LAKE SUPERIOR
ENVIRONMENTAL SENSITIVITY INDEX
METADATA

Prepared By:

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FILE DESCRIBES: Digital data for 1994 Lake Superior Environmental Sensitivity Index. Data were compiled and digitized at Research Planning, Inc., Columbia, South Carolina.

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FILE CREATED ON: 19970205

COMMENTS: Information was developed using the U.S. Federal Geographic Data Committee's Content Standards for Digital Geospatial Metadata, June 8, 1994. The numbering scheme matches the Meta Data Standard in order to facilitate referencing definitions of the elements. The items in **bold** are required elements and the others are optional elements. The Spatial Data Transfer Standard, ver. 03/92, was referenced to properly identify the geographic entities.

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1.0. IDENTIFICATION INFORMATION

1.1. CITATION

1.1.1. ORIGINATOR:

National Oceanic and Atmospheric Administration (NOAA), Office of Ocean Resources Conservation and Assessment, Seattle, Washington 98115; and Research Planning, Inc., 1121 Park Street, Post Office Box 328, Columbia, South Carolina 29202

1.1.2. PUBLICATION DATE:

199409

1.1.4. TITLE:

Sensitivity of Coastal Environments and Wildlife to Spilled Oil: Lake Superior

1.1.5. EDITION:

First

1.1.6. GEOSPATIAL DATA PRESENTATION FORM:

Atlas

1.1.7. SERIES INFORMATION

1.1.7.1. SERIES NAME:

None

1.1.7.2. ISSUE IDENTIFICATION:

Lake Superior

1.1.8. PUBLICATION INFORMATION

1.1.8.1. PUBLICATION PLACE:

Seattle, Washington

1.1.8.2. PUBLISHER:

NOAA, Office of Ocean Resources Conservation and Assessment

1.1.9. OTHER CITATION DETAILS:

Prepared by Research Planning, Inc., Columbia, South Carolina for the Hazardous Materials Response and Assessment Division, National Oceanic and Atmospheric Administration, Seattle, Washington and the Ninth Coast Guard District, U.S. Coast Guard, Cleveland, Ohio

1.1.10. ONLINE LINKAGE:

Not available

1.1.11. LARGER WORK CITATION:

None

1.2. DESCRIPTION

1.2.1. ABSTRACT:

This data set comprises the Environmental Sensitivity Index (ESI) maps for the shoreline of Lake Superior. ESI data characterize coastal environments and wildlife by their sensitivity to spilled oil. The ESI data include information for three main components: shoreline habitats; sensitive biological resources; and human-use resources

1.2.2. PURPOSE:

The ESI data were collected, mapped, and digitized to provide environmental data for oil spill planning and response. The Clean Water Act with amendments by the Oil Pollution Act of 1990 requires response plans for immediate and effective protection of sensitive resources

1.3. TIME PERIOD OF CONTENT

1.3.1. TIME PERIOD INFORMATION

1.3.1.3. RANGE OF DATES/TIMES:

The intertidal habitats were mapped during aerial and ground surveys conducted from 14-17 June 1993. The biological and human use resources data were compiled by regional biologists in 1994. The dates for these data vary and are documented in Section 2.5.1

1.4. STATUS

1.4.1. PROGRESS:

Complete

1.4.2. MAINTENANCE AND UPDATE FREQUENCY:

None planned

1.5. SPATIAL DOMAIN

1.5.1. BOUNDING COORDINATES

1.5.1.1. WEST BOUNDING COORDINATE:

-92.2916

1.5.1.2. EAST BOUNDING COORDINATE:
-84.625

1.5.1.3. NORTH BOUNDING COORDINATE:
48.2916

1.5.1.4. SOUTH BOUNDING COORDINATE:
46.375

1.6 KEYWORDS

1.6.1. THEME

1.6.1.1. THEME KEYWORD THESAURUS:
None

1.6.1.2. THEME KEYWORD:
Sensitivity maps; ESI; coastal resources; oil spill planning; and coastal zone management

1.6.2. PLACE

1.6.2.1. THESAURUS:
None

1.6.2.2. PLACE KEYWORD:
Shoreline of Lake Superior, to encompass the lakeshore for the states of Minnesota, Wisconsin, and Michigan

1.7. ACCESS CONSTRAINTS:
None

1.8. USE CONSTRAINTS:
DO NOT USE ESI MAPS FOR NAVIGATIONAL PURPOSES.
Besides the above warning, there are no use constraints on this data. Acknowledgment of NOAA and other contributing sources would be appreciated in products derived from these data

1.11. DATA SET CREDIT:
This project was supported jointly by NOAA's Hazardous Materials Response and Assessment Division, Robert Pavia, Project Manager, and the U.S. Coast Guard, LT. Kenneth Barton, Project Facilitator. The efforts of LCDR Michael Tobbe towards securing the funds are greatly appreciated. Air support was provided by the Air Station, Traverse City.

Roger Gauthier and Gordon Thompson from the U.S. Army Corps of Engineers, Detroit District, provided the digital base maps as well as color infrared aerial photographs which were used to confirm overflight observations.

Many people from various State and Federal agencies provided information for these maps, as well as reviewed the maps. From the state of Minnesota, information and edits were provided by Marilyn Danks, Pat Collins, Steve Persons, Steve Geving, Steve Leppalä, and Heidi Bauman. Information for Wisconsin was edited by Dennis Pratt, Duene Lahti, and Fred Strand.

Michigan reviews were coordinated by Ron Raisenen and completed by Dell Siler, Ray Perez, Steve Scott, Jim Hammill, and Ray Juetten.

Information for tribal lands was provided by Jay Leshinske for the Grand Portage tribe and William F. Beaver for the Keweenaw Bay Indian Community. Julie Van Stappen and Jack G. Oelfke from the National Park Service provided information for the Park Service lands.

At Research Planning, Inc., Jacqueline Michel was the project manager; she and Miles O. Hayes were responsible for the shoreline mapping. Jeffrey Dahlin was the project biologist and responsible for data collection. Debra K. Scholz and Robert J. Conway assisted in the biological and human-use data collection. James Olsen, Scott Johnson, William Holton, E. Lee Diveley, and Nilesh Shiroff worked diligently to complete the data entry and generate the final map product.

1.13. NATIVE DATA SET ENVIRONMENT:

The software packages used to develop the atlas are Environmental Systems Research Institute's ARC/INFO® (version 7.0.3) and ORACLE RDBMS (version 6.0.36.1.1). The hardware configuration is Hewlett Packard workstations (models 715/50 and 712/80 with 4 X-terminals) with UNIX operating system (HP-UX Release A.09.01). The following files are included in the data set:

arc_lut.e00	birds.e00	biores.e00
breed.e00	esi.e00	fish.e00
habitats.e00	hydro.e00	index.e00
nests.e00	pnts_lut.e00	poly_lut.e00
seasonal.e00	soc_data.e00	soc_lut.e00
socecon.e00	species.e00	t_mammal.e00

The entire data set is approximately 87 megabytes.

2.0. DATA QUALITY INFORMATION

2.1. ATTRIBUTE ACCURACY

2.1.1. ATTRIBUTE ACCURACY REPORT:

The attribute accuracy is estimated to be "good" given the years of ESI experience, the data input methodology, the quality control review sessions, and the digital logical consistency checks.

2.2. LOGICAL CONSISTENCY REPORT:

The digitization of shoreline types, biological resources, and human-use resources is a complex and highly quality-controlled process. In order to facilitate digitizing, the entire study area is split into individual quadrangles using the INDEX data layer. The first layer of information digitized is the ESI shoreline. Upon completion of digitization the data are checked for completeness and topological and logical consistency and then plotted and checked by the mapping geologists. Any errors in the shoreline classification are updated prior to digitization of the biological and socio-economic layers. All layers use the shoreline as the geographic reference. The biological and human-use data are digitized, checked using both digital and on-screen procedures, plotted, and sent out for review by the regional specialists. The edited maps are updated, checked once again, and the final product plotted (at approximately 1:50,000 scale). A team of specialists review the entire series of maps, check all data, and make final edits. The data are then merged to form the study-wide layers.

To finalize the data checking process, each data layer is checked using a standardized form by two GIS personnel (a technician and the GIS manager), and each attribute database is checked using several programs which test the files for missing or duplicate data, rules for proper coding, GIS topological consistencies (such as dangles, unnecessary nodes, etc.), and ORACLE® to ARC/INFO consistencies. A final review is made by the GIS manager and programs are run to generate the unique IDs and associated lookup tables.

2.3. COMPLETENESS REPORT:

Shoreline Habitat Mapping:

The shoreline habitats of Lake Superior were mapped during overflights conducted from 14-17 June 1993. The surveys were conducted at elevations of

300-500 feet and slow air speed, using a H-65 helicopter provided by the U.S. Coast Guard. An experienced coastal geologist delineated the coastal types directly onto 1:24,000 scale USGS topographic maps, using a standardized classification scheme. Where appropriate, multiple habitats were delineated for each shoreline segment. For complicated areas or where the shoreline had changed significantly from that shown on the base maps, color infrared aerial photographs provided by the Michigan Department of Natural Resources were used to update the maps.

Prediction of the behavior and persistence of oil on intertidal habitats is based on an understanding of the dynamics of the coastal environments, not just the substrate type and grain size. The vulnerability of a particular intertidal habitat is an integration of the following factors:

1) Shoreline type (substrate, grain size, tidal elevation, origin)
2) Exposure to wave and tidal energy
3) Biological productivity and sensitivity
4) Ease of cleanup

All of these factors are used to determine the relative sensitivity of intertidal habitats. Key to the sensitivity ranking is an understanding of the relationships between: physical processes; substrate; shoreline type; product type; fate and effect; and sediment transport patterns. The intensity of energy expended upon a shoreline by wave action, tidal currents, and river currents directly affects the persistence of stranded oil. The need for shoreline cleanup activities is determined, in part, by the slowness of natural processes in removal of oil stranded on the shoreline.

These concepts have been used in the development of the ESI, which ranks shoreline environments as to their relative sensitivity to oil spills, potential biological injury, and ease of cleanup. Generally speaking, areas exposed to high levels of physical energy, such as wave action and tidal currents, and low biological activity rank low on the scale, whereas sheltered areas with associated high biological activity have the highest ranking.

Sensitive Biological Resources:

Regional biologists compiled the biological data. These data denote the key biological resources that are most likely at risk in the event of an oil spill.

Four major categories, or elements, of biological resources were considered during data compilation: birds, fish, mammals, and habitats.

Each ELEMENT corresponds to a coverage or geographic theme. There are three attribute tables, BIORES, SEASONAL, and SPECIES, that are used to store the complex biological data (Fig. 1). Each biological coverage (BIRDS, FISH, T_MAMMAL, and HABITATS) is linked to the Biological Resources table (BIORES) using the item ID and the associated lookup tables. The lookup tables contain ID and RARNUM. RARNUM is the resources at risk number and is determined for each unique combination of SPECIES_ID, SEASON_ID, and CONC. The items in BIORES are: RARNUM, SPECIES_ID, CONC, SEASON_ID, G_SOURCE, S_SOURCE, and ELEMENT. SPECIES_ID is the numeric identifier of each species and is unique within each ELEMENT. CONC is the concentration of the species and can be LOW, MEDIUM, or HIGH, or an actual count of the numbers of species present in the polygon. SEASON_ID contains a numeric value according to the monthly presence of the species. Usually, there is one seasonality per species, but occasionally the same species has different monthly presence or breeding activity. When this occurs, a new record with a different seasonality is referenced.

The SEASONAL data table stores the monthly presence of each species and the characteristics of the presence (life history information). The BIORES data table is linked to the SEASONAL table using the SPECIES_ID, ELEMENT, and SEASON_ID items. The categories of the variables BREED1 through BREED5 for each ELEMENT are:

ELEMENT	BREED 1	BREED 2	BREED 3	BREED 4	BREED 5
BIRD	nesting	laying	hatching	fledging	
FISH	spawning	outmigration	larvae	juvenile	adult

NOTE: There are no BREED variables for HABITATS or T_MAMMALS.

The SPECIES data table contains the species identification number (SPECIES_ID), common name (NAME), scientific name (GEN_SPEC), two-letter state abbreviation for listed species (STATE), state and federal status (S_F), threatened and/or endangered status (T_E), date of the list for threatened or endangered species (DATE_PUB), biology element (ELEMENT), and the biology subelement (SUBELEMENT). The item SUBELEMENT refers to the grouping of the species within each ELEMENT:

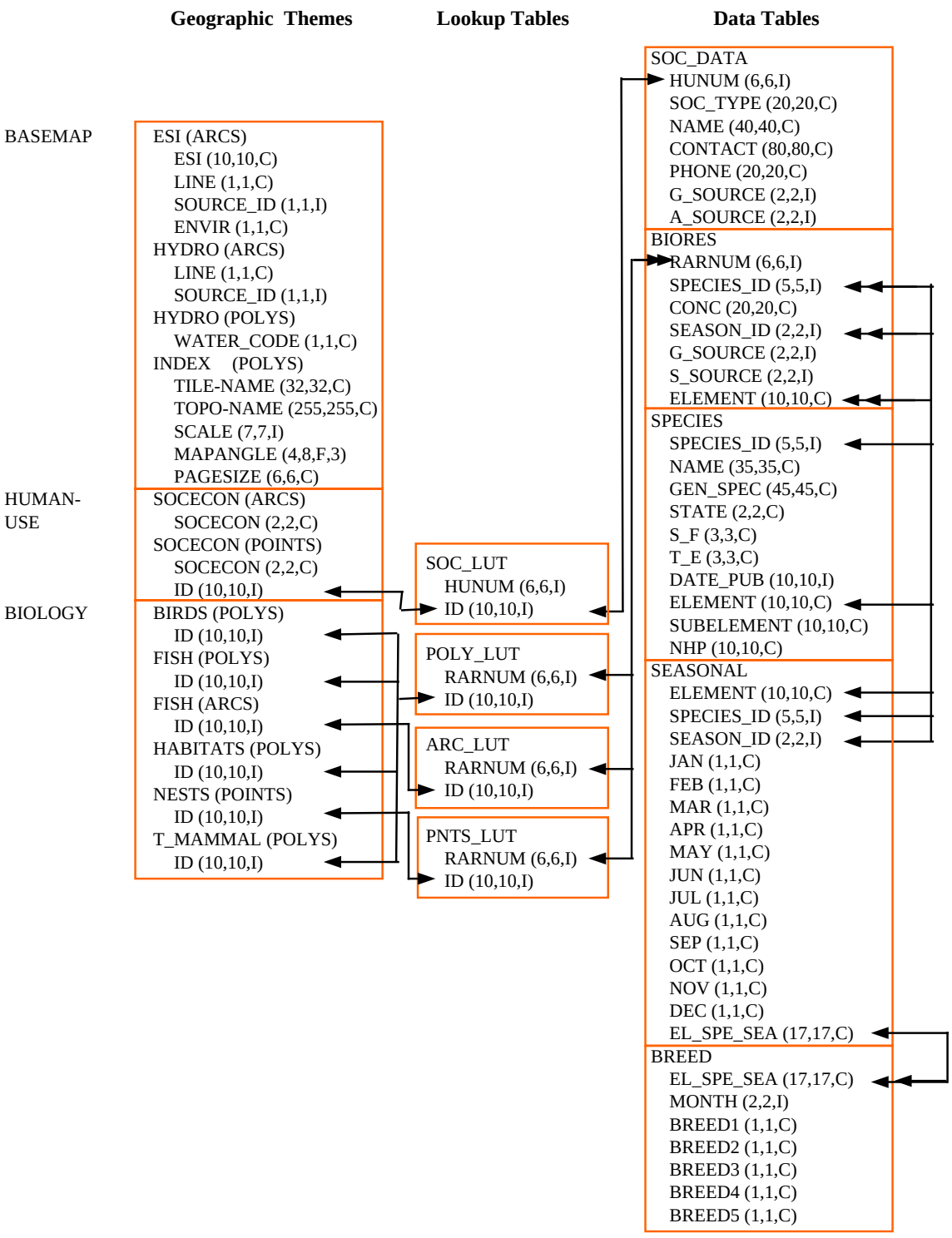

FIGURE 1. Relationships between data layers, lookup tables, and data tables.

ELEMENT	SUBELEMENT
Bird	diving
	gull_tern
	raptor
	shorebird
	wading
	waterfowl
Fish	anadromous
	special
Habitat	shrub
T_Mammal	canine
	mustelid
	rodent

Human Use Resources:

Several human use, or socio-economic, features are included in ESI atlases. Entity points and complete chains are digitized into the coverage SOCECON. The data set is linked to the data table SOC_DATA using the item ID found in the SOC_LUT. ID is a concatenation of atlas number (5), element number (10), and unique record number.

ENTITY POINTS (.PAT) **COMPLETE CHAINS (.AAT)**

Item	Type	Item	Type
SOCECON	C	SOCECON	C
ID	I		

The item SOCECON may contain the following values:

Entity Points		Polygons	
Feature	**SOCECON**	**Feature**	**SOCECON**
Access	A2	Beach	B
Airport	A	Indian Reservation	IR
Aquaculture	AQ	International Border	IB
Archaeological Site	AS	Marine Sanctuary	MS
Boat Ramp	BR	National Park	NP
Campground	CP	Regional or State Park	P
Coast Guard	CG	Wildlife Refuge	WR
Commercial Fishing	CF		
Diving	DV		
Ferry	F		
Factory	F2		
Hoist	H		
Helipad	HP		
Historical Site	HS		

Entity Points		Chains	
Feature	**SOCECON**	**Feature**	**SOCECON**
Lock and Dam	LD	Beach	B
Log Storage	LS	Indian Reservation	IR
Marina	M	International Border	IB
Mining	MZ	Marine Sanctuary	MS
Oil Facilities	OF	National Park	NP
Platform	PF	Pipeline	P
Recreational Fishing	RF	Regional or State Park	P
Subsistence	S	Wildlife Refuge	WR
Well	W		
Water Intake	WI		

The table SOC_DATA contains the human-use number (HUNUM), feature type (SOC_TYPE), name of the facility (NAME), contact person (CONTACT), telephone number (PHONE), geographic source (G_SOURCE), and attribute source (A_SOURCE).

2.4. POSITIONAL ACCURACY

2.4.1. HORIZONTAL POSITIONAL ACCURACY

2.4.1.1. HORIZONTAL POSITIONAL ACCURACY REPORT:

The ESI data uses USGS 1:24,000 topographic quadrangles as the base map. It is estimated that the ESI has a minimum mapping unit of 50 feet. The biological data sets are developed primarily using regional experts who estimate concentration areas. Unlike shorelines, which maintain relative spatial stability through time, the biological data by nature migrate across the landscape. Therefore, the 1:24,000 USGS quadrangles are used as a base map in gathering the data but the data have "fuzzy" boundaries which must be understood when utilizing this information.

2.5. LINEAGE

2.5.1. SOURCE INFORMATION:

Data layer or theme name: BIRDS

2.5.1.1. SOURCE CITATION

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denominator	2.5.1.4 Source Time Period
Herdendorf, C.E., S.M. Hartley, and M.D. Barnes	1981	Fish and Wildlife Resources of the Great Lakes Coastal Wetlands within the United States, Vol. 6–Lake Superior, Parts 1 & 2	Book	U.S. Fish and Wildlife Service, Biological Services Program, Washington, D.C., FWS/OBS-81/02-V6, 846 pp.	None	1913-1980
Wisconsin Coastal Management Program	1977	Wisconsin Coastal Atlas 1977	Book	Wisconsin Coastal Management Program, Madison, Wis.	None	1977
Brewer, R., G.A. McPeek, and R.J. Adams, Jr.	1991	The Atlas of Breeding Birds of Michigan	Book	Michigan State University Press, East Lansing Mich., 594 pp.	None	1989-1991
Evers, D.C.	1992	A Guide to Michigan's Endangered Wildlife	Book	University of Michigan Press, Ann Arbor, Mich., 103 pp.	None	1992
Raisenen, Ron, Michigan Department of Natural Resources	None	Birds for Michigan Shore	Personal knowledge	None	None	1994
Perez, Ray, Michigan Department of Natural Resources	None	Birds for Michigan Shore	Personal knowledge	None	None	1994

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denomi-nator	2.5.1.4 Source Time Period
Oelfke, Jack G., National Park Service	None	Birds, Isle Royale	Personal knowledge	None	None	1993
Van Stappen, J., National Park Service	None	Birds, Apostle Island National Lakeshore	Personal knowledge	None	None	1994
Danks, M., P. Collins, S. Persons, S. Geving, S. Leppalä, and H. Bauman, Minnesota Department of Natural Resources	None	Birds, Minnesota Shore	Personal knowledge	None	None	1994
Beaver, W.F., Keweenaw Bay Indian Community	None	Birds on Tribal Land	Personal knowledge	None	None	1994
Strand, Fred, Wisconsin Department of Natural Resources	None	Birds, Wisconsin Shore	Personal knowledge	None	None	1994
Reaman, Pete, Whitefish Point Bird Observatory	None	Birds, Whitefish Point, Michigan	Personal knowledge	None	None	1994

2.5.1. SOURCE INFORMATION:

Data layer or theme name: ESI

2.5.1.1. SOURCE CITATION

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denomi-nator	2.5.1.4 Source Time Period
State of Michigan	1989	Michigan Shorelines	Digital; line data	Provided by USACE, digitized by State of Michigan from 1982 aerial photos	24000	1982
U.S. Army Corps of Engineers, Detroit District	1989	Minnesota and Wisconsin Shorelines	Digital; line data	Digitized by USACOE from 1989 aerial photos	24000	1989
Michel, Jacqueline and Miles O. Hayes, Research Planning, Inc.	None	Shoreline Type and Sensitivity Classifi-cation	Maps, hardcopy	Notes made on USGS topos during over-flights, digitized by RPI	24000	1993
Lahti, Duene, Wisconsin Department of Natural Resources	None	Wetland Shorelines in Wisconsin	Personal knowledge	None	None	1994

2.5.1. SOURCE INFORMATION:

Data layer or theme name: FISH

2.5.1.1. SOURCE CITATION

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denomi-nator	2.5.1.4 Source Time Period
Herdendorf, C.E., S.M. Hartley, and M.D. Barnes	1981	Fish and Wildlife Resources of the Great Lakes Coastal Wetlands within the United States, Vol. 6–Lake Superior, Parts 1 & 2	Book	U.S. Fish and Wildlife Service, Biological Services Program, Washington, D.C., FWS/ OBS-81/02-V6, 846 pp.	None	1913-1980
U.S. Fish and Wildlife Service and U.S. Army Corps of Engineers	1982	Atlas of Spawning and Nursery Areas of the Great Lakes: Volume II– Lake Superior	Book	U.S. Fish and Wildlife Service, Biological Services Program, Washington, D.C., FWS/ OBS-82/52	None	Historical to-date of pub.
Schreiner, D.R., Minnesota Department of Natural Resources	1991	Lake Superior Area Fisheries and Creel Surveys	Report	Unpublished data Minnesota Department of Natural Resources	None	1991
Wisconsin Coastal Management Program	1977	Wisconsin Coastal Atlas 1977	Book	Wisconsin Coastal Management Program, Madison, Wis.	None	1977
Evers, D.C.	1992	A Guide to Michigan's Endangered Wildlife	Book	University of Michigan Press, Ann Arbor, Mich., 103 pp.	None	1992
Siler, Dell, Michigan Department of Natural Resources	None	Fishes, Michigan Shore	Personal knowledge	None	None	1994

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denomi-nator	2.5.1.4 Source Time Period
Scott, Steve, Michigan Department of Natural Resources	None	Fishes, Michigan Shore	Personal knowledge	None	None	1994
Oelfke, Jack G., National Park Service	None	Fish, Isle Royale	Personal knowledge	None	None	1993
Van Stappen, J., National Park Service	None	Fish, Apostle Island Natl. Lakeshore	Personal knowledge	None	None	1994
Danks, M., P. Collins, S. Persons, S. Geving, S. Leppalä, and H. Bauman, Minnesota Department of Natural Resources	None	Fishes, Minnesota Shore	Personal knowledge	None	None	1994
Leshinske, Jay, Grand Portage Tribe	None	Fishes on Tribal Lands	Personal knowledge	None	None	1994
Beaver, W.F., Keweenaw Bay Indian Community	None	Fishes on Tribal Lands	Personal knowledge	None	None	1994
Pratt, Dennis, Wisconsin Department of Natural Resources	None	Fishes, Wisconsin Shore	Personal knowledge	None	None	1994

2.5.1. SOURCE INFORMATION:

Data layer or theme name: HABITATS

2.5.1.1. SOURCE CITATION

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denominator	2.5.1.4 Source Time Period
Herdendorf, C.E., S.M. Hartley, and M.D. Barnes	1981	Fish and Wildlife Resources of the Great Lakes Coastal Wetlands within the United States, Vol. 6–Lake Superior, Parts 1 & 2	Book	USFWS, Biological Services Program, Washington, D.C., FWS/ OBS-81/02-V6, 846 pp.	None	1913-1980
Wisconsin Coastal Management Program	1977	Wisconsin Coastal Atlas 1977	Book	Wisconsin Coastal Management Program, Madison, Wis.	None	1977
Oelfke, Jack G., National Park Service	None	Plants, Isle Royale	Personal knowledge	None	None	1993
Van Stappen, J., National Park Service	None	Plants, Apostle Island National Lakeshore	Personal knowledge	None	None	1994
Danks, M., P. Collins, S. Persons, S. Geving, S. Leppalä, and H. Bauman, Minnesota Department of Natural Resources	None	Plants, Minnesota Shore	Personal knowledge	None	None	1994
Beaver, W.F., Keweenaw Bay Indian Community	None	Plants on Tribal Lands	Personal knowledge	None	None	1994

2.5.1. SOURCE INFORMATION:

Data layer or theme name: HYDRO

2.5.1.1. SOURCE CITATION

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denominator	2.5.1.4 Source Time Period
Gauthier, Roger and Gordon Thompson, U.S. Army Corps of Engineers, Detroit District	Unknown	Michigan Shorelines	ARC/INFO		24000	Unknown

2.5.1. SOURCE INFORMATION:

Data layer or theme name: INDEX

2.5.1.1. SOURCE CITATION

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denominator	2.5.1.4 Source Time Period
Research Planning, Inc.	1995	Index for Lake Superior ESI maps	Digital GT Polygons	Joanne Halls, GIS Manager	24000	1995

2.5.1. SOURCE INFORMATION:

Data layer or theme name: NESTS

2.5.1.1. SOURCE CITATION

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denominator	2.5.1.4 Source Time Period
Miller, M., Minnesota Department of Natural Resources	1991	Colonial Waterbird Colonies Database	Database, hardcopy	Unpublished database, Minnesota Department of Natural Resources	None	1991

2.5.1. SOURCE INFORMATION:

Data layer or theme name: SOCECON

2.5.1.1. SOURCE CITATION

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denominator	2.5.1.4 Source Time Period
Michel, Jacqueline and Miles O. Hayes, Research Planning, Inc.	None	Boat Ramps, Marinas, Access	Maps, hardcopy	Notes made on USGS topos during overflights, digitized by RPI	24000	1993
Wisconsin Coastal Management Program	1977	Wisconsin Coastal Atlas 1977	Book	Wisconsin Coastal Management Program, Madison, Wis.	None	1977
Oelfke, Jack G., National Park Service	None	Human-use Resources, Isle Royale	Personal knowledge	None	None	1993
Van Stappen, J., National Park Service	None	Human-use Resources, Apostle Island National Lakeshore	Personal knowledge	None	None	1994
Danks, M., P. Collins, S. Persons, S. Geving, S. Leppalä, and H. Bauman, Minnesota Department of Natural Resources	None	Human-use Resources, Minnesota Shore	Personal knowledge	None	None	1994
Leshinske, Jay, Grand Portage Tribe	None	Tribal Land Boundaries, Archaeologic /Historic Sites	Personal knowledge	None	None	1994
Beaver, W.F., Keweenaw Bay Indian Community	None	Tribal Land Boundaries, Human-use Resources on Tribal Lands	Personal knowledge	None	None	1994

2.5.1. SOURCE INFORMATION:

Data layer or theme name: T_MAMMAL

2.5.1.1. SOURCE CITATION

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denomi-nator	2.5.1.4 Source Time Period
Herdendorf, C.E., S.M. Hartley, and M.D. Barnes	1981	Fish and Wildlife Resources of the Great Lakes Coastal Wetlands within the United States, Vol. 6–Lake Superior, Parts 1 & 2	Book	U.S. Fish and Wildlife Service, Biological Services Program, Washington, D.C., FWS/ OBS-81/02-V6, 846 pp.	None	1913-1980
Wisconsin Coastal Management Program	1977	Wisconsin Coastal Atlas 1977	Book	Wisconsin Coastal Management Program, Madison, Wis.	None	1977
Baker, R.H.	1983	Michigan Mammals	Book	Michigan State University Press, East Lansing Mich., 642 pp.	None	1700-1982
Oelfke, Jack G., National Park Service	None	Mammals, Isle Royale	Personal knowledge	None	None	1993
Van Stappen, J., National Park Service	None	Mammals, Apostle Island National Lakeshore	Personal knowledge	None	None	1994
Danks, M., P. Collins, S. Persons, S. Geving, S. Leppalä, and H. Bauman, Min-nesota Depart-ment of Natural Resources	None	Mammals, Minnesota Shore	Personal knowledge	None	None	1994

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denomi-nator	2.5.1.4 Source Time Period
Beaver, W.F., Keweenaw Bay Indian Community	None	Mammals on Tribal Lands	Personal knowledge	None	None	1994

2.5.2. PROCESS STEP

2.5.2.1. PROCESS DESCRIPTION:

The digitization of ESI, biological resources, and human-use resources is a complex and highly quality controlled process. In order to facilitate digitizing, the entire study area was split into individual quadrangles using a map index coverage. The first layer of information digitized is the ESI. Upon completion of digitization the data is checked for completeness, topological and logical consistency and then plotted and checked by the overflight/field specialists. Any errors in the shoreline classification are updated prior to digitization of the biological and socio-economic layers. All data use the shoreline as the geographic reference so that there are no slivers in the geographic layers. The biological information is compiled onto 1:24,000 USGS topographic quadrangles by an in-house biological and GIS expert using the data from regional specialists in the form of maps, tables, charts, and written descriptions of wildlife distributions. The data are digitized, checked using both digital and on-screen procedures, plotted, and sent out for review by the regional specialists. The edited maps are updated on the computer, checked once again, and plotted at final map scale. A team of specialists review the entire series of maps, check all data, and make final edits. The data are merged to form the study-wide layers which are described in this document. The data merging includes a final quality control check where

topological consistency, rules for geography, and database to geography are checked and reported to the GIS manager.

2.5.2.3. PROCESS DATE:
199409

2.5.2.6. PROCESS CONTACT

2.5.2.6.1. CONTACT PERSON PRIMARY

2.5.2.6.1.1. CONTACT PERSON:
Jill Petersen

2.5.2.6.1.2. CONTACT ORGANIZATION:
NOAA HMRAD

2.5.2.6.3. CONTACT POSITION:
GIS Manager

2.5.2.6.4. CONTACT ADDRESS

2.5.2.6.4.1. ADDRESS TYPE:
Physical Address

2.5.2.6.4.2. ADDRESS:
7600 Sand Point Way N.E.
Bin C15700

2.5.2.6.4.3. CITY:
Seattle

2.5.2.6.4.4. STATE OR PROVINCE:
W A

2.5.2.6.4.5. POSTAL CODE:
98115

2.5.2.6.5. CONTACT VOICE TELEPHONE:
(206) 526-6944

2.5.2.6.7. CONTACT FACSIMILE TELEPHONE:
(206) 526-6329

2.5.2.6.8. CONTACT ELECTRONIC MAIL ADDRESS:
Jill_Petersen@hazmat.noaa.gov.us

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3.0. SPATIAL DATA ORGANIZATION INFORMATION

3.2. DIRECT SPATIAL REFERENCE METHOD:

Vector

3.3. POINT AND VECTOR OBJECT INFORMATION

3.3.1. SDTS TERMS DESCRIPTION:

3.3.1.1. SDTS POINT AND VECTOR OBJECT TYPE, and

3.3.1.2. POINT AND VECTOR OBJECT COUNT:

Theme	Universe Polygon	GT-Polygons	Area Points	Complete Chains	Line Segments	Label Points	Entity Points	Nodes
BIRDS	1	549	549	1,027	66,595			700
ESI				8,608	82,482			8,991
FISH	1	1,035	1,035	1,550	74,973			1,331
HABITATS	1	91	91	113	17,639			113
HYDRO	1	1,642	1,642	2,083	134,420	1,114		1,996
INDEX	1	136	136	380	15,114			246
NESTS							239	
SOCECON				133	11,515		423	5,970
T_MAMMAL	1	194	194	331	18,962			283

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4.0. SPATIAL REFERENCE INFORMATION

4.1. HORIZONTAL COORDINATE SYSTEM DEFINITION

4.1.2. PLANAR

4.1.2.1. MAP PROJECTION

4.1.2.1.1. MAP PROJECTION NAME:
OBLIQUE MERCATOR

4.1.2.1.2. MAP PROJECTION PARAMETERS :

4.1.2.1.2.4. FALSE EASTING:
9,000,000

4.1.2.1.2.5. FALSE NORTHING:
-1,600,000

4.1.2.1.2.8. LONGITUDE OF PROJECTION CENTER:
DMS -88 50 0.256

4.1.2.1.2.9. LATITUDE OF PROJECTION CENTER:
DMS 47 12 21.554

4.1.2.1.2.10. SCALE FACTOR AT CENTER LINE:
0.9999

4.1.2.1.2.11. OBLIQUE LINE AZIMUTH:

4.1.2.1.2.11.1. AZIMUTH ANGLE:
285.0

4.1.2.1.2.11.2. AZIMUTH MEASURE POINT LONGITUDE:
-88 50 0.256

4.1.2.4. PLANAR COORDINATE INFORMATION

4.1.2.4.1. PLANAR COORDINATE ENCODING METHOD:
Coordinate Pair

4.1.2.4.2. COORDINATE REPRESENTATION:

4.1.2.4.2.1. ABSCISSA RESOLUTION:
5 feet

4.1.2.4.2.2. ORDINATE RESOLUTION:
5 feet

4.1.4. GEODETIC MODEL

4.1.4.1. HORIZONTAL DATUM NAME:

North American Datum of 1927

4.1.4.2. ELLIPSOID NAME:

Clarke, 1866

4.1.4.3. SEMI-MAJOR AXIS:

6,378,206.4

4.1.4.4. DENOMINATOR OF FLATTENING RATIO:

294.98

5.0. ENTITY AND ATTRIBUTE INFORMATION

5.1. DETAILED DESCRIPTION: BIRDS

The data layer BIRDS contains the polygons with bird species.

5.1.1. ENTITY TYPES:

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:	
GT-Polygons	ID	integer

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

ID

5.1.2.2. ATTRIBUTE DEFINITION:

A unique identifier which links to the POLY_LUT table. The POLY_LUT is a lookup table with two attributes: ID and RARNUM. ID is a concatenation of atlas number (6), element number (1), and record number. ID values of zero are holes in polygons and do not contain information. In the lookup table (POLY_LUT) and biological resources table (BIORES), the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, CONC, G_SOURCE, and S_SOURCE and links to the biology table, BIORES. The items in BIORES are: RARNUM, SPECIES_ID, CONC, SEASON_ID, G_SOURCE, S_SOURCE, and ELEMENT. SPECIES_ID is the numeric identifier of each species and is unique within each ELEMENT. CONC is the concentration of the species and can be LOW, MEDIUM, HIGH, or a numeric value representing the number of individuals. SEASON_ID contains a numeric value according to the monthly presence of the species. Usually, there is one seasonality per species, but occasionally the same species has different monthly presence or breeding activity. When this occurs, a new record with a different seasonality is referenced. G_SOURCE and S_SOURCE are

used for identifying sources which were unavailable during compilation of this atlas.

The following BIRDS species are found in the Lake Superior ESI atlas:

SPECIES ID	NAME
1	Common loon
8	Double-crested cormorant
12	Canada goose
16	Mallard
17	Northern pintail
18	Green-winged teal
22	Greater scaup
24	Common goldeneye
27	Oldsquaw
29	White-winged scoter
32	Common merganser
33	Red-breasted merganser
42	Bonaparte's gull
45	Common tern
54	Great blue heron
56	Spotted sandpiper
58	Greater yellowlegs
59	Lesser yellowlegs
62	Least sandpiper
67	Sanderling
70	Killdeer
76	Bald eagle
77	Osprey
107	Peregrine falcon
153	Piping plover
156	Semipalmated sandpiper
179	Pied-billed grebe
180	Ring-necked duck
181	Northern harrier
185	American bittern
186	Black duck
187	Virginia rail
188	Sora rail
190	Blue-winged teal
191	Wood duck
193	Black tern
195	American woodcock
196	Common snipe

SPECIES ID	NAME
198	Hooded merganser
218	Red-shouldered hawk
219	Sharp-shinned hawk
220	Merlin
221	Coopers hawk
231	Broad-winged hawk
240	Goshawk
1,001	Gulls
1,002	Shorebirds
1,003	Waterfowl
1,004	Wading birds
1,006	Diving birds
1,008	Terns

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

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5.1. DETAILED DESCRIPTION: ESI

The data layer ESI contains arc (Complete Chains) features for the ESI shoreline classification. The classification of the features is based upon *Guidelines for Developing Digital Environmental Sensitivity Index Atlases and Data-bases* (Michel, J. and J. Dahlin, 1993, Hazardous Materials Response and Assessment Division, NOAA). The ESI classification was performed 18-21 April 1994.

5.1.1. ENTITY TYPES:

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:	
Complete Chain	ESI	character
	LINE	character
	SOURCE_ID	integer
	ENVIR	character

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

ESI

5.1.2.2. ATTRIBUTE DEFINITION:

The item ESI contains values according to the ESI ranking of the shorelines and polygons. The ESI rankings progress from low to high susceptibility to oil spills. In many cases, the shorelines are also ranked with multiple codes such as 10A/5. The first number is the most landward shoreline type, fringing wetlands, with mixed sand and gravel beaches being the shoreline type closest to the water. The Lake Superior shoreline types are listed below.

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
1A	Exposed Rocky Cliffs
1A/4	Exposed Rocky Cliffs/Sand Beaches
1A/6A	Exposed Rocky Cliffs/Gravel Beaches
1B	Exposed, Solid Man-made Structures
1B/4	Exposed, Solid Man-made Structures/Sand Beaches
1B/6A	Exposed, Solid Man-made Structures/Gravel Beaches

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
1B/6A/2	Exposed, Solid Man-made Structures/Gravel Beaches/Shelving Bedrock Shores
1B/6B	Exposed, Solid Man-made Structures/Riprap Revetments, Groins, and Jetties
2	Shelving Bedrock Shores
2/6A	Shelving Bedrock Shores/Gravel Beaches
3	Eroding Scarps in Unconsolidated Sediments
3/2	Eroding Scarps in Unconsolidated Sediments/Shelving Bedrock Shores
3/4	Eroding Scarps in Unconsolidated Sediments/Sand Beaches
3/5	Eroding Scarps in Unconsolidated Sediments/Mixed Sand and Gravel Beaches
3/6A	Eroding Scarps in Unconsolidated Sediments/Gravel Beaches
4	Sand Beaches
4/2	Sand Beaches/Shelving Bedrock Shores
5	Mixed Sand and Gravel Beaches
5/2	Mixed Sand and Gravel Beaches/Shelving Bedrock Shores
5/3	Mixed Sand and Gravel Beaches/Eroding Scarps in Unconsolidated Sediments
6A	Gravel Beaches
6A/2	Gravel Beaches/Shelving Bedrock Shores
6A/4	Gravel Beaches/Sand Beaches
6A/5	Gravel Beaches/Mixed Sand and Gravel Beaches
6A/8A	Gravel Beaches/Sheltered Scarps in Bedrock
6B	Riprap Revetments, Groins, and Jetties
6B/2	Riprap Revetments, Groins, and Jetties/Shelving Bedrock Shores
6B/4	Riprap Revetments, Groins, and Jetties/Sand Beaches
6B/5	Riprap Revetments, Groins, and Jetties/Mixed Sand and Gravel Beaches
6B/6A	Riprap Revetments, Groins, and Jetties/Gravel Beaches
7/2	Exposed Flats/Shelving Bedrock Shores
8A	Sheltered Scarps in Bedrock
8B	Sheltered, Solid Man-made Structures
8B/1B	Sheltered, Solid Man-made Structures/Exposed, Solid Man-made Structures
8B/6B	Sheltered, Solid Man-made Structures/Riprap Revetments, Groins, and Jetties
8B/9B	Sheltered, Solid Man-made Structures/Sheltered Sand/Mud Flats

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
9A	Sheltered, Vegetated Low Banks
9B	Sheltered Sand/Mud Flats
10A	Fringing Wetlands
10A/4	Fringing Wetlands/Sand Beaches
10A/6B	Fringing Wetlands/Riprap Revetments, Groins, and Jetties
10B	Extensive Wetlands
10B/4	Extensive Wetlands/Sand Beaches
10B/9A	Extensive Wetlands/Sheltered, Vegetated Low Banks

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

ordered

5.1.2.1. ATTRIBUTE LABEL:

LINE

5.1.2.2. ATTRIBUTE DEFINITION:

Type of geographic feature

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
S	Shoreline

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

5.1.2.1. ATTRIBUTE LABEL:

SOURCE_ID

5.1.2.2. ATTRIBUTE DEFINITION:

Data source for the ESI

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:
Research Planning, Inc.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
0	Digital (Corps of Engineers)
1	Overflight
2	Aerial photo
3	Digitized off topo
4	Line added to edge-match

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:
U.S. Army Corps of Engineers, digitized by State of Michigan from 1982, 1:24,000 aerial photographs

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:
nominal

5.1.2.1. ATTRIBUTE LABEL:
ENVIR

5.1.2.2. ATTRIBUTE DEFINITION:
Type of geographic feature

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:
Research Planning, Inc.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
L	Lacustrine

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:
Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:
nominal

5.1. DETAILED DESCRIPTION: FISH

The data layer FISH contains the polygons and arcs with fish species.

5.1.1. ENTITY TYPES:

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:	
GT-Polygons	ID	integer
Complete Chains	ID	integer

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

ID

5.1.2.2. ATTRIBUTE DEFINITION:

A unique identifier which links to the POLY_LUT table. The POLY_LUT is a lookup table with two attributes: ID and RARNUM. ID is a concatenation of atlas number (6), element number (2), and record number. The value of RARNUM is determined for each unique combination of SPECIES_ID, SEASON_ID, and CONC. The items in BIORES are: RARNUM, SPECIES_ID, CONC, SEASON_ID, G_SOURCE, S_SOURCE, and ELEMENT. SPECIES_ID is the numeric identifier of each species and is unique within each ELEMENT. CONC is the concentration of the species and almost all are classified as UNKNOWN. Two RARNUMs have CONC = 90,000 and eight RARNUMs have CONC = HIGH. SEASON_ID contains a numeric value according to the monthly presence of the species. Usually, there is one seasonality per species, but occasionally the same species has different monthly presence or breeding activity. When this occurs, a new record with a different seasonality is referenced. G_SOURCE and S_SOURCE are variables which hold metadata information. The information for these variables was unavailable during compilation of this atlas.

The following FISH species are found in the Lake Superior ESI atlas:

SPECIES ID	NAME
68	Chinook salmon (king)
69	Coho salmon (silver)
70	Pink salmon (humpy)
74	Rainbow trout (steelhead)
84	Rainbow smelt
85	Alewife
98	American eel
100	Brown trout
102	Atlantic sturgeon
144	Atlantic salmon
145	White perch
152	Yellow perch
161	Lake sturgeon
162	Carp
164	Cisco sp.
165	Lake whitefish
166	Brook trout
167	Lake trout
168	Spottail shiner
170	Blacknose shiner
171	Fathead minnow
174	Longnose sucker
175	White sucker
176	Yellow bullhead
178	Rock bass
179	Largemouth bass
180	Smallmouth bass
181	Black crappie
182	Bluegill
185	Northern pike
186	Muskellunge
188	Walleye
190	White bass
191	Shorthead redhorse
201	Channel catfish
211	Brown bullhead
212	Pumpkinseed
222	Mottled sculpin
230	Pygmy whitefish
231	Tadpole madtom
232	Trout perch

SPECIES ID	NAME
233	Ninespine stickleback
234	Johnny darter
235	Lake herring
237	Burbot
238	Round whitefish (menomonee)
239	Splake
245	Silver redhorse
246	Black bullhead
247	Emerald shiner
248	Common shiner
249	Logperch
250	Ruffe
251	Tiger musky

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

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5.1. DETAILED DESCRIPTION: HABITATS

The data layer HABITATS contains the polygons with plant species.

5.1.1. ENTITY TYPES:

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:	
GT-Polygons	ID	integer

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

ID

5.1.2.2. ATTRIBUTE DEFINITION:

A unique identifier which links to the POLY_LUT table. The POLY_LUT is a lookup table with two attributes: ID and RARNUM. The value of RARNUM is determined for each unique combination of SPECIES_ID, SEASON_ID, and CONC. The items in BIORES are: RARNUM, SPECIES_ID, CONC, SEASON_ID, G_SOURCE, S_SOURCE, and ELEMENT. SPECIES_ID is the numeric identifier of each species and is unique within each ELEMENT. CONC is the concentration of the species are polygons and are unknown, except one, which is HIGH. SEASON_ID contains a numeric value according to the monthly presence of the species. Usually, there is one seasonality per species, but occasionally the same species has different monthly presence or breeding activity. When this occurs, a new record with a different seasonality is referenced. G_SOURCE and S_SOURCE are variables which hold metadata information. The information for these variables was unavailable during compilation of this atlas.

The following HABITATS species are found in the Lake Superior ESI atlas:

SPECIES ID	NAME
3	Menzies wallflower
12	Pitcher's thistle (Dune thistle)
25	Moonwort
35	Lake Huron tansy

SPECIES ID	NAME
59	Plant (E)
60	Plant (T)
61	Butterwort
62	Beautiful sedge
63	Lenticular sedge
64	Spike trisetum
65	Grass-of-parnassus
66	Coast sedge
67	Michaux's sedge
68	Lake cress
73	Tamarack Swamp natural community

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

5.1. DETAILED DESCRIPTION: HYDRO

The data layer HYDRO contains polygonal water and land features as well as linear features for rivers and streams that are tidally influenced. This coverage was created using the digital shoreline provided by the U.S. Army Corps of Engineers.

5.1.1. ENTITY TYPES:

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:	
GT-Polygons	WATER_CODE	character
Complete Chains	LINE	character
	SOURCE_ID	integer

The WATER_CODE, LINE, and SOURCE_ID attributes are the same as in the ESI coverage. This data layer contains all annotation used in producing the atlas.

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

WATER_CODE

5.1.2.2. ATTRIBUTE DEFINITION:

Specifies a polygon as either water or land

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
W	Water
L	Land
U	Unmapped

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

5.1.2.1. ATTRIBUTE LABEL:

LINE

5.1.2.2. ATTRIBUTE DEFINITION:

Type of geographic feature

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
H	Hydrography or stream features
I	Map Index
S	Shoreline

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

5.1.2.1. ATTRIBUTE LABEL:

SOURCE_ID

5.1.2.2. ATTRIBUTE DEFINITION:

Data source for the ESI

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
0	Digital

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

5.1. DETAILED DESCRIPTION: INDEX

The data layer INDEX contains the map boundaries for each quad/map in the atlas.

5.1.1. ENTITY TYPES:

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:	
GT-Polygons	TILE-NAME	character
	TOPO-NAME	character
	SCALE	integer
	MAPANGLE	floating point
	PAGESIZE	character

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:
TILE-NAME

5.1.2.2. ATTRIBUTE DEFINITION:
The TILE-NAME contains the map number according to the specified layout of the atlas. During the map production process the value of TILE-NAME is plotted on the map product to order the maps in a coherent manner. The values for each polygon are unique and range from 1 through 133.

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:
Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:
ordered

5.1.2.1. ATTRIBUTE LABEL:
TOPO-NAME

5.1.2.2. ATTRIBUTE DEFINITION:
USGS 1:24,000 topographic map name. Some polygons straddle two or more maps and all map names are included in this attribute. The date (latest/revised) of the USGS maps are also included in this field.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:
Research Planning, Inc.

AHMEEK, MICH.; PHOENIX, MICH. (1980)
ALBERTA, MICH. (1985); L'ANSE, MICH. (1985)
AMNICON POINT, WIS. (1975)
ASHLAND EAST, WIS. (1975); ASHLAND WEST, WIS. (1975)
AU SABLE POINT SW, MICH. (1980); AU SABLE POINT, MICH. (1966)
AU TRAIN, MICH. (1985)
AURA, MICH. (1984); SKANEE SOUTH, MICH. (1985)
BARK BAY, WIS. (1964)
BAYFIELD, WIS. (1975)
BEAR ISLAND, WIS. (1963)
BELLE HARBOR, MICH. (1985)
BETSY LAKE NORTH, MICH. (1968)
BETSY LAKE NW, MICH. (1968)
BIG BAY, MICH. (1985)
BLACK RIVER HARBOR, MICH. (1980)
CARP RIVER, MICH. (1980)
CASTLE DANGER, MINN. (1957)
CAT ISLAND, WIS. (1975)
CEDAR, WIS. (1975)
CHASSELL, MICH. (1975); HANCOCK, MICH. (1975)
CLOVERLAND, WIS. (1975)
CORNUCOPIA, WIS. (1975); SQUAW BAY, WIS. (1964)
DEER LAKE, MICH. (1975); GAY, MICH. (1975)
DEER YARD LAKE, MINN. (1986)
DELAWARE, MICH. (1975)
DOLLAR SETTLEMENT, MICH. (1976)
DULUTH, MINN. (1975)
EAGLE HARBOR, MICH. (1975)
EMERSON, MICH. (1975)
ESKO, MINN.-WIS. (1983)
ESKO, MINN.-WIS. (1983); WEST DULUTH, MINN.-WIS. (1983)
FELDTMANN LAKE, MICH. (1985)
FELDTMANN RIDGE, MICH. (1985)
FORT WILKINS, MICH. (1975)
FOUR CORNERS, MICH. (1982)
GAY, MICH. (1975)
GLOVERS CORNER, MICH. (1984)
GOOD HARBOR BAY, MINN. (1986)
GOOD HARBOR BAY, MINN. (1986); GRAND MARAIS, MINN. (1986)

GOVERNMENT PEAK, MICH. (1981)
GRAND MARAIS NE, MICH. (1968)
GRAND MARAIS, MICH. (1968)
GRAND PORTAGE, MINN.-ONT. (1976)
GRAND PORTAL POINT, MICH. (1983)
GRAND SABLE LAKE, MICH. (1966)
GRANITE POINT, MICH. (1985)
GREEN, MICH. (1982)
HANCOCK, MICH. (1975); OSKAR, MICH. (1975)
HARVEY, MICH. (1985); MARQUETTE, MICH. (1975)
HERBSTER, WIS. (1984)
HOVLAND, MINN. (1986)
HOWE LAKE, MICH. (1984)
ILLGEN CITY, MINN. (1976); FINLAND, MINN. (1976)
INDIAN TOWN, MICH. (1984); WOOD ISLAND SE, MICH. (1984)
IVES HILL, MICH. (1984); HURON MOUNTAIN, MICH. (1985)
KADUNCE RIVER, MINN. (1986)
KEWEENAW BAY NE, MICH. (1984)
KNIFE RIVER, MINN. (1975)
LAKE MEDORA, MICH. (1975)
LAKE RICHIE, MICH. (1985)
LAKEWOOD, MINN.-WIS. (1975); FRENCH RIVER, MINN. (1975)
LAUGHING FISH POINT, MICH. (1985); ROCK RIVER, MICH. (1985)
LAURIUM, MICH. (1975)
LITTLE GIRLS POINT, MICH.-WIS. (1980)
LITTLE MARAIS, MINN. (1956)
LITTLE MARAIS, MINN. (1956); SCHROEDER, MINN. (1976)
LITTLE TODD HARBOR, MICH. (1985)
LONG ISLAND, WIS. (1964)
LUTSEN, MINN. (1959)
MADELINE ISLAND, WIS. (1975)
MALONE BAY, MICH. (1985)
MANITOU ISLAND, MICH. (1975)
MARQUETTE NW, MICH. (1953); BUCKROE, MICH. (1985)
MARQUETTE, MICH. (1975)
MARR ISLAND, MINN. (1986)
McCARGOE COVE, MICH. (1985)
McNEARNEY LAKE, MICH. (1975)
MICHIGAN ISLAND, WIS. (1963)
MINERAL CENTER, MINN.-ONT. (1986)

MOTT ISLAND, MICH. (1985)
MUGGUN CREEK, MICH. (1975)
MUNISING, MICH. (1985)
MUSKALLONGE LAKE EAST, MICH. (1968)
MUSKALLONGE LAKE WEST, MICH. (1968)
NORTH IRONWOOD, MICH.-WIS. (1981); BLACK RIVER HARBOR, MICH. (1980)
OAK ISLAND, WIS. (1975)
ODANAH, WIS. (1975); CHEQUAMEGON POINT, WIS. (1975)
ONTONAGON NORTH, MICH. (1982); ONTONAGON SOUTH, MICH. (1982)
ORONTO BAY, WIS.-MICH. (1980)
OSKAR, MICH. (1975); BEACON HILL, MICH. (1975)
OULU, WIS. (1984)
OUTER ISLAND, WIS. (1963)
PARKLAND, WIS.-MINN. (1975)
PASSAGE ISLAND, MICH.-ONT. (1985)
PENDILLS LAKE, MICH. (1976)
PHOENIX, MICH. (1980)
PIATT LAKE, MICH. (1975)
PIGEON POINT, MINN.-MICH.-ONT. (1976)
POINT HOUGHTON, MICH. (1985)
POINT ISABELLE, MICH. (1975)
POINT MILLS, MICH. (1975)
POPLAR NE, WIS. (1975)
PORT WING, WIS. (1984)
PORTAGE ENTRY, MICH. (1984)
RICE LAKE, MICH. (1975)
ROCK HARBOR LODGE, MICH. (1985)
ROCKHOUSE POINT, MICH. (1975); GRAVERAET RIVER, MICH. (1975)
ROCKY ISLAND, WIS. (1975)
SAND ISLAND, WIS. (1975)
SAND RIVER, MICH. (1985); LAUGHING FISH POINT, MICH. (1985)
SHEEPHEAD LAKE, MICH. (1951); VERMILION, MICH. (1951)
SHELLDRAKE, MICH. (1975)
SKANDIA, MICH. (1985); SHOT POINT, MICH. (1985)
SKANEE NORTH, MICH. (1984)
SPLIT ROCK POINT, NE, MINN. (1970); SILVER BAY, MINN. (1985)
SPLIT ROCK POINT, MINN. (1976)
STOCKTON ISLAND, WIS. (1975)
SUGAR MOUNTAIN, MICH. (1985)
SUPERIOR, WIS.-MINN. (1983)

TENMILE POINT, MICH. (1982)
TIEBEL CREEK, MICH. (1980); CARP RIVER, MICH. (1980)
TODD HARBOR, MICH. (1985)
TOFTE, MINN. (1955)
TRAPPERS LAKE, MICH. (1983)
TRAVERSE ISLAND, MICH. (1975)
TWO HARBORS, MINN. (1969)
VERMILION SE, MICH. (1951)
WASHBURN, WIS. (1975); MT. ASHWAYBAY, WIS. (1975)
WHITE PINE, MICH. (1956)
WHITEFISH POINT, MICH. (1951)
WINDIGO, MICH. (1985)
WINONA NORTH, MICH. (1982); ROCKHOUSE POINT, MICH. (1975)
WOOD ISLAND, MICH. (1985)
YORK ISLAND, WIS. (1964)

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:
nominal

5.1.2.1. ATTRIBUTE LABEL:
SCALE

5.1.2.2. ATTRIBUTE DEFINITION:
SCALE contains the value of the denominator of the scale at which the INDEX polygon is plotted in the final map product.

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:
Research Planning, Inc.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:

38,500
40,800
45,000

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:
Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:
nominal

5.1.2.1. ATTRIBUTE LABEL:

MAPANGLE

5.1.2.2. ATTRIBUTE DEFINITION:

MAPANGLE contains a value (usually negative) to rotate the final map product so that it is situated straight up and down.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:

-3.100
-2.980
-2.900
-2.800
-2.700
-2.600
-2.400
-2.300
-2.250
-2.150
-2.050
-1.950
-1.850
-1.800
-1.650
-1.550
-1.500
-1.400
-1.350
-1.250
-1.100
-1.000
-0.950
-0.900
-0.750
-0.700
-0.650
-0.600
-0.550
-0.500
-0.450
-0.400
-0.350
-0.300
-0.200
-0.150
-0.100
-0.050

0.000
0.050
0.100
0.200
0.300
0.450
0.550
0.700
0.800
1.000
1.100
1.150
1.200
1.250
1.270
1.300
1.350
1.400
1.500
1.650
1.700
1.750
1.800
1.900
1.950
2.100
2.150
2.300
2.400
2.450
2.600

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:
Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:
nominal

5.1.2.1. ATTRIBUTE LABEL:
PAGESIZE

5.1.2.2. ATTRIBUTE DEFINITION:
PAGESIZE contains the value of the width and height of the map in the final map product.

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:

11,17
4.5,4
17,11

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

5.1. DETAILED DESCRIPTION: NESTS

The data layer NESTS contains entity points representing nesting sites.

5.1.1. ENTITY TYPES:

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:	
GT-Polygons	ID	integer

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

ID

5.1.2.2. ATTRIBUTE DEFINITION:

A unique identifier which links to the PNTS_LUT table. The PNTS_LUT is a lookup table with two attributes: ID and RARNUM. ID is a concatenation of atlas number (6), element number (5), and record number. The value of RARNUM is determined for each unique combination of SPECIES_ID, SEASON_ID, and CONC. The items in BIORES are: RARNUM, SPECIES_ID, CONC, SEASON_ID, G_SOURCE, S_SOURCE, and ELEMENT. SPECIES_ID is the numeric identifier of each species and is unique within each ELEMENT. CONC is the concentration of the species and can be LOW, MEDIUM, or HIGH or an actual count of the numbers of species present at the point or the number of nests. SEASON_ID contains a numeric value according to the monthly presence of the species. Usually, there is one seasonality per species, but occasionally the same species has different monthly presence or breeding activity. When this occurs, a new record with a different seasonality is referenced. G_SOURCE and S_SOURCE are variables which hold metadata information. The information for these variables was unavailable during compilation of this atlas.

The following bird species are found in the NESTS data layer of the Lake Superior ESI atlas:

SPECIES ID	NAME
38	Herring gull
40	Ring-billed gull
172	Sandhill crane

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

5.1. DETAILED DESCRIPTION: SOCECON

The data layer SOCECON contains the entity points and complete chains for the human use data.

5.1.1. ENTITY TYPES:

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:	
Complete Chain	SOCECON	character
Entity Points	SOCECON	character
	ID	integer

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

SOCECON

5.1.2.2. ATTRIBUTE DEFINITION:

Identifies a line or point with a socio-economic, or human-use, feature. This attribute allows direct access to the type of feature instead of linking to the more detailed SOC_DATA table.

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
A	Airport (P)
A2	Access (P)
AQ	Aquaculture (P)
AS	Archaeological Site (P)
B	Recreational Beach (P & L)
BR	Boat Ramp (P)
CF	Commercial Fishing (P & L)
CG	Coast Guard (P)
CP	Campground (P)
F	Ferry (P)
HS	Historical Site (P)

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
IB	International Border (L)
IR	Indian Reservation (P & L)
M	Marina (P)
NP	National Park (P & L)
P	Park (P & L)
W I	Water Intake (P)
W R	Wildlife Refuge (P & L)

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:
nominal

5.1.2.1. ATTRIBUTE LABEL:
ID

5.1.2.2. ATTRIBUTE DEFINITION:
A unique identifier which links to the SOC_LUT table. SOC_LUT is a lookup table with two attributes: ID and HUNUM. ID is a concatenation of atlas number (6), element number (10), and record number. HUNUM is the link to the socio-economic data found in the SOC_DATA table. The table SOC_DATA contains the feature type (SOC_TYPE), name of the feature (NAME), contact agency or person (CONTACT), telephone number (PHONE), geographic source number (G_SOURCE), and attribute source number (A_SOURCE).

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:
Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:
nominal

5.1. DETAILED DESCRIPTION: T_MAMMAL

The data layer T_MAMMAL contains the polygons with terrestrial mammal species.

5.1.1. ENTITY TYPES:

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:	
GT-Polygons	ID	integer

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

ID

5.1.2.2. ATTRIBUTE DEFINITION:

A unique identifier which links to the POLY_LUT table. The POLY_LUT is a lookup table with two attributes: ID and RARNUM. ID is a concatenation of atlas number (6), element number (9), and record number. The value of RARNUM is determined for each unique combination of SPECIES_ID, SEASON_ID, and CONC. The items in BIORES are: RARNUM, SPECIES_ID, CONC, SEASON_ID, G_SOURCE, S_SOURCE, and ELEMENT. SPECIES_ID is the numeric identifier of each species and is unique within each ELEMENT. CONC is the concentration of the species and is unknown. SEASON_ID contains a numeric value according to the monthly presence of the species. Usually, there is one seasonality per species, but occasionally the same species has different monthly presence or breeding activity. When this occurs, a new record with a different seasonality is referenced. In this atlas, all SEASON_IDs are 1. G_SOURCE and S_SOURCE are variables which hold metadata information. The information for these variables was unavailable during compilation of this atlas.

The following T_MAMMAL species are found in the Lake Superior ESI atlas:

SPECIES ID	NAME
8	River otter
36	Beaver
51	Red fox
54	Gray wolf

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

6.0. DISTRIBUTION INFORMATION

6.1. DISTRIBUTOR

6.1.1. CONTACT PERSON PRIMARY

6.1.1.1. CONTACT PERSON:
Robert Pavia

6.1.1.2. CONTACT ORGANIZATION:
NOAA

6.1.4. CONTACT ADDRESS

6.1.4.1. ADDRESS TYPE:
Physical Address

6.1.4.2. ADDRESS:
7600 Sand Point Way N.E., Bin C15700

6.1.4.3. CITY:
Seattle

6.1.4.4. STATE OR PROVINCE:
W A

6.1.4.5. POSTAL CODE:
98115

6.1.5. CONTACT VOICE TELEPHONE:
(206) 526-6319

6.1.7. CONTACT FACSIMILE TELEPHONE:
(206) 526-6329

6.2. RESOURCE DESCRIPTION:
ESI Atlas for Lake Superior

6.3. DISTRIBUTION LIABILITY:
Although this data has been processed successfully on a computer system at the National Oceanic and Atmospheric Administration, no warranty, expressed or implied, is made by NOAA regarding the utility of the data on any other system, nor shall the act of distribution constitute any such warranty. NOAA warrants the delivery of this product in computer-readable format, and will offer a replacement copy of the product when the product is determined unreadable by computer input peripherals, or when the physical medium is delivered in damaged condition.

6.5. CUSTOM ORDER PROCESS
Contact NOAA for distribution options (see 6.1.1.).

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7.0. METADATA REFERENCE INFORMATION

7.1. METADATA DATE:
19970219

7.2. METADATA REVIEW DATE:
19941115

7.4. METADATA CONTACT

7.4.1. CONTACT PERSON PRIMARY

7.4.1.1. CONTACT PERSON:
Jill Petersen

7.4.1.2. CONTACT ORGANIZATION:
NOAA HMRAD

7.4.3. CONTACT POSITION:
GIS Manager

7.4.4. CONTACT ADDRESS

7.4.4.1. ADDRESS TYPE:
Physical Address

7.4.4.2. ADDRESS:
7600 Sand Point Way N.E., Bin C15700

7.4.4.3. CITY:
Seattle

7.4.4.4. STATE OR PROVINCE:
Washington

7.4.4.5. POSTAL CODE:
98115

7.4.5. CONTACT VOICE TELEPHONE:
(206) 526-6944

7.4.7. CONTACT FACSIMILE TELEPHONE:
(206) 526-6329

7.4.8. CONTACT ELECTRONIC MAIL ADDRESS:
Jill_Petersen@hazmat.noaa.gov.us

7.5. METADATA STANDARD NAME:
Content Standards for Digital Geospatial Metadata

7.6. METADATA STANDARD VERSION:
19940608

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