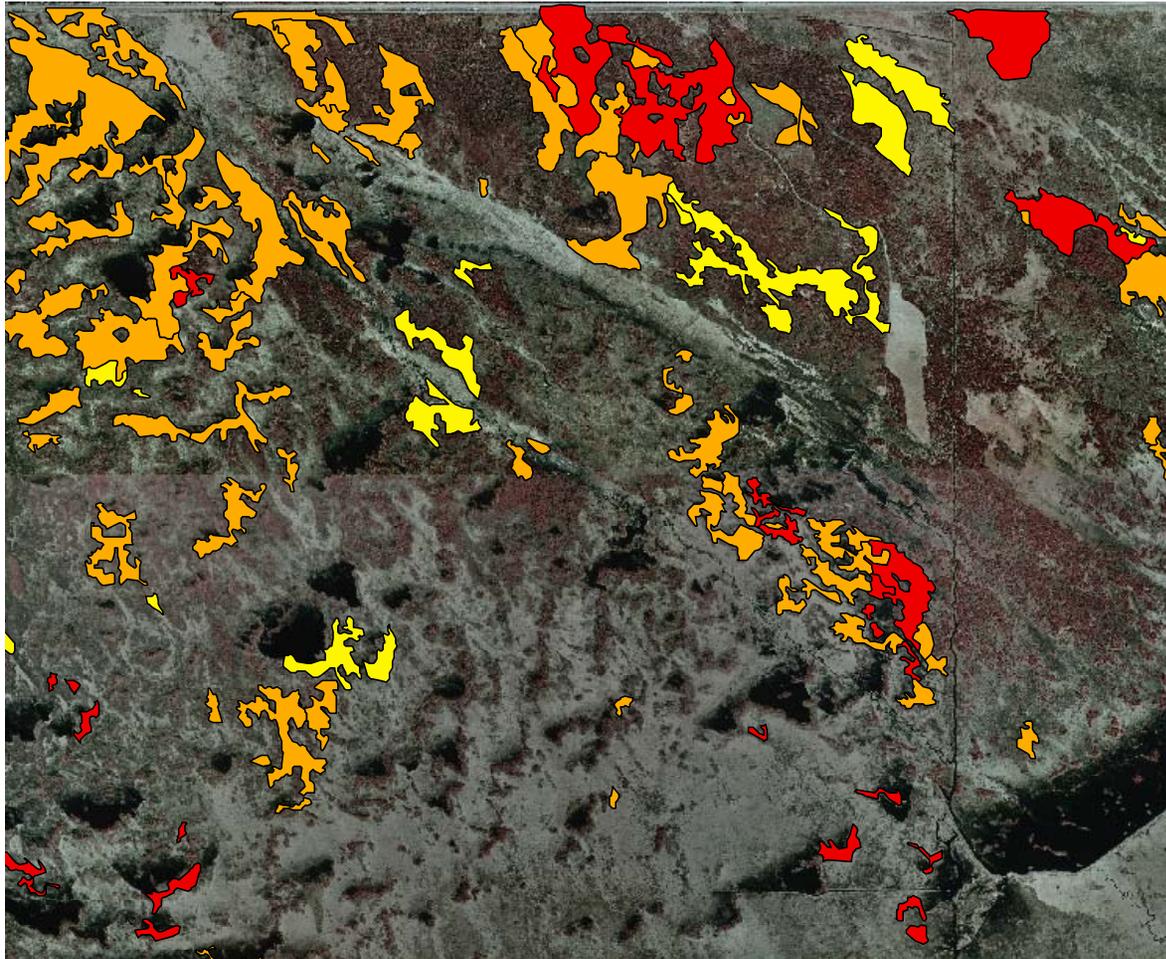


Figure 7: Refuge Extent Map

Seney National Wildlife Refuge

Various Cover Types with Aspen Trees Overlain on the Walsh DOQ



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Aspen Trees
■ Aspen
■ Aspen/Birch/Fir/Spruce
■ Aspen/Birch/Fir/Spruce/Pine



2 0 2 Miles

Figure 8: DOQ Image

Appendix A: A National Wildlife Refuge GIS Data Inventory (last revision Dec. 2002)

Data Set Name	Status / Notes	Source	Resolution	Extent	MetaData
<i>Regional Data</i>					
DRG's 1:250,000					
<i>Hydrography</i>					
Major Lakes					
Major Rivers					
<i>Land Ownership</i>					
Other Public Lands					
Land Use/Land Cover					
<i>Political Boundaries</i>					
Congressional Districts					
Counties					
State					
<i>Transportation</i>					
Roads - major					
<i>Vegetation</i>					
Historical					
Potential (Kuchler)					
<i>Watersheds</i>					
Watersheds - major					
<i>Watershed Data</i>					
Digital Elevation Models (DEMs)					
DRG's 1:24,000					
<i>Floodplains (FEMA)</i>					
100 year boundaries					
500 year boundaries					
<i>Hydrography</i>					
Lakes					
Rivers					
Streams					
Natural Heritage Data					
National Wetlands Inventory (NWI)					
<i>Political Boundaries</i>					
Cities / Municipal Boundaries					
Civil Townships					
Zoning					
<i>Public Land Survey</i>					
Township/Range					
PLS Sections					
PLS 40's					

Data Set Name	Status / Notes	Source	Resolution	Extent	MetaData
<i>Soils</i>					
STATSGO					
<i>Transportation</i>					
Airports					
Railroads					
Roads - minor					
<i>Watersheds</i>					
Watersheds - minor					
Refuge Data					
Digital Orthophoto Quadrangles					
<i>Boundaries</i>					
Easements					
Refuge Legislative Boundary					
Refuge Ownership Boundary					
Tracts (Internal tracts)					
WPAs					
<i>Cultural</i>					
Archeological Sites					
Land Cover					
<i>Management plans</i>					
Burn Units					
Cropland Management Plan					
Future Planning					
<i>Public Recreation</i>					
Boat Access					
Fishing Access					
Hiking Trails					
Parks					
Picnic Areas					
<i>Real Property Inventory</i>					
Dikes					
Ditches					
Drainage Network					
Signs					
Stormwater Sewers					
Structures					
Water Control Structures					
<i>Soils</i>					
SSURGO					

Data Set Name	Status / Notes	Source	Resolution	Extent	MetaData
<i>Transportation</i>					
Refuge Roads					
Parking Areas					
<i>Wildlife Habitats</i>					
Critical Habitat					
Eagles, Herons, etc					
Fish Habitat					

Appendix B:
Text file description for Seney National Wildlife Refuge GIS data

Documentation:

This CD contains GIS data for the Seney National Wildlife Refuge in Schoolcraft County, Michigan.

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 16, using the North American Datum of 1983. There are also metadata .MET, and .xml, 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. Each data set also has an associated .prj file, which contains detailed projection information for the specific file.

Seney National Wildlife Refuge Data

/sny/document/

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

/sny/graphics/

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

/sny/regional/cities/

This directory contains the ArcView shapefile **cities**, showing the major cities and towns for the region surrounding Seney National Wildlife Refuge.

/sny/regional/eco_reg/

This directory contains the ArcView shapefile **eco_reg**, representing the Bailey's ecological units for the region surrounding Seney National Wildlife Refuge.

/sny/regional/geology/

This directory contains the ArcView shapefiles **bedrock** and **quat**, showing various geological units for the region surrounding Seney National Wildlife Refuge.

/sny/regional/hydro/

This directory contains the ArcView shapefiles **lakes**, **rivers**, **streams**, and **ws_major**. These shapefiles cover the major hydrographic features for the region surrounding Seney National Wildlife Refuge.

/sny/regional/images/

This directory contains the compressed TIFF file format file **drg250k**, a mosaic of the 1:250,000 scale USGS Digital Raster Graphics (DRG's) for the region surrounding Seney National Wildlife Refuge.

/sny/regional/landown/

This directory contains the ArcView shapefile **publand**, which shows the public lands, and the owners, for the region surrounding Seney National Wildlife Refuge.

/sny/regional/lulc/

This directory contains a variety of land use and land cover files for the region surrounding Seney 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 dataset **nlcd** is in a raster grid format (30 m resolution), and represents cells classified into one of twenty-one general land cover categories. The dataset **lta** shows broad land type associations across the region.

/sny/regional/polbnds/

This directory contains political boundary data. The state (ArcView shapefile **state**) and county (ArcView shapefile **county**) boundaries are given for the state of Michigan, while the congressional district boundaries (ArcView shapefile **congdist**) are given for the region surrounding Seney National Wildlife Refuge. Also included is the ArcView shapefile **region**, which represents the boundaries of the regional area of interest.

/sny/regional/topo_ind/

This directory contains the ArcView shapefiles **ind_24**, **ind_100**, and **ind_250**, which represent the boundaries of USGS topographic maps at the three scales for the region surrounding Seney National Wildlife Refuge.

/sny/regional/trans/

This directory contains the ArcView shapefile **hwys**, representing the major highways for the region surrounding Seney National Wildlife Refuge.

/sny/regional/soils/

This directory contains the ArcView shapefile **statsgo**, representing the State Soil Geographic Database (STATSGO) data for the region surrounding Seney National Wildlife Refuge.

/sny/wtrshed/dems/

This directory contains the GRID dataset **dems**, representing a 30-meter Digital Elevation Model (DEM) for the watershed in which Seney National Wildlife Refuge lies.

/sny/wtrshed/hydro/

This directory contains the ArcView shapefiles **lakes**, **rivers**, **streams**, and **ws_minor**, representing 1:24000 hydrographic data for the watershed in which Seney National Wildlife Refuge lies.

/sny/wtrshed/images/

This directory contains the compressed TIFF file format files **drg100k** (a mosaic of the 1:100,000 scale USGS Digital Raster Graphics (DRG's)), and **relief** (a shaded relief map created from DEM data) for the region surrounding Seney National Wildlife Refuge.

/sny/wtrshed/nwi/

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

/sny/wtrshed/polbnds/

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

/sny/wtrshed/pls/

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

/sny/wtrshed/trans/

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

/sny/wtrshed/utility/

This directory contains the ArcView shapefile **utility**, representing utility data for the watershed in which Seney National Wildlife Refuge lies.

/sny/refuge/bound/

This directory contains ArcView shapefiles for a variety of project boundary data types. **Sny_bnd** contains refuge land ownership status boundaries, **sny_leg** contains refuge legislative boundaries, **hist_own** shows land ownership boundaries on the refuge from 1896, **hunt** shows the boundaries of various hunting areas, and **mgmtunit** shows the Forest Management Unit boundaries for Seney National Wildlife Refuge.

/sny/refuge/cultural/

This directory contains the ArcView shapefiles **archsited** and **archprob**, representing historic archeological features, and zones of archaeological probability, respectively, for Seney National Wildlife Refuge.

/sny/refuge/enviro/

This directory contains the ArcView Shapefiles **farm**, showing farm units, **landmark**, representing the boundaries of National Landmark areas, **natural**, showing the locations of natural areas, and **wild**, showing the locations of wilderness areas for Seney National Wildlife Refuge.

/sny/refuge/fire/

This directory contains the ArcView shapefiles **fm**, showing the boundaries of fire management units, and **walsh**, representing the extent of the 1976 Walsh wildfire.

/sny/refuge/hydro/

This directory contains the ArcView shapefiles **lakes**, **rivers**, and **streams**, representing all the hydrologic features for Seney National Wildlife Refuge.

/sny/refuge/images/

This directory contains the compressed Mr. Sid files **doqq**, which is the mosaic of color infra-red aerial photographs of the Seney National Wildlife Refuge. The photos were flown in 2000. This directory also contains the compressed TIFF file format file **drg24k**, a mosaic of the USGS 7.5 minute topographic maps that cover Seney National Wildlife Refuge.

/sny/refuge/landform/

This directory contains the ArcView shapefile **contours**, representing 10-foot contour intervals as generated from the DEM for Seney National Wildlife Refuge.

/sny/refuge/mgmtplns/

This directory contains the ArcView shapefile **forestmu**, showing the boundaries of the twenty forest management units of Seney National Wildlife Refuge.

/sny/refuge/pls/

This directory contains the ArcView shapefile **pls40**, showing the boundaries of the Public Land Survey 40-acre parcels within the boundary of Seney National Wildlife Refuge.

/sny/refuge/pubrec/

This directory contains ArcView shapefiles showing public recreation opportunities in and around Seney NWR. The shapefile **trails** shows nature walks, and the shapefile **picnic** shows the location of picnic areas.

/sny/refuge/soils/

This directory contains the ArcView shapefile **soils**, representing large-scale soil data for Seney National Wildlife Refuge.

/sny/refuge/struct/

This directory contains the ArcView shapefiles **bridge**, showing the locations of all bridges, **build**, the locations of all buildings, and **gates**, the locations of all gates within the boundary of Seney National Wildlife Refuge.

/sny/refuge/trans/

This directory contains the ArcView shapefile **roads**, showing detailed roadway data for the Seney National Wildlife Refuge.

/sny/refuge/veg/

This directory contains the ArcView shapefiles **exotics**, showing the locations of various exotic plant species, and **veg_cov**, a large-scale vegetation classification for Seney National Wildlife Refuge.

/sny/refuge/wcs/

This directory contains the ArcView shapefiles **dikes**, showing the locations of man-made dike structures, and **wcs**, recording the locations of other water control structures for Seney National Wildlife Refuge.

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

Dataset Name	Directory Name	Datafile Name	Description
<i>Basemap Data, Regional Level</i>	<i>/regional</i>		
Cities	/cities	cities	Points - major cities and towns
Ecological Regions	/eco_reg	eco_reg	Polygons - ecological characterization boundaries
Geology	/geology		
Bedrock Geology		bedrock	Polygons - boundaries of bedrock geologic units
Quaternary Geology		quat	Polygons - the boundaries of quaternary geologic units
Hydrography	/hydro		
Lakes - major		lakes	Polygons - major lake boundaries
Rivers - major		rivers	Polygons - major river features
Streams - major		streams	Lines - major stream features
Watersheds - major		ws_major	Polygons - major watershed boundaries
Images	/images	drg250k	Image - mosaic of 1:250,000 scale USGS topographic maps
Land Ownership	/landown	publand	Polygons - land ownership info for other public lands
Land Use/Land Cover	/lulc		
Historical Vegetation		histveg	Polygons - Marshner's map of historical vegetation
Land Type Associations		lta	Polygons - Broad land type associations
National Land Cover Data		nlcd	GRID - 30m land cover data
Potential Vegetation		potveg	Polygons - Kuchler's map of potential natural vegetation
Political Boundaries	/polbnds		
Congressional Districts		congdist	Polygons - congressional districts for the region
County		county	Polygons - county boundaries for the state of Michigan
Regional Extent		region	Polygons - county boundaries for the regional extent
State		state	Polygons - Michigan state boundary
Soils	/soils	statsgo	Polygons - boundaries of general soil associations
Topographic Index	/topo_ind		

Dataset Name	Directory Name	Datafile Name	Description
7.5 Minute Series		ind_24	Polygons - boundaries of the USGS 7.5 minute series
30 x 60 Minute Series		ind_100	Polygons - boundaries of the USGS 30x60 minute series
1 x 2 Degree Series		ind_250	Polygons - boundaries of the USGS 1x2 degree series
Transportation - major roads	/trans	hwys	Lines - major roads of the region
<i>Basemap Data, Watershed Level</i>	<i>/wtrshed</i>		
Digital Elevation Models	/dems	dems	Raster - 30 meter DEM mosaic
Hydrography	/hydro		
Lakes		lakes	Polygons - 1:24,000 scale lake boundaries
Rivers		rivers	Polygons - 1:24,000 scale river boundaries
Streams		streams	Lines - 1:24,000 scale stream data
Watersheds - minor		ws_minor	Polygons - minor watershed boundaries
Images	/images		
1:100,000 DRG's		drg100k	Image - mosaic of 1:100,000 scale USGS topographic maps
Shaded Relief		relief	Image - relief map created from DEM data
National Wetlands Inventory	/nwi	nwi	Polygons - NWI data obtained from the Michigan DNR
Political Boundaries	/polbnds		
Municipal Boundaries		munbnd	Polygons - municipal boundaries
Civil Townships		civtwp	Polygons - civil township boundaries
Public Land Survey	/pls		
Township/Range		twprng	Polygons - public land survey township/range boundaries
PLS Sections		plssec	Polygons - public land survey section boundaries
Transportation	/trans		
Airports		runway	Polygons - airports mapped at 1:24,000
Railroads		railroad	Lines - 1:24,000 scale railroad lines
Roads - minor		roads	Lines - 1:24,000 scale obtained from the Michigan DNR
Utilities	/utility	utility	Lines - 1:24,000 scale utility data

Dataset Name	Directory Name	Datafile Name	Description
<i>Basemap Data, Refuge Specific</i>	<i>/refuge</i>		
Boundaries	/bound		
Forest Management Units		mgmtunit	Polygons- 1:24,000 scale forest management units
Historic Land Ownership (1896)		hist_own	Polygons - land ownership boundaries from 1896
Hunting Areas		hunt	Polygons - boundaries of various hunting areas
Refuge Boundary		sny_leg	Polygons - legal boundary of refuge
Refuge Ownership		sny_bnd	Polygons - boundary of USFWS ownership
Cultural Resources	/cultural		
Archaeological Sites		archsite	Points - locations of historic archaeological resources
Archaeological Probabililty Zones		archprob	Polygons - zones of archaeological probability
Environmental Preservation	/enviro		
Farm Units		farm	Polygons - boundaries of farm units within the refuge
National Landmarks		landmark	Polygons - boundaries of national landmark areas
Natural Areas		natural	Polygons - boundaries of natural areas within the refuge
Wilderness Areas		wild	Polygons - boundaries of wilderness areas
Fire	/fire		
Fire Management Units		fmu	Polygons - refuge fire management units
Walsh Fire of 1976		walsh	Polygons - boundary of the 1976 Walsh wild fire
Hydrography	/hydro		
Lakes/Pools		lakes	Polygons - 1:24,000 scale lake boundaries
Rivers		rivers	Polygons - 1:24,000 scale river boundaries
Streams		streams	Lines - 1:24,000 scale stream data
Images	/images		
Digital Orthophoto Quadrangles		doqq	Image - mosaics of color infra-red aerial photos
1:24,000 DRG's		drg24k	Image - mosaic of USGS 7.5 minute topographic maps
Landforms	/landform	contours	Lines - 10ft. contour data generated from the DEM

Dataset Name	Directory Name	Datafile Name	Description
Public Land Survey	/pls		
40's		pls40	Polygons - public land survey 40-acre parcel boundaries
Public Recreation	/pubrec		
Nature Walks		trails	Lines - locations of nature walks and hiking trails
Picnic Areas		picnic	Points - locations of picnic areas
Soils	/soils	soils	Polygons - 1:24,000 scale soil type boundaries
Structures	/struct		
Bridges		bridge	Points - locations of bridges on the refuge
Buildings		build	Points - locations of building on the refuge
Gates		gates	Points - locations of gates on the refuge
Transportation	/trans		
Roads		roads	Lines - 1:24,000 scale mapping of roads and 2-tracks
Vegetation	/veg		
Exotic Species		exotics	Points - locations of exotic plant species
Vegetation Cover		veg_cov	Polygons - boundaries of various vegetation types
Water Control Structures	/wcs		
Dikes		dikes	Lines - 1:24,000 scale mapping of dike structures
Other Water Control Structures		wcs	Points - 1:24,000 scale mapping of other structures