

SOUTHERN LAKE MICHIGAN  
ENVIRONMENTAL SENSITIVITY INDEX  
METADATA

*Prepared By:*

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

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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:  
Southern Lake Michigan

#### 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:

Southern Lake Michigan

#### 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 southern Lake Michigan. 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 18-21 April 1994. 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:**

-87.875

**1.5.1.2. EAST BOUNDING COORDINATE:**

-87.125

**1.5.1.3. NORTH BOUNDING COORDINATE:**

42.5

**1.5.1.4. SOUTH BOUNDING COORDINATE:**

41.5

**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:**

Southern shoreline of Lake Michigan, to encompass the coastal areas of Menominee, Delta, Schoolcraft, Mackinac, Emmet, Charlevoix, Antrim, Grand Traverse, and Leelanau counties

**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 Manager. Air support was provided by the Air Station, Chicago

Roger Gauthier and Gordon Thompson from the U.S. Army Corps of Engineers, Detroit District provided the digital base maps.

Many people from various State and Federal agencies provided information for these maps, as well as reviewed the maps, including Katie Smith, Marty Holtgren, and their associates from the Indiana Department of Natural Resources, Division of Fish and Wildlife; Michelle Martin from the Indiana Natural Heritage Program; Cindy Chaffee, David Hudak, Ed Korecki, and Jody Millar of the U.S. Fish and Wildlife Service; John Roguer of the Illinois Department of Fish and Wildlife; and Susan Wright of Illinois Beach State Park

At Research Planning, Inc., Jacqueline Michel was the project manager; she was responsible for the shoreline mapping. Debra Scholz and Jeffrey Dahlin were the project biologists and responsible for the data collection. E. Lee Diveley, III, Jeffrey Dahlin, James Olsen, Scott Johnson, William Holton, and Mark White worked diligently to complete the data entry and generate the final map product. Graphics support was provided by Joseph Holmes. Dot Zaino prepared the text. Jack Moore was the project coordinator

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) 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:

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		

The entire data set is approximately 15 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 so that there are no slivers in the geographic coordinates. The hardcopy biological information is compiled onto 1:24,000 USGS topographic quadrangles by a biological expert using 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, 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. The data merging includes a final quality control check where labels, chains, and polygons are checked for attribute accuracy.

To finalize the data checking process, each coverage 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 Southern Lake Michigan were mapped during overflights conducted 7 May 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. Three major categories, or elements, of biological resources were considered during data compilation: birds, fish, 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, and HABITATS) is linked to the Biological Resources table (BIORES) using the item ID and the associated look up 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 data table using the SPECIES\_ID, ELEMENT, and SEASON\_ID items. The categories of the variables BREED1 through BREED5 for each ELEMENT are:

<b>ELEMENT</b>	<b>BREED 1</b>	<b>BREED 2</b>	<b>BREED 3</b>	<b>BREED 4</b>	<b>BREED 5</b>
BIRD	nesting	laying	hatching	fledging	
FISH	spawning	outmigration	larvae	juvenile	adults

NOTE: There are no BREED variables for HABITATS.

The SPECIES data table contains the 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

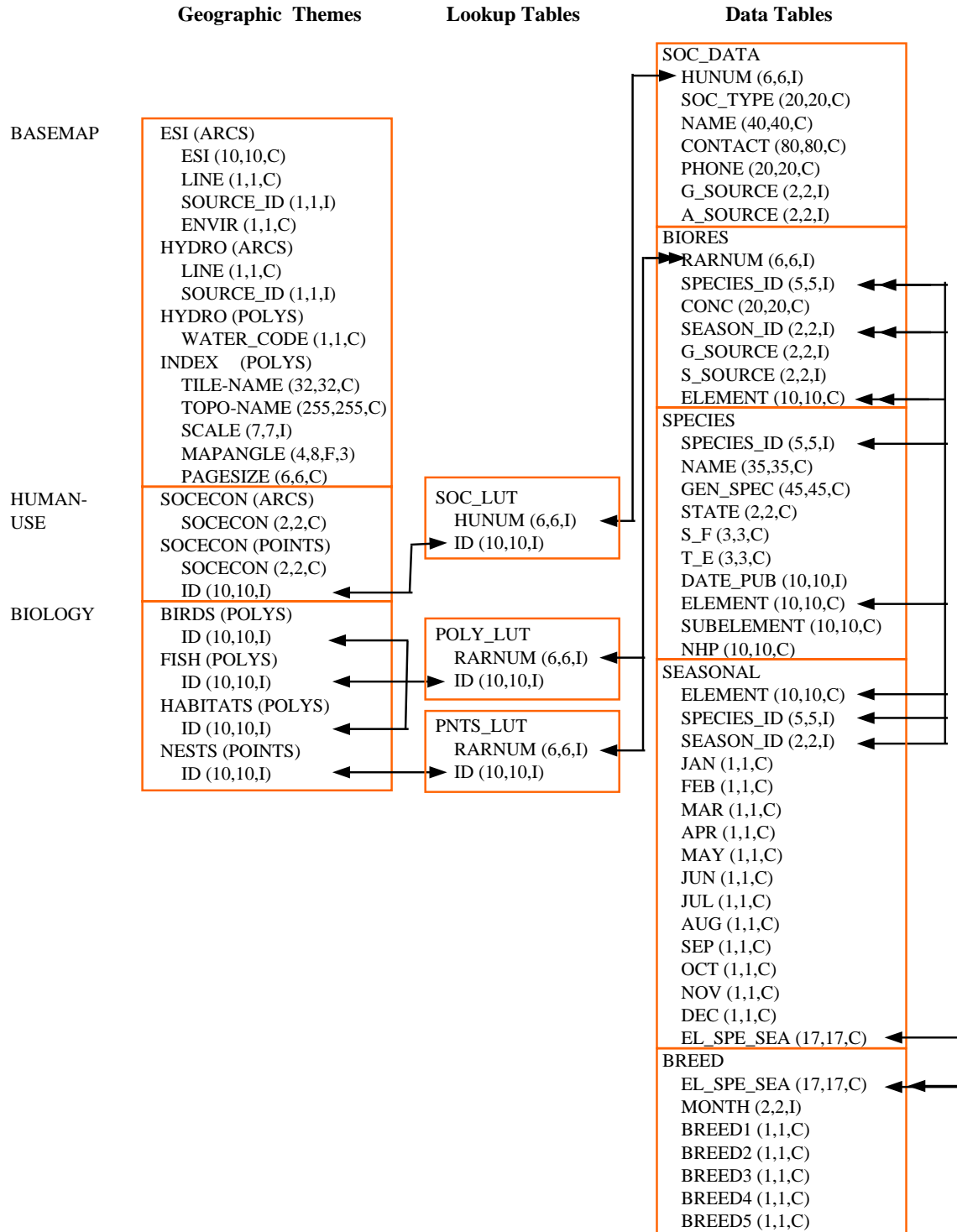


FIGURE 1. Relationships between data layers, lookup tables, and data tables.

list for threatened or endangered species (DATE\_PUB), species element (ELEMENT), species subelement (SUBELEMENT), and the global ranking

from the Natural Heritage Program (NHP). The NHP item is included for data structure consistency. The item SUBELEMENT refers to the grouping of the species within each ELEMENT:

ELEMENT	SUBELEMENT
Bird	diving
	gull_tern
	pelagic
	raptor
	shorebird
	wading
	waterfowl
Fish	anadromous
	special
Habitat	shrub

The BIORES items G\_SOURCE and S\_SOURCE refer to the geographic and seasonality sources and link to the SOURCES table.

#### 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		

Entity Points		Chains	
Feature	SOCECON	Feature	SOCECON
Factory	F2	Beach	B
Hoist	H	Indian Reservation	IR
Helipad	HP	International Border	IB
Historical Site	HS	Marine Sanctuary	MS
Lock and Dam	LD	National Park	NP
Log Storage	LS	Pipeline	P
Marina	M	Regional or State Park	P
Mining	MZ	Wildlife Refuge	WR
Oil Facilities	OF		
Platform	PF		
Recreational Fishing	RF		
Subsistence	S		
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:**

Coverage or theme name: BIRDS

**2.5.1.1. SOURCE CITATION**

2.5.1.1.1 <b>Originator</b>	2.5.1.1.2 <b>Publication Date</b>	2.5.1.1.4 <b>Title</b>	2.5.1.1.6 <b>Geospatial Data Presentation Form</b>	2.5.1.1.8 <b>Publication Information</b>	2.5.1.2 <b>Source Scale Denominator</b>	2.5.1.4 <b>Source Time Period</b>
M. Martin, Indiana Natural Heritage Program	None	Threatened/Endangered Birds in Indiana	Digital; ASCII database	Unpublished database, Indiana Natural Heritage Program	None	1962-1992
K.J. Brock	1986	Birds of the Indiana Dunes	Book	Indiana University Press, Bloomington, Ind., 178 pp.	None	mid-1800s to 1985
H.D. Bohlen	1989	The Birds of Illinois	Book	Indiana University Press, Bloomington, Ind.	None	Historical to-date of pub.
S. Mlodinow	1984	Chicago Area Birds	Book	Chicago Review Press, Chicago, Ill.	None	Historical to-date of pub.
Indiana Department of Natural Resources	1993	Indiana's Rare Plants and Animals: A Checklist of Endangered and Threatened Species	Book	Indiana Department of Natural Resources, Indianapolis, Ind., 26 pp.	None	1993
David Hudak, U.S. Fish and Wildlife Service, Bloomington Field Office (ES)	None	Birds in general, especially T/E birds	Personal knowledge	None	None	1994
Ed Karecki, U.S. Fish and Wildlife Service, Chicago Metro Wetlands Office	None	Birds	Personal knowledge	None	None	1994

SOUTHERN LAKE MICHIGAN METADATA

2.5.1.1.1 <b>Originator</b>	2.5.1.1.2 <b>Publication Date</b>	2.5.1.1.4 <b>Title</b>	2.5.1.1.6 <b>Geospatial Data Presentation Form</b>	2.5.1.1.8 <b>Publication Information</b>	2.5.1.2 <b>Source Scale Denominator</b>	2.5.1.4 <b>Source Time Period</b>
John Roguer, Illinois Department of Fish and Wildlife	None	Birds, Illinois	Personal knowledge	None	None	1994
Susan Wright, Illinois Beach State Park	None	Birds, Illinois	Personal knowledge	None	None	1994

**2.5.1. SOURCE INFORMATION:**

Coverage or theme name: ESI

**2.5.1.1. SOURCE CITATION**

2.5.1.1.1 <b>Originator</b>	2.5.1.1.2 <b>Publication Date</b>	2.5.1.1.4 <b>Title</b>	2.5.1.1.6 <b>Geospatial Data Presentation Form</b>	2.5.1.1.8 <b>Publication Information</b>	2.5.1.2 <b>Source Scale Denominator</b>	2.5.1.4 <b>Source Time Period</b>
U.S. Army Corps of Engineers, Detroit District	1989	Indiana and Illinois Shorelines	Digital; line data	Digitized by USACE from 1989 Aerial Photographs	24000	1989
J. Michel, RPI	None	Shoreline Type and Sensitivity Classification	Maps	Notes made on USGS topos during overflights, digitized by RPI	24000	1993



**2.5.1. SOURCE INFORMATION:**

Coverage 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 Denominator	2.5.1.4  Source Time Period
M. Martin, Indiana Natural Heritage Program	None	Threatened/Endangered Fish in Indiana	Digital; ASCII database	Unpublished database, Indiana Natural Heritage Program	None	1962-1992
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 III- Lake Michigan	Book	USFWS, Biological Services Program, FWS/OBS-82/52	None	Historical to-date of pub.
Indiana Department of Natural Resources	1993	Indiana's Rare Plants and Animals: A Checklist of Endangered and Threatened Species	Book	Indiana Department of Natural Resources, Indianapolis, Ind., 26 pp.	None	1993
Marty Holtgren, Indiana Department of Natural Resources	None	Fish Distribution and Concentration Areas	Personal knowledge	None	None	1994
Ed Karecki, U.S. Fish and Wildlife Service, Chicago Metro Wetlands Office	None	Fish	Personal knowledge	None	None	1994
John Roguer, Illinois Department of Fish and Wildlife	None	Fish, Illinois	Personal knowledge	None	None	1994

**2.5.1. SOURCE INFORMATION:**

Coverage 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
M. Martin, Indiana Natural Heritage Program	None	Threatened/Endangered Plants in Indiana	Digital; ASCII database	Unpublished database, Indiana Natural Heritage Program	None	1962-1992
Indiana Department of Natural Resources	1993	Indiana's Rare Plants and Animals: A Checklist of Endangered and Threatened Species	Book	Indiana Department of Natural Resources, Indianapolis, Ind., 26 pp.	None	1993
David Hudak, U.S. Fish and Wildlife Service, Bloomington Field Office (ES)	None	T/E Plants	Personal knowledge	None	None	1994
Ed Karecki, U.S. Fish and Wildlife Service, Chicago Metro Wetlands Office	None	Threatened/Endangered Plants	Personal knowledge	None	None	1994

**2.5.1. SOURCE INFORMATION:**

Coverage 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
U.S. Army Corps of Engineers, Detroit District	1989	Indiana and Illinois Shorelines	Digital; line data	Digitized by USACE from 1989 Aerial Photographs	24000	1989

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
J. Michel, RPI	None	Shoreline Type and Sensitivity Classification	Maps	Notes made on USGS topos during overflights, digitized by RPI	24000	1993

**2.5.1. SOURCE INFORMATION:**

Coverage 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 Southern Lake Michigan ESI maps	Digital GT Polygons	Joanne Halls, GIS Manager	24000	1995

**2.5.1. SOURCE INFORMATION:**

Coverage 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
M. Martin, Indiana Natural Heritage Program	None	Threatened/Endangered Birds in Indiana	Digital; ASCII database	Unpublished database, Indiana Natural Heritage Program	None	1962-1992
David Hudak, U.S. Fish and Wildlife Service, Bloomington Field Office (ES)	None	Birds in general, especially T/E birds	Personal Knowledge	None	None	1994

**2.5.1. SOURCE INFORMATION:**

Coverage or theme name: SOCECON

**2.5.1.1. SOURCE CITATION**

2.5.1.1.1 <b>Originator</b>	2.5.1.1.2 <b>Publication Date</b>	2.5.1.1.4 <b>Title</b>	2.5.1.1.6 <b>Geospatial Data Presentation Form</b>	2.5.1.1.8 <b>Publication Information</b>	2.5.1.2 <b>Source Scale Denominator</b>	2.5.1.4 <b>Source Time Period</b>
J. Michel, RPI	None	Boat Ramps, Marinas, Access	Hardcopy maps	Notes made on USGS topos during over-flights, digitized by RPI	24000	1993
Marty Holtgren, Indiana Department of Natural Resources	None	Water Intakes (not a complete list)	Personal knowledge	None	None	1994
Ed Karecki, USFWS, Chicago Metro Wetlands Office	None	Human-use Resources	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 data layer. 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 over-flight/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:**

Joanne Halls

**2.5.2.6.1.2. CONTACT ORGANIZATION:**

Research Planning, Inc.

**2.5.2.6.3. CONTACT POSITION:**

Director, GIS Department

**2.5.2.6.4. CONTACT ADDRESS**

**2.5.2.6.4.1. ADDRESS TYPE:**

Physical Address

**2.5.2.6.4.2. ADDRESS:**

1121 Park Street

**2.5.2.6.4.3. CITY:**

Columbia

**2.5.2.6.4.4. STATE OR PROVINCE:**

SC

**2.5.2.6.4.5. POSTAL CODE:**

29201

**2.5.2.6.5. CONTACT VOICE TELEPHONE:**

(803) 256-7322

**2.5.2.6.7. CONTACT FACSIMILE TELEPHONE:**

(803) 254-6445

**2.5.2.6.8. CONTACT ELECTRONIC MAIL ADDRESS:**

joanne@researchplanning.com

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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	74	74	149	3,186			107
ESI	1			504	4,762			515
FISH	1	46	46	87	6,095			66
HABITATS	1	3	3	3	554			6
HYDRO	1	74	74	271	11,163	68		267
INDEX	1	11	11	29	47			35
NESTS							2	
SOCECON				21	549		67	56

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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:**

TRANSVERSE MERCATOR

**4.1.2.1.2. MAP PROJECTION PARAMETERS :**

TRANSVERSE MERCATOR

**4.1.2.1.2.2. LONGITUDE OF CENTRAL**

**MERIDIAN:**

-85.0

**4.1.2.1.2.3. LATITUDE OF PROJECTION ORIGIN:**

0

**4.1.2.1.2.4. FALSE EASTING:**

500,000

**4.1.2.1.2.5. FALSE NORTHING:**

0

**4.1.2.1.2.6. SCALE FACTOR AT CENTRAL**

**MERIDIAN:**

0.99960

**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:**

50 feet

**4.1.2.4.2.2. ORDINATE RESOLUTION:**

50 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

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## 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:
<u>GT-Polygons</u>	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 (5), element number (1), and record number. ID values of zero are holes in polygons and do not contain information. In the lookup table, 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. SOURCE\_ID is a variable which holds metadata information. The information for this variable was unavailable during compilation of this atlas.

The following BIRD species are found in the southern Lake Michigan ESI atlas:

SPECIES ID	NAME
1	Common loon
2	Arctic loon
4	Red-necked grebe
5	Horned grebe
7	Western grebe
8	Double-crested cormorant
12	Canada goose
13	Brant
16	Mallard
17	Northern pintail
18	Green-winged teal
20	Northern shoveler
21	Canvasback
22	Greater scaup
23	Lesser scaup
24	Common goldeneye
26	Bufflehead
27	Oldsquaw
28	Harlequin duck
29	White-winged scoter
30	Surf scoter
32	Common merganser
33	Red-breasted merganser
34	American coot
38	Herring gull
40	Ring-billed gull
42	Bonaparte's gull
44	Thayer's (herring) gull
45	Common tern
54	Great blue heron
56	Spotted sandpiper
58	Greater yellowlegs
59	Lesser yellowlegs
60	Red knot
61	Pectoral sandpiper
62	Least sandpiper
63	Dunlin
64	Short-billed dowitcher
67	Sanderling
69	Semipalmated plover
70	Killdeer

<b>SPECIES ID</b>	<b>NAME</b>
71	Black-bellied plover
73	Ruddy turnstone
76	Bald eagle
77	Osprey
82	Glaucous gull
88	Great egret
90	Black-crowned night heron
92	Great black-backed gull
93	Cattle egret
97	Green-backed heron
98	Laughing gull
100	Black-legged kittiwake
107	Peregrine falcon
124	Redhead
136	Caspian tern
138	Forster's tern
148	Ruddy duck
153	Piping plover
155	Willet
156	Semipalmated sandpiper
162	Gadwall
169	American wigeon
172	Sandhill crane
178	Least bittern
179	Pied-billed grebe
180	Ring-necked duck
182	American kestrel
184	King rail
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
197	Black scoter (common)
198	Hooded merganser
214	Solitary sandpiper
216	Belted kingfisher
217	Mute swan
223	Upland sandpiper
234	Purple sandpiper
237	Baird's sandpiper

<b>SPECIES ID</b>	<b>NAME</b>
238	White-rumped sandpiper
241	Franklin's gull
1,001	Gulls
1,002	Shorebirds
1,003	Waterfowl
1,004	Wading 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:**

integer

**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:
<u>Complete Chain</u>	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 southern Lake Michigan 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:
1B	Exposed, Solid Man-made Structures
1B/5	Exposed, Solid Man-made Structures/Mixed Sand and Gravel Beaches
1B/6B	Exposed, Solid Man-made Structures/Riprap Revetments, Groins, and Jetties

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
1B/8B	Exposed, Solid Man-made Structures/Sheltered, Solid Man-made Structures
4	Sand Beaches
5	Mixed Sand and Gravel Beaches
6B	Riprap Revetments, Groins, and Jetties
6B/5	Riprap Revetments, Groins, and Jetties/Mixed Sand and Gravel Beaches
8B	Sheltered, Solid Man-made Structures
8B/1B	Sheltered, Solid Man-made Structures/Exposed, Solid Man-made Structures
9A	Sheltered, Vegetated Low Banks
10A	Fringing Wetlands

**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.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
--	---

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.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
--	---

0	Digital
1	Overflight
3	Tablet Digitization from USGS Quadrangle

**5.1.2.4.1.3. ENUMERATED DOMAIN VALUE  
DEFINITION SOURCE:**

U.S. Army Corps of Engineers,  
digitized by State of Michigan from  
1989, 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.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
--	---

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 with fish species.

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>GT-Polygons</u>	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 (5), element number (2), and record number. ID values of zero are holes in polygons and do not contain information. In the lookup table, 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. SOURCE\_ID is a variable which holds metadata information. The information for this variable was unavailable during compilation of this atlas.

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

<b>SPECIES ID</b>	<b>NAME</b>
68	Chinook salmon (king)
69	Coho salmon (silver)
74	Rainbow trout (steelhead)
84	Rainbow smelt
85	Alewife
100	Brown trout
104	Striped bass
152	Yellow perch
162	Carp
163	Gizzard shad
166	Brook trout
167	Lake trout
168	Spottail shiner
175	White sucker
176	Yellow bullhead
178	Rock bass
179	Largemouth bass
180	Smallmouth bass
181	Black crappie
182	Bluegill
183	Green sunfish
185	Northern pike
188	Walleye
201	Channel catfish
202	White crappie
211	Brown bullhead
212	Pumpkinseed
232	Trout perch
233	Ninespine stickleback
234	Johnny darter
237	Burbot
243	Longear sunfish
246	Black bullhead
247	Emerald shiner
251	Tiger musky
252	Yellow bass

**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:
<u>GT-Polygons</u>	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 (5), element number (3), and record number. ID values of zero are holes in polygons and do not contain information. In the lookup table, 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. SOURCE\_ID is a variable which holds metadata information. The information for this variable was unavailable during compilation of this atlas.

The following HABITAT species are found in the southern Lake Michigan ESI atlas:

<b>SPECIES ID</b>	<b>NAME</b>
59	Plant (E)
60	Plant (T)

---

**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:**

integer



**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:
<u>GT-Polygons</u>	WATER_CODE character
<u>Complete Chains</u>	LINE character
	SOURCE_ID integer

The WATER\_CODE, LINE, and SOURCE\_ID attributes are the same as in the ESI coverage. This coverage contains all annotation used in producing the atlas. The annotation features are categorized into three subclasses in order to simplify the mapping and quality control procedures: geog or geographic features, soc or socio-economic features and hydro or water features.

**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:**

L	Land
W	Water

**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:**

---

H	Hydrography or stream features
I	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
1	Overflight
3	Tablet Digitization from USGS Quadrangle

---

**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:**

<b>5.1.1.1. ENTITY TYPE LABEL:</b>	<b>5.1.1.2. ENTITY TYPE DEFINITION:</b>
<u>GT-Polygons</u>	TILE-NAME      character
	TOPO-NAME     character
	SCALE           integer
	MAPANGLE      fraction
	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 11.

**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.

CHICAGO LOOP, ILL. (1993)  
EVANSTON, ILL. (1978)  
GARY, IND. (1991)  
HIGHLAND PARK, ILL. (1980)  
JACKSON PARK, ILL. (1972)  
LAKE CALUMET, ILL.-IND. (1991)  
OGDEN DUNES, IND. (1991)  
PORTAGE, IND. (1992)  
WAUKEGAN, ILL. (1980)  
WHITING, IND. (1991); HIGHLAND, IND. (1991)  
ZION, ILL.-WIS. (1980)

---

**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:**

---

43,500

---

**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:**

---

0.000  
0.142  
0.143  
0.225  
0.310  
0.388  
0.450  
0.475  
0.538  
0.550

---

**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

---

**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: NESTS**

The data layer NEST 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:
<u>Entity Points</u>	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 (5), element number (5), and record number. ID values of zero are holes in polygons and do not contain information. In the lookup table, 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. SOURCE\_ID is a variable which holds metadata information. The information for this variable was unavailable during compilation of this atlas.

The following NESTS are found in the southern Lake Michigan ESI atlas:

<b>SPECIES ID</b>	<b>NAME</b>
38	Herring gull
40	Ring-billed gull
92	Great black-backed gull
107	Peregrine falcon
136	Caspian tern

**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:**

integer



**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:	
<u>Complete Chain</u>	SOCECON	character
<u>Entity Points</u>	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 – Points
B	Beach – Chains
BR	Boat Ramp – Points
CG	Coast Guard – Points
M	Marina – Points
NP	National Park – Points and Chains
P	Park – Points and Chains
WI	Water Intake – Points
WR	Wildlife Refuge – Points and Chains

**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 (35), 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:**

integer

## 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 Southern Lake Michigan

### 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:**

19950710

**7.2. METADATA REVIEW DATE:**

19970205

**7.4. METADATA CONTACT**

**7.4.1. CONTACT PERSON PRIMARY**

**7.4.1.1. CONTACT PERSON:**

Joanne Halls

**7.4.1.2. CONTACT ORGANIZATION:**

Research Planning, Inc.

**7.4.3. CONTACT POSITION:**

Director, GIS Dept.

**7.4.4. CONTACT ADDRESS**

**7.4.4.1. ADDRESS TYPE:**

Physical Address

**7.4.4.2. ADDRESS:**

1121 Park Street

**7.4.4.3. CITY:**

Columbia

**7.4.4.4. STATE OR PROVINCE:**

South Carolina

**7.4.4.5. POSTAL CODE:**

29201

**7.4.5. CONTACT VOICE TELEPHONE:**

(803) 256-7322

**7.4.7. CONTACT FACSIMILE TELEPHONE:**

(803) 254-6445

**7.4.8. CONTACT ELECTRONIC MAIL ADDRESS:**

joanne@researchplanning.com

**7.5. METADATA STANDARD NAME:**

Content Standards for Digital Geospatial Metadata

**7.6. METADATA STANDARD VERSION:**

19940608

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