LAKE HURON
ENVIRONMENTAL SENSITIVITY INDEX
METADATA

April 1997

Prepared By:

National Oceanic and Atmospheric Administration
Hazardous Materials Response and Assessment Division
7600 Sand Point Way, Northeast
Seattle, Washington 98115

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

FILE CREATED BY: Joanne N. Halls, Ph.D.
Director, GIS Department
Research Planning, Inc.
Post Office Box 328
Columbia, SC 29202
Phone: (803) 256-7322
FAX: (803) 254-6445
email: joanne@researchplanning.com

FILE CREATED ON: 19970310

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 Metadata 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 (SDTS), ver. 03/92, was referenced to properly identify the geographic entities.

TABLE OF CONTENTS

Page

TABLE OF CONTENTS (continued)

Page

LIST OF FIGURES

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. (RPI), 1200 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 Huron

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 Huron

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

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 Huron. 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 in May of 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:

-84.75

1.5.1.2. EAST BOUNDING COORDINATE:

-82.375

1.5.1.3. NORTH BOUNDING COORDINATE:

46.125

1.5.1.4. SOUTH BOUNDING COORDINATE:

43.0

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:

Lake Huron Coastal Zone, Chippewa County, Mackinac County, Cheboygan County, Presque Isle County, Alpena County, Alcona County, Iosco County, Arenac Bay County, Tuscola County, Huron County, Sanilac County, and Saint Claire County

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:

Many people from various State and Federal agencies provided information for this atlas, as well as reviewed maps. From the Michigan Department of Natural Resources, biological resource information and edits were provided by Glen Matthews, Steve Scott, James P. Baker, Dale Rabe, Jerry Martz, Jerry Weinrich, Larry Robinson, Dick Schellenbarger, Steve Swann, Ray Perez, George Burgoyne, Doug Reeves, and Bob Hess.

Additional information was provided by Judith Soule and Lyn Scrimger of the Michigan Natural Features Inventory; Carol Delaharte of the Great Lakes Commission; Mike Kovach of the Michigan Department of Health, Water Supply Division; Eric MacDonald of the Bureau of History, State Historic Preservation Office; Tom Eitner, David Best, and Bob Kavetsky of the U.S. Fish and Wildlife Service; and Michele Malarney from the proposed Thunder Bay National Marine Sanctuary.

At NOAA, Robert Pavia and LT Ken Barton were the project managers and facilitators. The U.S. Coast Guard provided the funding for the project, and air support was provided by the Air Station Traverse City.

Information for tribal lands was provided by Julie Green and Betty Kienitz of the Michigan Commission on Indian Affairs.

At Research Planning, Inc. Jacqueline Michel was the project manager and she was responsible for mapping the shoreline. Debra Scholz was the project biologist and was responsible for 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 products. Graphics support was provided by Joseph Holmes and Dot Zaino prepared the atlas text. Joanne Halls, the GIS department manager, managed the GIS components and developed the metadata.

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:

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 38 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. The first layer of information digitized is the ESI shoreline. Any errors in the shoreline classification are updated prior to digitization of the biological and socioeconomic layers. All layers use the shoreline as the geographic reference so that there are no slivers in the geographic coordinates. The biological 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 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 that 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, where data is written to tape and metadata is written.

2.3. COMPLETENESS REPORT:

Shoreline Habitat Mapping:

The shoreline habitats of Lake Huron were characterized as to their sensitivity to oil spills using a shoreline classification system that has been used by NOAA for all ESI maps nationwide. 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 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, habitats, and terrestrial mammals.

Each ELEMENT corresponds to a coverage or geographic theme. There are four attribute tables, BIORES, SEASONAL, SPECIES, and BREED, that are used to store the complex biological data (Fig. 1). Each biological polygon coverage (BIRDS, FISH, HABITATS, NESTS, and T_MAMMAL) is linked to the Biological Resources table (BIORES) using the lookup tables POLY_LUT, ARC_LUT, and PNTS_LUT, and the item ID. 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

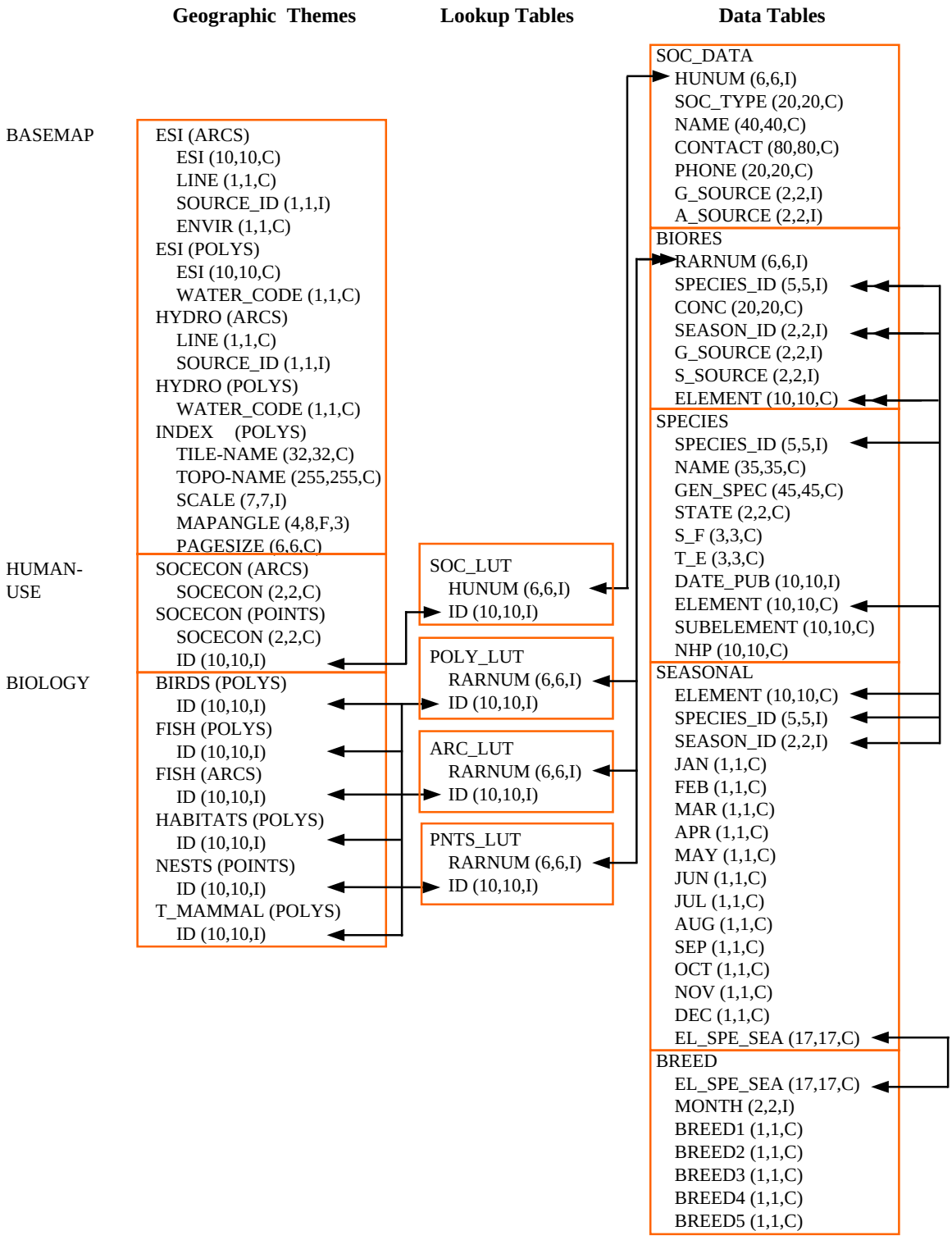

FIGURE 1. Relationships between data layers, lookup tables, and data tables.

unique within each ELEMENT. CONC is the concentration of the species and can be LOW, MEDIUM, or 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. The G_SOURCE and S_SOURCE items are for referencing the sources used to compile to atlas. The values for these items were unavailable at production time; however, they were kept in the table in order to maintain a standardized layout across atlases.

The SEASONAL table stores the monthly presence of each species and the characteristics of the presence (life history information). The BIORES 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 and T_MAMMAL.

The SPECIES table contains the species identification number (SPECIES_ID), common name (NAME), the scientific name (GEN_SPEC), the two-letter state code for listed species (STATE), the state and federal status (S_F), the threatened or endangered status (T_E), the date of the state or federal list (DATE_PUB), the species element (ELEMENT), the species sub-group (SUBELEMENT), and the global rank of the species as defined by the Natural Heritage Program (NHP). The item SUBELEMENT refers to the grouping of the species. The SUBELEMENTS, by ELEMENT, included in this atlas are:

ELEMENT	SUBELEMENT
BIRD	diving
	gull_tern
	raptor
	shorebird
	wading
	waterfowl
FISH	anadromous
	special

ELEMENT	SUBELEMENT
HABITAT	shrub
T_MAMMAL	mustelid
	rodent

The BIORES items G_SOURCE and S_SOURCE refer to the geographic and seasonality sources and were not used in this atlas but are included to maintain data structure integrity.

Human-use Resources:

Several human-use, or socioeconomic, features are included in ESI atlases. Entity points and complete chains (arcs) are digitized into the coverage SOCECON and the points are linked to the SOC_DAT table using the SOC_LUT and ID items. ID is a concatenation of atlas number (32), element number (10), and unique record number.

ENTITY POINTS (.PAT)		COMPLETE CHAINS (.AAT)	
Item	**Type**	**Item**	**Type**
SOCECON	C	SOCECON	C
ID	I		

Complete chains and entity points are digitized and attributed in the SOCECON items and may contain:

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	**Complete Chains**	
Ferry	F	**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

Entity Points	
Feature	**SOCECON**
Oil Facilities	OF
Platform	PF
Recreational Fishing	RF
Subsistence	S
Well	W
Water Intake	WI

The table SOC_DATA contains the link to the SOC_LUT resource at risk number (RARNUM), the feature type (SOC_TYPE), the name of the facility (NAME), the person or organization (CONTACT), the telephone number (PHONE), the geographic source (G_SOURCE), and the attribute source (A_SOURCE). G_SOURCE and A_SOURCE were not compiled in this atlas, but the items remain in order to keep the integrity of the data structure.

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 shoreline classification 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 that 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
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 ,MI, 594 pp.	N/A	1989-1991
Evers, D.C.	1991	A Guide to Michigan's Endangered Wildlife	Book	University of Michigan Press, Ann Arbor, MI, 103 pp.	N/A	historical to 1991
Matthews, Glen, MDNR	N/A	Birds of Alpena, Cheboygan, and Presque Isle Counties	Expert knowledge	N/A	N/A	1994
Perez, Ray, MDNR	N/A	Birds of Chippewa and Mackinac Counties	Expert knowledge	N/A	N/A	1994
Hess, Robert, MDNR	N/A	Birds of Alcona, Iosco, and Arena Counties	Expert knowledge	N/A	N/A	1994
Swann, Steve, MDNR	N/A	Birds of Bay, Tuscola, and Huron Counties	Expert knowledge	N/A	N/A	1994
Reeves, Doug, MDNR	N/A	Birds of Sanilac County	Expert knowledge	N/A	N/A	1994
Kavetsky, B., K. Millenbaugh, D. Best, USFWS, East Landing Field Office	N/A	Bald Eagle and Piping Plover Nesting Sites	Expert knowledge	N/A	N/A	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 Denominator	2.5.1.4 Source Time Period
Eitner, Tom, USFWS, East Landing Field Office	N/A	Bald Eagle Nesting Sites and Piping Plover Distribution and Nesting Sites	Expert knowledge	N/A	N/A	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 Denominator	2.5.1.4 Source Time Period
State of Michigan	1989	Michigan Shorelines	Digital chains	Provided by USACE from data digitized by the State of Michigan from 1982 photography	24000	1982
Research Planning, Inc.	1996	ESI Shorelines	Digital chains and complex polygons	None	24000	1993

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 Denominator	2.5.1.4 Source Time Period
USFWS and USACE	1982	Atlas of Spawning and Nursery Areas of the Great Lakes: Volume V, Lake Huron	Book	USFWS, Biological Services Program, FWS/OBS-82/52	N/A	historical to 1982
Evers, D.C.	1991	A Guide to Michigan's Endangered Wildlife	Book	University of Michigan Press, Ann Arbor, MI, 103 pp.	N/A	historical to 1991
Scott, Steve, MDNR	N/A	Fish of Chippewa and Mackinac Counties	Expert knowledge	N/A	N/A	1994
Baker, James, MDNR	N/A	Fish of Bay, Tuscola, Huron, and Sanilac Counties	Expert knowledge	N/A	N/A	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
Eitner, Tom, USFWS, East Landing Field Office	N/A	T/E plants	Expert knowledge	N/A	N/A	1994
Soule, J. and L. Scrimger, Michigan Natural Features Inventory	N/A	T/E plants	Expert knowledge	N/A	N/A	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
State of Michigan	1989	Michigan Shorelines	Digital chains	Provided by USACE from data digitized by the State of Michigan from 1982 photography	24000	1982
Research Planning, Inc.	1996	Hydrology and Water Codes	Digital chains and complex polygons	None	24000	1994

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.	1996	Index for Lake Huron ESI maps	Digital complex polygons	Bill Holton, GIS Analyst	24000	1994

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
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 MI, 594 pp.	N/A	1989-1991
Evers, D.C.	1991	A Guide to Michigan's Endangered Wildlife	Book	University of Michigan Press, Ann Arbor, Mich., 103 pp.	N/A	historical to 1991
Matthews, Glen, MDNR	N/A	Birds of Alpena, Cheboygan, and Presque Isle Counties	Expert knowledge	N/A	N/A	1994
Perez, Ray, MDNR	N/A	Birds of Chippewa and Mackinac Counties	Expert knowledge	N/A	N/A	1994
Hess, Robert, MDNR	N/A	Birds of Alcona, Iosco, and Arena Counties	Expert knowledge	N/A	N/A	1994
Swann, Steve, MDNR	N/A	Birds of Bay, Tuscola, and Huron Counties	Expert knowledge	N/A	N/A	1994
Reeves, Doug, MDNR	N/A	Birds of Sanilac County	Expert knowledge	N/A	N/A	1994
Kavetsky, B., K. Millenbaugh, and D. Best, USFWS, East Landing Field Office	N/A	Bald Eagle and Piping Plover Nesting Sites	Expert knowledge	N/A	N/A	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 Denominator	2.5.1.4 Source Time Period
Eitner, Tom, USFWS, East Landing Field Office	N/A	Bald Eagle Nesting Sites and Piping Plover Distribution and Nesting Sites	Expert knowledge	N/A	N/A	1994

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, J., Research Planning, Inc.	N/A	Boat Ramps, Marinas, and Access Points	Maps	N/A	24000	1993
Fishing Hot Spots, Inc.	1991	Saginaw Bay Marked Fishing Map (access points)	Map	Fishing Hot Spots, Inc. Map Number M228	Unknown	1990
Peebles, C.S. and D.B. Black, Div. of the Great Lakes, Museum of Anthropology, University of Michigan	1976	The Distribution and Abundance of Archaeological Sites in the Coastal Zone of Michigan	Book	A Report of the Michigan History Division, Michigan Dept. of State, 226 pp.	N/A	1825-1976
Bureau of Michigan History, State Historic Preservation Office, Michigan Dept. of State	1991	Archaeological and Historical Sites	Expert knowledge	N/A	N/A	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 Denominator	2.5.1.4 Source Time Period
MacDonald, Eric, Bureau of Michigan History, State Historic Preservation Office, Michigan Dept. of State	N/A	Archaeological and Historic Sites	Expert knowledge	N/A	N/A	1994
Kovach, Mike, Michigan Dept. of Public Health, Water Supply Division	N/A	Water Intakes	Expert knowledge	N/A	N/A	1994
Malarney, Michelle, Dept. of Parks, Recreation, and Tourism Resources, Michigan State University	N/A	Thunder Bay National Marine Sanctuary (proposed)	Expert knowledge	N/A	N/A	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 Denominator	2.5.1.4 Source Time Period
Baker, R.H.	1993	Michigan Mammals	Book	Michigan State University Press, East Lansing, MI, 642 pp.	N/A	1700-1982

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. Any errors in the shoreline classification are updated prior to digitization of the biological and socioeconomic 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 expert using the data from regional specialists in the form of verbal discussions, 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 that 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:
WA

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

This page intentionally left blank

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	465	465	1,064	162,166			816
ESI	1	343	343	5,534	76,363			5,521
FISH	1	481	481	1,317	280,327			1,168
HABITATS	1	53	53	53	4,534			53
HYDRO	1	639	639	907	104,488	846		856
INDEX	1	71	71	198	299			128
NESTS							44	
SOCECON				45	1,749		487	459
T_MAMMAL	1	124	65,124	381	98,569			331

This page intentionally left blank

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

This page intentionally left blank

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 that 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 (3), element number (1), and record number. ID values of zero are holes in polygons and do not contain information. In the look up table, the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, and CONC and links to the biology table, BIORES. The items in BIORES are: RARNUM, ELEMENT, SPECIES_ID, CONC, SEASON_ID, G_SOURCE and S_SOURCE. SPECIES_ID is the numeric identifier of each species and is unique within each ELEMENT. CONC is the concentration of the species and is HIGH, if known. 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 not used in this atlas but are included to maintain data structure integrity with other ESI atlases.

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

SPECIES ID	NAME
1	Common loon
5	Horned grebe
8	Double-crested cormorant
11	Whistling swan (tundra swan)
12	Canada goose
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
29	White-winged scoter
30	Surf scoter
32	Common merganser
33	Red-breasted merganser
34	American coot
38	Herring gull
40	Ring-billed gull
45	Common tern
54	Great blue heron
56	Spotted sandpiper
58	Greater yellowlegs
59	Lesser yellowlegs
70	Killdeer
73	Ruddy turnstone
76	Bald eagle
77	Osprey
86	Least tern
88	Great egret
90	Black-crowned night heron
93	Cattle egret
97	Green-backed heron
124	Redhead
136	Caspian tern
148	Ruddy duck
153	Piping plover
156	Semipalmated sandpiper

SPECIES ID	NAME
162	Gadwall
169	American wigeon
179	Pied-billed grebe
180	Ring-necked duck
181	Northern harrier
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
192	Common moorhen
193	Black tern
196	Common snipe
197	Black scoter (common)
198	Hooded merganser
217	Mute swan
1003	Waterfowl
1006	Diving birds

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

This page intentionally left blank

5.1. DETAILED DESCRIPTION: ESI

The data layer ESI contains arc (Complete Chains) and polygon (GT-Polygons) features for the ESI shoreline classification and is based on *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 20-23 May 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
GT-Polygons	ESI	character
	WATER_CODE	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. The Lake Huron shoreline types are listed below. In many cases, the shorelines are also ranked with multiple codes such as 10/7. The first number is the most landward shoreline type, salt marsh, with exposed tidal flats being the shoreline type closest to the water.

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/5	Exposed Rocky Cliffs/Mixed Sand and Gravel Beaches
1B	Exposed, Solid Man-made Structures

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
1B / 4	Exposed, Solid Man-made Structures / Sand Beaches
1B / 5	Exposed, Solid Man-made Structures / Mixed Sand and Gravel Beaches
1B / 6B	Exposed, Solid Man-made Structures / Riprap Revetments, Groins, and Jetties
2A	Shelving Bedrock Shores
2A / 4	Shelving Bedrock Shores / Sand Beaches
3A	Eroding Scarps in Unconsolidated Sediments
4	Sand Beaches
5	Mixed Sand and Gravel Beaches
5 / 2A	Mixed Sand and Gravel Beaches / Shelving Bedrock Shores
5 / 6B	Mixed Sand and Gravel Beaches / Riprap Revetments, Groins, and Jetties
5 / 9A	Mixed Sand and Gravel Beaches / Sheltered, Vegetated Low Banks
5 / 9B	Mixed Sand and Gravel Beaches / Sheltered Sand / Mud Flats
5 / 10B	Mixed Sand and Gravel Beaches / Extensive Wetlands
6A	Gravel Beaches
6A / 2A	Gravel Beaches / Shelving Bedrock Shores
6A / 9B	Gravel Beaches / Sheltered Sand / Mud Flats
6A / 10B	Gravel Beaches / Extensive Wetlands
6B	Riprap Revetments, Groins, and Jetties
6B / 1B	Riprap Revetments, Groins, and Jetties / Exposed, Solid Man-made Structures
6B / 4	Riprap Revetments, Groins, and Jetties / Sand Beaches
6B / 5	Riprap Revetments, Groins, and Jetties / Mixed Sand and Gravel Beaches
6B / 10B	Riprap Revetments, Groins, and Jetties / Extensive Wetlands
8A	Sheltered Scarps in Bedrock
8A / 10B	Sheltered Scarps in Bedrock / Extensive Wetlands
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
9A	Sheltered, Vegetated Low Banks
9B	Sheltered Sand / Mud Flats
10A	Fringing Wetlands
10A / 2A	Fringing Wetlands / Shelving Bedrock Shores
10A / 4	Fringing Wetlands / Sand Beaches

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
10A / 5	Fringing Wetlands / Mixed Sand and Gravel Beaches
10A / 6A	Fringing Wetlands / Gravel Beaches
10A / 6B	Fringing Wetlands / Riprap Revetments, Groins, and Jetties
10A / 8A	Fringing Wetlands / Sheltered Scarps in Bedrock
10A / 9B	Fringing Wetlands / Sheltered Sand / Mud Flats
10A / 10B	Fringing Wetlands / Extensive Wetlands
10B	Extensive Wetlands
10B / 4	Extensive Wetlands / Sand Beaches
10B / 5	Extensive Wetlands / Mixed Sand and Gravel Beaches
10B / 6A	Extensive Wetlands / Gravel Beaches
10B / 9A	Extensive Wetlands / Sheltered, Vegetated Low Banks
10B / 9B	Extensive Wetlands / Sheltered Sand / Mud Flats
U	Unranked

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

5.1.2.1. 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

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:nominal

This page intentionally left blank

5.1. DETAILED DESCRIPTION: FISH

The data layer FISH contains the polygons and complete chains 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 that links to either the POLY_LUT or the ARC_LUT lookup table, depending on topology. The lookup tables have two attributes: ID and RARNUM. ID is a concatenation of atlas number (3), element number (2), and record number. ID values of zero are holes in polygons and do not contain information. In the lookup tables, the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, and CONC and links to the biology table, BIORES. The items in BIORES are: RARNUM, ELEMENT, SPECIES_ID, CONC, SEASON_ID, G_SOURCE and S_SOURCE. 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 HIGH or an actual count of the numbers of species present. 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 not used in this atlas but are included to maintain data structure integrity with other ESI atlases.

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

SPECIES ID	NAME
68	Chinook salmon (king) (a)
69	Coho salmon (silver) (a)
70	Pink salmon (humpy) (a)
74	Rainbow trout (steelhead) (a)
84	Rainbow smelt (a)
85	Alewife (a)
100	Brown trout
144	Atlantic salmon (a)
152	Yellow perch (a)
161	Lake sturgeon (a)
162	Carp
165	Lake whitefish (a)
166	Brook trout (a)
167	Lake trout (a)
168	Spottail shiner
174	Longnose sucker
175	White sucker (a)
178	Rock bass
179	Largemouth bass
180	Smallmouth bass (a)
181	Black crappie
182	Bluegill
185	Northern pike (a)
186	Muskellunge
188	Walleye (a)
190	White bass
201	Channel catfish (a)
229	River redhorse
235	Lake herring (a)
237	Burbot (a)
239	Splake
246	Black bullhead

The species names with "(a)" are those associated with the arcs or complete chains. All of the species in this list are found in the GT-Polygon data.

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

This page intentionally left blank

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 that 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 (3), element number (3), and record number. ID values of zero are holes in polygons and do not contain information. In the look up table, the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, and CONC and links to the biology table, BIORES. The items in BIORES are: RARNUM, ELEMENT, SPECIES_ID, CONC, SEASON_ID, G_SOURCE and S_SOURCE. SPECIES_ID is the numeric identifier of each species and is unique within each ELEMENT. CONC is the concentration of the species and is blank. 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 not used in this atlas but are included to maintain data structure integrity with other ESI atlases.

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

SPECIES ID	NAME
12	Pitcher's thistle (Dune thistle)

SPECIES ID	NAME
35	Lake Huron tansy
37	Houghton's goldenrod

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 all annotation used in creating the atlas.

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

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

5.1.2. ATTRIBUTES:

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:
I	Index for map / quad boundary
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

5.1.2.1. ATTRIBUTE LABEL:
WATER_CODE

5.1.2.2. ATTRIBUTE DEFINITION:
The WATER_CODE attributes contain L for land and W for water. 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 socioeconomic features; and hydro or water features.

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	Unclassified

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 69.

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.

ALABASTER, MICH. (1976); TAWAS CITY, MICH. (1989)
ALBANY ISLAND, MICH. (1976)
ALPENA, MICH. (1971)
AU GRES, MICH. (1976)
BAY CITY, MICH. (1973)
BAY PORT EAST, MICH. (1970); BAY PORT WEST, MICH. (1980)
BLACK RIVER, MICH. (1971)
BURNT ISLAND, MICH.-ONT. (1976)
CASEVILLE, MICH. (1970); SAND POINT, MICH. (1970)
CEDARVILLE, MICH. (1975); PICKFORD SE, MICH. (1975)
CHARLES, MICH. (1976)
CHEYBOYGAN, MICH. (1982)
CORDWOOD POINT, MICH. (1982)
CROSWELL, MICH. (1976)
DE TOUR VILLAGE, MICH. (1964)
DRUMMOND, MICH.-ONT. (1976)
DRUMMOND SE, MICH.-ONT. (1976)
EAST TAWAS, MICH. (1989)
ESSEXVILLE, MICH. (1973); BAY CITY NE, MICH. (1973)
EVERGREEN SHORES, MICH. (1964)
FISH POINT, MICH. (1973); FAIRGROVE, MICH. (1973)
FORESTVILLE, MICH. (1963); RUTH, MICH. (1976)
GOOSE ISLAND, MICH. (1975); HESSEL, MICH. (1964)
GRACE, MICH. (1982); NINEMILE POINT, MICH. (1982)
GREENBUSH, MICH. (1989)
HARBOR BEACH, MICH. (1978)
HARRISVILLE, MICH. (1989)
JEDDO, MICH. (1976)
KAWKAWLIN, MICH. (1973)
KINDE WEST, MICH. (1970); PORT AUSTIN WEST, MICH. (1970)
LAKEPORT, MICH.-ONT. (1976)
LONG LAKE EAST, MICH. (1971)
MARBLE HEAD, MICH.-ONT. (1976)
MC RAE BAY, MICH. (1976)
MEADE ISLAND, MICH. (1964)

MIDDLE ISLAND, MICH. (1971)
MOLTKE, MICH. (1971)
NORTH POINT, MICH. (1971)
OCQUEOC, MICH. (1986); GRACE, MICH. (1982)
OSCODA, MICH. (1989)
OSSINEKE, MICH. (1971)
PINCONNING, MICH. (1973)
POINT LOOKOUT, MICH. (1976); ALABASTER, MICH. (1976)
POINT NIPIGON, MICH. (1982); FREEDOM, MICH. (1982)
PONTCHARTRAIN SHORES, MICH. (1975)
PORT AUSTIN EAST, MICH. (1978)
PORT HOPE, MICH. (1970)
PORT SANILAC, MICH. (1963)
POSEN, MICH. (1971); ADAMS POINT, MICH. (1971)
PRENTISS BAY, MICH. (1976)
PRESQUE ISLE, MICH. (1971)
QUANICASSEE, MICH. (1973)
REDMAN, MICH. (1970); HURON CITY, MICH. (1970)
RICHMONDVILLE, MICH. (1963)
ROGERS CITY, MICH. (1971)
ROUND ISLAND, MICH. (1976)
RUSH LAKE, MICH. (1970); CASEVILLE, MICH. (1970)
SAGINAW, MICH. (1973)
SAND POINT, MICH. (1970); CHARITY ISLAND, MICH. (1970)
SEBEWAING, MICH. (1978); BAY PORT WEST, MICH. (1980)
SOUTH POINT, MICH. (1971)
SPENCER LAKE, MICH. (1989)
ST. IGNACE, MICH. (1976)
ST. MARTIN ISLAND, MICH. (1964)
STANDISH, MICH. (1973)
STANDISH NE, MICH. (1967); OMER, MICH. (1968)
THOMPSONS HARBOR, MICH. (1971)
THUNDER BAY ISLAND, MICH. (1971)
WHITNEY BAY, MICH. (1976)

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 that 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:

42,000

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:

VARIES BETWEEN 0 AND -1.75

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
17,11

3.55,7.75

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

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:nominal

This page intentionally left blank

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:	
Entity Points	ID	integer

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

ID

5.1.2.2. ATTRIBUTE DEFINITION:

A unique identifier that 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 (3), element number (5), and record number. In the lookup table, the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, and CONC and links to the biology table, BIORES. The items in BIORES are: RARNUM, ELEMENT, SPECIES_ID, CONC, SEASON_ID, G_SOURCE and S_SOURCE. 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 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 not used in this atlas but are included to maintain data structure integrity with other ESI atlases.

The following NESTS species are found in the Lake Huron ESI atlas:

SPECIES ID	NAME
8	Double-crested cormorant
12	Canada goose
16	Mallard

SPECIES ID	NAME
17	Northern pintail
18	Green-winged teal
20	Northern shoveler
34	American coot
38	Herring gull
40	Ring-billed gull
45	Common tern
54	Great blue heron
56	Spotted sandpiper
70	Killdeer
77	Osprey
86	Least tern
97	Green-backed heron
124	Redhead
136	Caspian tern
138	Forster's tern
153	Piping plover
162	Gadwall
169	American wigeon
179	Pied-billed grebe
180	Ring-necked duck
181	Northern harrier
182	American kestrel
186	Black duck
187	Virginia rail
188	Sora rail
190	Blue-winged teal
191	Wood duck
192	Common moorhen
193	Black tern
196	Common snipe
198	Hooded merganser
217	Mute swan

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 complete chains and entity points 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 Chains	SOCECON	character
Entity Points	SOCECON	character
	ID	character

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

SOCECON

5.1.2.2. ATTRIBUTE DEFINITION:

Identifies an entity point or complete chain with a socioeconomic, 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)
BR	Boat Ramp (P)
CF	Commercial Fishing (P)
CG	Coast Guard (P)
F	Ferry (P)
H	Hoist (P)
HS	Historical Site (P)
IB	International Border (L)
M	Marina (P)
MS	Marine Sanctuary (P)

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
NP	National Park (L)
P	Park (P & L)
WI	Water Intake (P)
WR	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 that 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 (3), element number (10), and record number. HUNUM is the link to the socioeconomic 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 that 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 (32), element number (9), and record number. ID values of zero are holes in polygons and do not contain information. In the look up table, the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, and CONC and links to the biology table, BIORES. The items in BIORES are: RARNUM, ELEMENT, SPECIES_ID, CONC, SEASON_ID, G_SOURCE and S_SOURCE. SPECIES_ID is the numeric identifier of each species and is unique within each ELEMENT. CONC is the concentration of the species and is blank. 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 not used in this atlas but are included to maintain data structure integrity with other ESI atlases.

The following terrestrial mammal species are found in the Lake Huron ESI atlas:

SPECIES ID	NAME
8	River otter
36	Beaver
37	Muskrat
38	Mink
44	Northern raccoon

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:

WA

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 Huron

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.).

This page intentionally left blank

7.0. METADATA REFERENCE INFORMATION

7.1. METADATA DATE:
19970310

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

This page intentionally left blank