LEAF RIVER, MISSISSIPPI
REACH SENSITIVITY INDEX
METADATA

Prepared By:

Research Planning, Inc.
1121 Park Street
Columbia, South Carolina 29201 USA

FILE DESCRIBES: Digital data for 1996 Leaf River, Mississippi Reach 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:

199612

1.1.4. TITLE:

Sensitivity of Coastal Environments and Wildlife to Spilled Oil: Leaf River, Mississippi

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:

Leaf River, Mississippi

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:

Reach Sensitivity Index (RSI) maps have been developed for the Leaf River watershed of southern Mississippi. Strategies for identification and protection of sensitive resources in inland areas under U.S. Environmental Protection Agency (EPA) management have focused on major rivers and built on the Environmental Sensitivity Index (ESI) approach developed for marine environments (Michel, J., J. Halls, S. Zengel, and J.A. Dahlin, 1995, Environmental Sensitivity Index Guidelines. NOAA Technical Memorandum NOS ORCA 92. Hazardous Materials Response and Assessment Division, NOAA, Seattle, Wash.). Previous research for EPA Regions 5 and 9 suggested a watershed approach for mapping of smaller rivers and streams (National Oceanic and Atmospheric Administration, 1994, Environmental Sensitivity Mapping for Developing and Evaluating Spill Response Plans. Working paper for EPA/NOAA Regional Workshop on Developing GIS for Oil Spills, San Francisco, Calif.; Michel, J., M.O. Hayes, J.A. Dahlin, and K. Barton, 1994, Sensitivity Mapping of Inland Areas: Technical Support to the Inland Area Planning Committee Working Group EPA Region 5. HAZMAT Report 95-4, Hazardous Materials Response and Assessment Division, NOAA, Seattle, Wash.). However, existing standardized river classification schemes did not adequately address oil-spill response issues. Thus, a new stream reach sensitivity scheme was developed based on: 1) the degree of difficulty anticipated for the containment and recovery of spilled oil; and 2) the sensitivity and vulnerability of associated wetlands. The relative elevation of associated flood plains was a key element in determining their sensitivity. This scheme considered the following factors: navigability, water-flow patterns, stream size, occurrence of suitable collection points inherent in the stream type, and channel leakage and bifurcation. A reach sensitivity index was prototyped using streams in South Carolina, then applied to the Leaf River watershed in Mississippi. It was decided early in the project that the stream classification system would be developed for normal and seasonally

high water levels (annual flooding conditions), and that extreme flood events would not be addressed. The reach classification is based on how the water and oil are expected to behave under normal and annual flood conditions.

1.2.2. PURPOSE:

The RSI 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 Leaf River, Mississippi was mapped 3-9 March 1996. The biological and human-use resources data were compiled by database specialists and biologists in 1996. 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:

89.75°

1.5.1.2. EAST BOUNDING COORDINATE:

88.75°

1.5.1.3. NORTH BOUNDING COORDINATE:

32.0°

1.5.1.4. SOUTH BOUNDING COORDINATE:

31.0°

1.6 KEYWORDS

1.6.1. THEME

1.6.1.1. THEME KEYWORD THESAURUS:

None

1.6.1.2. THEME KEYWORD:

Sensitivity mapping; RSI; watershed management; oil spill planning; river reach; and river corridor

1.6.2. PLACE

1.6.2.1. THESAURUS:

None

1.6.2.2. PLACE KEYWORD:

Leaf River watershed, Mississippi, United States

1.7. ACCESS CONSTRAINTS:

None

1.8. USE CONSTRAINTS:

DO NOT USE ESI MAPS FOR NAVIGATIONAL PURPOSES.
Acknowledgment of NOAA and other contributing sources listed in 1.11. (Data Set Credit) would be appreciated in products derived from these data

1.11. DATA SET CREDIT:

This project was conducted for NOAA's Hazardous Materials Response and Assessment Division. Robert Pavia, Scientific Support Branch Chief, was the project manager, and Linda Maxson was the project coordinator. James Illg, also at NOAA, assisted in data collection and Wade Blake assisted with the logistics for the overflight.

Funds were provided by the EPA, Region 4. Michael Norman, Mary Jo Bragan, and Libby Holcomb of EPA participated in project design, data collection, and review.

The data on the maps and preliminary field work data were provided by numerous federal and state offices. Neal Smith of the Mississippi Automated Resource Information System provided soils, hydrologic unit boundaries, geology, and national forests. Libby Holcomb of EPA Region 4 provided locations of oil facilities. David Cobb of the Mississippi Department of

Environmental Quality, Office of Land and Water Resources, provided the surface water withdrawal sites. Biological element occurrences were provided by Kenneth Gordon of the Mississippi Natural Heritage Program, Mississippi Department of Wildlife, Fisheries, and Parks.

At Research Planning, Inc. (RPI), Joanne Halls and Jacqueline Michel were the project managers. The mapping of the RSI, boat ramps, and collection sites was conducted by Miles O. Hayes and Todd M. Montello. Chris Locke digitized the features mapped in the field. Other human-use and biological resources data were collected, compiled, and mapped by Joanne Halls, Bill Holton, and Chris Locke. Scott Zengel reviewed and coordinated the inclusion of biological resources and associated text. Graphics were provided by Joe Holmes and Becky Cox. Dot Zaino prepared the final text.

1.13. NATIVE DATA SET ENVIRONMENT:

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

biores.e00	fish.e00	habitats.e00
hydro.e00	index.e00	mgt.e00
nests.e00	pnts_lut.e00	reptiles.e00
rsi.e00	shellfsh.e00	soc_data.e00
soc_lut.e00	socecon.e00	sources.e00
species.e00	t_mammal.e00	

The entire data set is approximately 25 megabytes.

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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 experience, the data input methodology, the quality control review sessions, the expert review, and the digital logical consistency checks.

2.2. LOGICAL CONSISTENCY REPORT:

The digitization of reach sensitivity types is a highly quality-controlled process. The first layer of information digitized is the RSI shoreline. Any errors in the shoreline classification are updated prior to digitizing additional data sets. All layers use the shoreline as the geographic reference. The biological and human-use data were imported into the data structure, checked using both digital and on-screen procedures, plotted, and sent out for review by the regional specialists. The edited maps were updated, checked once again, and the data were then merged to form the study-wide layers. The data merging included a final quality control check where labels, chains, and polygons were checked for attribute accuracy. A team of experts reviewed the entire series of maps, checked all data, and made final edits. The final product plotted (at 1:100,000 scale).

To finalize the data checking process, each coverage was checked using a standardized form by two GIS personnel (a technician and the GIS manager), and each attribute database was 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 was made by the GIS manager, where data was written to tape and metadata was written.

2.3. COMPLETENESS REPORT:

An extensive literature review revealed that the only sensitivity mapping approaches for response to oil spills that are currently being used in freshwater settings in North America are: 1) ESI shoreline rankings for lacustrine environments, developed as part of the NOAA and Environment Canada projects in the Great Lakes, both of which have been ongoing since the mid-1980's; 2) ESI rankings for large rivers, such as those used by NOAA

for mapping the Apalachicola and Columbia Rivers; and 3) the inland sensitive areas mapping conducted by EPA Region 5 along the Mississippi River, on which NOAA provided extensive technical assistance. No effort had been made before this project to map small rivers and streams based on a sensitivity index classification such as the ESI.

Most streams can be readily subdivided into clear-cut segments, or reaches, that have very distinct and uniform characteristics within that stretch of the stream. The definition of the reach type is usually based on whatever the intended use of the reach classification might be. For example, in a study of the aquatic insects of a mountain stream, one single set of pool/riffles might be designated a reach, or possibly a series of very similar pool/riffle sets could be the reach. The application in this study is to define a stretch of the stream where similar spill-response modes and potential ecological and/or socio-economic impacts from the spill are to be anticipated. However defined, the boundary of the reach is usually marked by an abrupt change in the morphology of the stream, a change commonly, but not always, brought about by a change in the stream's gradient.

The first criteria used to delineate sensitivity of stream reaches is the degree of difficulty anticipated for the containment and recovery of spilled oil. The key factors related to the containment and recovery of oil spilled in smaller rivers and streams are discussed below.

1. Navigation—Whether or not the stream is navigable by motorized small boats is an important issue, which is taken into account in the sensitivity classification. On most of the navigable rivers in the Leaf River watershed, boat ramps are fairly closely spaced so access by Jon boats or motorized inflatables would be possible.
2. Water flow patterns—Small rocky streams have turbulent flow which mixes oil into the water column, making the oil difficult to recover. In larger streams and rivers, where the channel is straight, oil is expected to flow with the stronger current, down the center of the channel or smear along the down-wind bank. In comparison, in meandering streams and rivers, the water flow patterns are more complicated and oil slicks are more likely to contact alternating banks and/or accumulate in low-flow zones, making protection and recovery strategies more difficult to implement.

3. Stream size—On small streams, response options can be very different and require much less specialized equipment, compared to larger streams and rivers. Under- and overflow dams, filter fences, earthen dams, etc. can be constructed on site using local materials. For larger streams, specialized equipment, boats for deployment, etc. are needed to contain and recover spilled oil.
4. Occurrence of suitable collection points—Effective booming strategies include deflecting oil to a collection point where the oil is trapped and recovered. Optimal collection points would be features such as clay banks, sand bars, solid revetments, and boat ramp areas. Stream types can be differentiated according to whether they are likely to have these features.
5. Channel leakage and bifurcation—In places where the water easily escapes the confinement of a discrete channel and there is no bank to deflect the oil to, containment becomes much more difficult than it would be in a channel with well-defined banks. Furthermore, if the channel abruptly breaks up into a number of smaller channels with a multitude of directions in which the oil can flow, that also decreases the likelihood of containment and recovery.
6. Residence time—The longer the oil remains in the environment, the more likely it is to do harm. Habitats such as quiet water swamps tend to retain oil and be difficult to clean.

The second criteria used to delineate sensitivity of stream reaches is the abundance of sensitive and vulnerable wetlands within the reach and the potential for oil to leave the main channel of the stream and impact the wetland. One must differentiate between vulnerability, which is the potential for being exposed to oil because of the physical location of the wetland, and sensitivity, which is how the wetland type is expected to be affected by exposure to oil. In general, stream banks in the southeast are either muddy sand or sandy mud, and those that lack wetlands are not considered to be particularly sensitive to oil-spill impacts. Freshwater marshes are rare in the piedmont and coastal plain river systems of the Southeastern United States, the dominant wetland type being bottomland hardwood ecosystems. Six zones were described, ranging from Zone I, which is the permanently wet

stream or river itself, to Zone VI, which is a transition zone between the floodplain and the uplands and is rarely flooded.

The Leaf River, Mississippi was mapped during ground surveys and overflights conducted from 3-9 March 1996. Two experienced geologists carried out the following tasks:

1. Ground inspection of 68 stations, including locating boat ramps and collection sites.
2. An overflight of the watershed.
3. Collection of extensive ground and aerial photography.
4. Analysis of the most recent vertical aerial photography of the river system at the Department of Transportation archives in Jackson, Mississippi.
5. Based on all of the above information, the reaches of the Leaf River mainstem, and most of its major tributaries (Okatoma Creek, Gaines Creek, Tallahala Creek, Bouge Homa Creek, and Thompson Creek) were classified according to their sensitivity to oil spill impacts. The field maps used were 1:24,000 U.S. Geological Survey (USGS) topographic maps.

Upon returning to the office, the RSI classifications as well as potential access and collection points for response operations were transferred to 1:100,000 USGS topographic maps and digitized.

The biological information presented on the maps are element occurrences provided by the Mississippi Natural Heritage Program (NHP), Mississippi Department of Wildlife, Fisheries, and Parks. The quantity and quality of data collected by NHPs are dependent on the research and observations of many individuals and organizations. Not all of this information is the result of comprehensive or site-specific field surveys. In addition, some areas may have never been thoroughly surveyed. As a result, new locations for animal and plant species are continuously added to NHP databases. Since data acquisition is dynamic and on-going, NHPs cannot provide definitive statements on the presence, absence, or condition of biological resources in particular areas. Information from NHP databases summarizes existing data known to the program at the time data was provided to the users. NHP data used in the Leaf River atlas was provided in mid-February 1996. These data

should not be regarded as complete representations of the biological resources present in the study area.

An ecologist knowledgeable in the oil spill vulnerability and sensitivity of wildlife, fish, and shellfish examined the element occurrence database records provided by the NHP and selected the species to be included in the atlas. All species with state and/or federal threatened or endangered designations were included in the atlas, regardless of their vulnerability or sensitivity to oil. In addition, all species or subspecies with Global Conservation Status Ranks of G1 (critically imperiled) or G2 (imperiled), and selected species with ranks of G3 (vulnerable), were included in the atlas. The conservation status rankings approximate the risk of extinction for particular species, and are based on the species' rarity (number of populations, occurrences, and/or individuals), its population trends, and threats to its existence. These rankings were developed by The Nature Conservancy (TNC) in conjunction with the NHPs. Additional species were also included in the atlas, with an emphasis on aquatic and wetland organisms. These species are the most vulnerable and sensitive to waterborne spills. In addition, specific aquatic subgroups are recognized as top priorities for conservation. Roughly 67 percent of freshwater mussels, 65 percent of crayfish, 35 percent of amphibians, and 37 percent of freshwater fish species nationwide are considered to be at risk from extinction. Similar independent estimates of the imperilment of aquatic organisms suggest that nearly 72 percent of freshwater mussel species and 27-35 percent of freshwater fishes in North America are endangered, threatened, or of special concern.

The RSI Geographic Information System is composed of data layers (RSI, HYDRO, INDEX, MGT, SOCECON, FISH, HABITATS, NESTS, REPTILES, SHELLFSH, and T_MAMMAL), lookup tables (SOC_LUT and PNTS_LUT), and data tables (SOC_DATA, BIORES, SOURCES, and SPECIES) (Fig. 1). The base map data layers consist of the classified river reaches (RSI), hydrography, and quad boundaries. The human-use data layers are managed lands (MGT) and cultural and economic resources (SOCECON). Each biological element is stored in a separate data layer, while the attribute data are stored in composite data tables because the data structures are identical across all elements.

Each biological data layer is linked to the BIORES data table using the PNTS_LUT lookup table. The BIORES data table contains the resources at

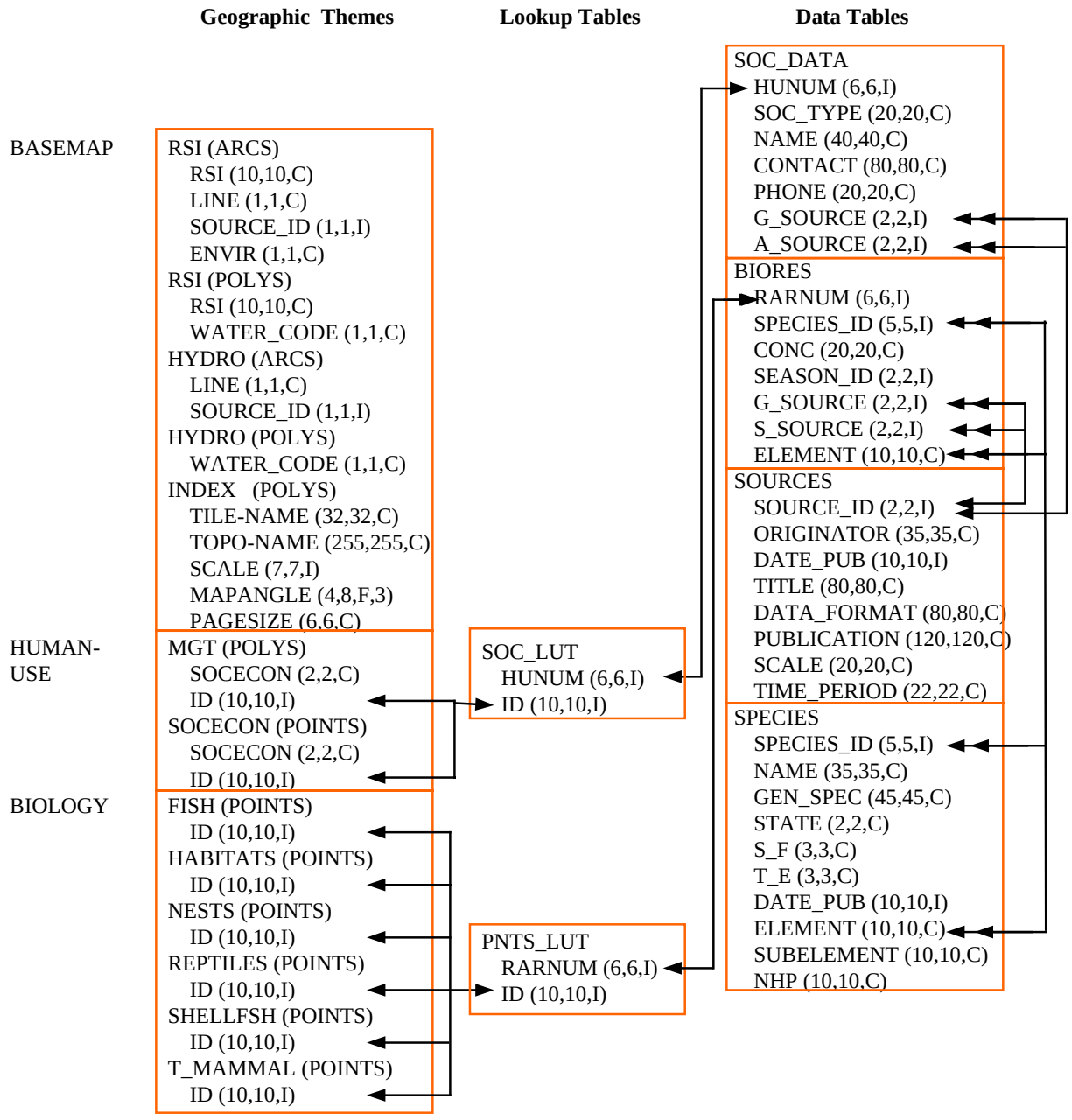

FIGURE 1. Relationships between data layers and data tables.

risk number (RARNUM), the species identification number (SPECIES_ID), the concentration (CONC), the seasonality or life stage identification number (SEASON_ID), the geographic source number (G_SOURCE), the seasonality source number (S_SOURCE), and the biology element (ELEMENT). The value of RARNUM is determined using the unique combination of SPECIES_ID, CONC, SEASON_ID, G_SOURCE, S_SOURCE, and ELEMENT.

Therefore, at each location, the combinations of species and the species characteristics determines the value of RARNUM. The numbering system eliminates data redundancy. The SPECIES_ID is a unique number within each ELEMENT and is consistently used in all ESI and RSI atlases nationwide. Therefore, within an atlas the SPECIES_ID may be found more than once, so it is important that the user identify both the SPECIES_ID and the ELEMENT and use these together to link to the SPECIES data table, which contains more details on the species. Unlike other ESI and RSI atlases, the Leaf River RSI atlas does not contain any seasonal or life stage information because it was not available at the time. Therefore, the SEASON_ID item is not used in this atlas. The G_SOURCE and S_SOURCE items do link to the SOURCES data table which details the sources.

2.4. POSITIONAL ACCURACY

2.4.1. HORIZONTAL POSITIONAL ACCURACY

2.4.1.1. HORIZONTAL POSITIONAL ACCURACY REPORT:

The RSI data uses USGS 1:100,000 topographic quadrangles as the base map. It is estimated that the RSI has a minimum mapping unit of 200 feet. The biological data sets are developed using Natural Heritage Program data. Unlike shorelines, which maintain relative spatial stability through time, the biological data by nature migrate across the landscape.

2.5. LINEAGE

2.5.1. SOURCE INFORMATION:

Coverage or theme name: FISH

2.5.1.1. SOURCE CITATION:

2.5.1.1.1. ORIGINATOR:

Gordon, Kenneth

2.5.1.1.2. PUBLICATION DATE:

199602

2.5.1.1.4. TITLE:

Mississippi Natural Heritage Program

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:

Digital ASCII

2.5.1.1.8. PUBLICATION INFORMATION:
Mississippi Department of Wildlife, Fisheries, and Parks

2.5.1.2. SOURCE SCALE DENOMINATOR:
Unknown

2.5.1.4. SOURCE TIME PERIOD:
Varies

2.5.1. SOURCE INFORMATION:
Coverage or theme name: HABITATS

2.5.1.1. SOURCE CITATION:

2.5.1.1.1. ORIGINATOR:
Gordon, Kenneth

2.5.1.1.2. PUBLICATION DATE:
199602

2.5.1.1.4. TITLE:
Mississippi Natural Heritage Program

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital ASCII

2.5.1.1.8. PUBLICATION INFORMATION:
Mississippi Department of Wildlife, Fisheries, and Parks

2.5.1.2. SOURCE SCALE DENOMINATOR:
Unknown

2.5.1.4. SOURCE TIME PERIOD:
Varies

2.5.1. SOURCE INFORMATION:
Coverage or theme name: HYDRO

2.5.1.1. SOURCE CITATION:

2.5.1.1.1. ORIGINATOR:
Research Planning, Inc.

2.5.1.1.2. PUBLICATION DATE:
1996

2.5.1.1.4. TITLE:
RSI

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital complex chains
2.5.1.1.8. PUBLICATION INFORMATION:
Leaf River RSI
2.5.1.2. SOURCE SCALE DENOMINATOR:
100000
2.5.1.4. SOURCE TIME PERIOD:
1996

2.5.1. SOURCE INFORMATION:
Coverage or theme name: HYDRO
2.5.1.1. SOURCE CITATION:
2.5.1.1.1. ORIGINATOR:
U.S. Geological Survey
2.5.1.1.2. PUBLICATION DATE:

2.5.1.1.4. TITLE:

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Hardcopy maps
2.5.1.1.8. PUBLICATION INFORMATION:

2.5.1.2. SOURCE SCALE DENOMINATOR:
100000
2.5.1.4. SOURCE TIME PERIOD:

2.5.1. SOURCE INFORMATION:
Coverage or theme name: HYDRO
2.5.1.1. SOURCE CITATION:
2.5.1.1.1. ORIGINATOR:
Libby Holcomb, EPA Region 4
2.5.1.1.2. PUBLICATION DATE:
Unknown
2.5.1.1.4. TITLE:
River Reach (RF3)

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital complex chains
2.5.1.1.8. PUBLICATION INFORMATION:
Unknown
2.5.1.2. SOURCE SCALE DENOMINATOR:
24000
2.5.1.4. SOURCE TIME PERIOD:
Unknown

2.5.1. SOURCE INFORMATION:
Coverage or theme name: INDEX
2.5.1.1. SOURCE CITATION:
2.5.1.1.1. ORIGINATOR:
Research Planning, Inc.
2.5.1.1.2. PUBLICATION DATE:
1996
2.5.1.1.4. TITLE:
Index for Leaf River RSI
2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital complex polygons
2.5.1.1.8. PUBLICATION INFORMATION:
Research Planning, Inc.
2.5.1.2. SOURCE SCALE DENOMINATOR:
100000
2.5.1.4. SOURCE TIME PERIOD:
1996

2.5.1. SOURCE INFORMATION:
Coverage or theme name: MGT
2.5.1.1. SOURCE CITATION:
2.5.1.1.1. ORIGINATOR:
Smith, Neal
2.5.1.1.2. PUBLICATION DATE:
1996
2.5.1.1.4. TITLE:
National Forest

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital complex polygons

2.5.1.1.8. PUBLICATION INFORMATION:
Mississippi Automated Resource Information System (MARIS)

2.5.1.2. SOURCE SCALE DENOMINATOR:
24000

2.5.1.4. SOURCE TIME PERIOD:
Unknown

2.5.1. SOURCE INFORMATION:
Coverage or theme name: NESTS

2.5.1.1. SOURCE CITATION:

2.5.1.1.1. ORIGINATOR:
Gordon, Kenneth

2.5.1.1.2. PUBLICATION DATE:
199602

2.5.1.1.4. TITLE:
Mississippi Natural Heritage Program

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital ASCII

2.5.1.1.8. PUBLICATION INFORMATION:
Mississippi Department of Wildlife, Fisheries, and Parks

2.5.1.2. SOURCE SCALE DENOMINATOR:
Unknown

2.5.1.4. SOURCE TIME PERIOD:
Varies

2.5.1. SOURCE INFORMATION:
Coverage or theme name: REPTILES

2.5.1.1. SOURCE CITATION:

2.5.1.1.1. ORIGINATOR:
Gordon, Kenneth

2.5.1.1.2. PUBLICATION DATE:
199602

2.5.1.1.4. TITLE:
Mississippi Natural Heritage Program
2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital ASCII
2.5.1.1.8. PUBLICATION INFORMATION:
Mississippi Department of Wildlife, Fisheries, and Parks
2.5.1.2. SOURCE SCALE DENOMINATOR:
Unknown
2.5.1.4. SOURCE TIME PERIOD:
Varies

2.5.1. SOURCE INFORMATION:
Coverage or theme name: RSI
2.5.1.1. SOURCE CITATION:
2.5.1.1.1. ORIGINATOR:
Neal Smith
2.5.1.1.2. PUBLICATION DATE:
N/A
2.5.1.1.4. TITLE:
Soils, Hydrologic Unit Boundaries Geology
2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital complex polygons
2.5.1.1.8. PUBLICATION INFORMATION:
Mississippi Automated Resource Information System (MARIS)
2.5.1.2. SOURCE SCALE DENOMINATOR:
24000
2.5.1.4. SOURCE TIME PERIOD:
Varies

2.5.1. SOURCE INFORMATION:
Coverage or theme name: RSI
2.5.1.1. SOURCE CITATION:
2.5.1.1.1. ORIGINATOR:
U.S. Geological Service, Jackson, Miss.

2.5.1.1.2. PUBLICATION DATE:
N/A
2.5.1.1.4. TITLE:
Gaging Station Data
2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital entity points
2.5.1.1.8. PUBLICATION INFORMATION:
N/A
2.5.1.2. SOURCE SCALE DENOMINATOR:
Unknown
2.5.1.4. SOURCE TIME PERIOD:
Varies

2.5.1. SOURCE INFORMATION:
Coverage or theme name: RSI
2.5.1.1. SOURCE CITATION:
2.5.1.1.1. ORIGINATOR:
Research Planning, Inc.
2.5.1.1.2. PUBLICATION DATE:
1996
2.5.1.1.4. TITLE:
RSI Field Classification
2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Hardcopy maps from overflight
2.5.1.1.8. PUBLICATION INFORMATION:
Research Planning, Inc.
2.5.1.2. SOURCE SCALE DENOMINATOR:
24000
2.5.1.4. SOURCE TIME PERIOD:
1996

2.5.1. SOURCE INFORMATION:
Coverage or theme name: RSI
2.5.1.1. SOURCE CITATION:
2.5.1.1.1. ORIGINATOR:
U.S. Geological Survey

2.5.1.1.2. PUBLICATION DATE:
Varies
2.5.1.1.4. TITLE:
Topographic quadrangles
2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Hardcopy maps
2.5.1.1.8. PUBLICATION INFORMATION:
U.S. Geological Survey
2.5.1.2. SOURCE SCALE DENOMINATOR:
100000
2.5.1.4. SOURCE TIME PERIOD:
Varies

2.5.1. SOURCE INFORMATION:
Coverage or theme name: RSI
2.5.1.1. SOURCE CITATION:
2.5.1.1.1. ORIGINATOR:
Libby Holcomb, EPA Region 4
2.5.1.1.2. PUBLICATION DATE:
Unknown
2.5.1.1.4. TITLE:
River Reach (RF3)
2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital complex chains
2.5.1.1.8. PUBLICATION INFORMATION:
Unknown
2.5.1.2. SOURCE SCALE DENOMINATOR:
24000
2.5.1.4. SOURCE TIME PERIOD:
Unknown

2.5.1. SOURCE INFORMATION:
Coverage or theme name: SHELLFSH
2.5.1.1. SOURCE CITATION:
2.5.1.1.1. ORIGINATOR:
Gordon, Kenneth

2.5.1.1.2. PUBLICATION DATE:
199602

2.5.1.1.4. TITLE:
Mississippi Natural Heritage Program

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital ASCII

2.5.1.1.8. PUBLICATION INFORMATION:
Mississippi Department of Wildlife, Fisheries, and Parks

2.5.1.2. SOURCE SCALE DENOMINATOR:
Unknown

2.5.1.4. SOURCE TIME PERIOD:
Varies

2.5.1. SOURCE INFORMATION:
Coverage or theme name: SOCECON

2.5.1.1. SOURCE CITATION:

2.5.1.1.1. ORIGINATOR:
Holcomb, Libby, EPA Region 4

2.5.1.1.2. PUBLICATION DATE:
1996

2.5.1.1.4. TITLE:
Facilities

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:
Digital entity points

2.5.1.1.8. PUBLICATION INFORMATION:
EPA Region 4, Atlanta, Ga.

2.5.1.2. SOURCE SCALE DENOMINATOR:
Unknown

2.5.1.4. SOURCE TIME PERIOD:
1996

2.5.1. SOURCE INFORMATION:

Coverage or theme name: SOCECON

2.5.1.1. SOURCE CITATION:

2.5.1.1.1. ORIGINATOR:

Cobb, David

2.5.1.1.2. PUBLICATION DATE:

1996

2.5.1.1.4. TITLE:

Surface Water Withdrawal Sites

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:

Digital entity points

2.5.1.1.8. PUBLICATION INFORMATION:

Mississippi Department of Environmental Quality, Office of Land and Water Resources

2.5.1.2. SOURCE SCALE DENOMINATOR:

Unknown

2.5.1.4. SOURCE TIME PERIOD:

1996

2.5.1. SOURCE INFORMATION:

Coverage or theme name: SOCECON

2.5.1.1. SOURCE CITATION:

2.5.1.1.1. ORIGINATOR:

Research Planning, Inc.

2.5.1.1.2. PUBLICATION DATE:

1996

2.5.1.1.4. TITLE:

Boat Ramps and Collection Points

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:

Hardcopy map

2.5.1.1.8. PUBLICATION INFORMATION:

Research Planning, Inc.

2.5.1.2. SOURCE SCALE DENOMINATOR:

24000

2.5.1.4. SOURCE TIME PERIOD:

1996

2.5.1. SOURCE INFORMATION:

Coverage or theme name: T_MAMMALS

2.5.1.1. SOURCE CITATION:

2.5.1.1.1. ORIGINATOR:

Gordon, Kenneth

2.5.1.1.2. PUBLICATION DATE:

199602

2.5.1.1.4. TITLE:

Mississippi Natural Heritage Program

2.5.1.1.6. GEOSPATIAL DATA PRESENTATION FORM:

Digital ASCII

2.5.1.1.8. PUBLICATION INFORMATION:

Mississippi Department of Wildlife, Fisheries, and Parks

2.5.1.2. SOURCE SCALE DENOMINATOR:

Unknown

2.5.1.4. SOURCE TIME PERIOD:

Varies

2.5.2. PROCESS STEP

2.5.2.1. PROCESS DESCRIPTION:

The digitization of RSI, human-use, and biological resources is a highly quality controlled process. Before conducting field work to classify the river reaches, numerous data sets were gathered, integrated, plotted, and studied to identify geomorphic qualities of the watershed. The Mississippi Automated Resource Information System (MARIS) contains a wealth of information and contributed greatly to the success of this project. However, we obtained only a limited number of data sets from MARIS and instead sought data sets available across the entire EPA Region 4 in order to be able to duplicate the methodology in other areas. Several data sets were used to develop the stream classification system: surface geology; soils; hydrologic units; watershed boundaries; and gaging station locations and data (from the USGS office in Jackson, Miss.). We were hoping that flood

plains and wetlands would be available, but at the time this project was undertaken, neither the National Wetlands Inventory nor the Federal Emergency Management Agency had available data.

The entire study area was processed using 1:100,000 USGS quadrangles and the first layer processed was the EPA River Reach RF(3) data. These data were processed into ARC/INFO® coverages and then attributed with the RSI classification system derived from annotated field work 1:24,000 USGS quadrangles. Also digitized from the field maps were collection point and boat ramp locations. Digital data came from the Mississippi Natural Heritage Program in the Mississippi Department of Wildlife, Fisheries, and Parks for all biological resources and human-use resources came digitally from the EPA (facilities), Mississippi Automated Resource Information System (national forests), and the Mississippi Department of Environmental Quality (surface water withdrawal sites). These digital data were integrated into the RSI-GIS data structure, checked using automated and visual methods, plotted and reviewed internally, and then sent out for review by regional experts. The data were edited, plotted, checked, and plotted for a final time using the USGS 1:100,000 topographic map as a gray-scale image in the background. Finally, all data were merged to form study area layers, metadata were written, and final quality control checks were made.

2.5.2.3. PROCESS DATE:

199612

2.5.2.6. PROCESS CONTACT

2.5.2.6.1. CONTACT PERSON PRIMARY

2.5.2.6.1.1. CONTACT PERSON:

Jill Petersen

2.5.2.6.1.2. CONTACT ORGANIZATION:

NOAA HMRAD

2.5.2.6.3. CONTACT POSITION:

GIS Manager

2.5.2.6.4. CONTACT ADDRESS

2.5.2.6.4.1. ADDRESS TYPE:
Physical Address

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

2.5.2.6.4.3. CITY:
Seattle

2.5.2.6.4.4. STATE OR PROVINCE:
W A

2.5.2.6.4.5. POSTAL CODE:
98115

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

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

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

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3.0. SPATIAL DATA ORGANIZATION INFORMATION

3.2. DIRECT SPATIAL REFERENCE METHOD:

Vector

3.3. POINT AND VECTOR OBJECT INFORMATION

3.3.1. SDTS TERMS DESCRIPTION:

3.3.1.1. SDTS POINT AND VECTOR OBJECT TYPE, and

3.3.1.2. POINT AND VECTOR OBJECT COUNT:

Theme	Universe Polygon	GT-Polygons	Area Points	Complete Chains	Line Segments	Entity Points	Nodes
FISH						7	
HABITATS						2	
HYDRO	1	827	827	4,572	98,755		4,182
INDEX	1	9	9	26	104		18
MGT	1	2	2	2	161		2
NESTS						21	
REPTILES						58	
RSI	1	7	7	360	11,339		368
SHELLFSH						10	
SOCECON						98	
T_MAMMAL						1	

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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:

Universal Transverse Mercator

4.1.2.1.2. MAP PROJECTION PARAMETERS:

4.1.2.1.2.1. ZONE:

16

4.1.2.1.2.2. UNITS:

Meters

4.1.4. GEODETIC MODEL

4.1.4.1. HORIZONTAL DATUM NAME:

North American Datum of 1983

4.1.4.2. ELLIPSOID NAME:

GRS1980

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5.0. ENTITY AND ATTRIBUTE INFORMATION

5.1. DETAILED DESCRIPTION: FISH

The data layer FISH contains the entity points with fish species. The fish occurrences depicted in the atlas include protected or rare darters, madtoms, and suckers. In addition to these fishes, species of fishery interest which may occur in the study area include largemouth bass, bluegill, crappie, sunfish, catfish, etc. Fish are generally at high risk during riverine spills and massive fish kills are often observed, especially when large amounts of lighter products (e.g., diesel) are spilled into smaller streams and creeks. Fish are primarily at risk when oil becomes mixed into the water column by currents, rapids, or falls, or when oil accumulates in shallow, stagnant backwaters. Although many fishes may avoid oil in the water column when possible, species or life stages (e.g., spawning adults and juveniles) associated with particular habitats and/or displaying site fidelity are at particular risk. Larval and juvenile life stages are also generally more sensitive to oil than adults.

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 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 (68), element number (2), and record number. RARNUM links to RARNUM in the BIORES data table. In the BIORES data table, the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, CONC, 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. SEASON_ID is blank for this atlas.

The following FISH species are found in the Leaf River, Mississippi RSI atlas:

SPECIES ID	NAME
279	Blue sucker
336	Pearl darter
337	Freckled darter
338	Frecklebelly madtom

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: HABITATS

The data layer HABITATS contains the entity points with plant species. Plants included in the Leaf River atlas are restricted to rare species of conservation interest. Outside of a few aquatic and wetland species, little is known concerning the relative oil sensitivities of different types of plants. In general, substantial coverage of above-ground plant parts and/or contamination of sediments or soil in the root zone can cause severe plant injury or even complete mortality. Impacts and recovery may vary depending on the time of year or season, the reproductive or life history strategy of the plant (annual or perennial, colonizer or climax), the growth form of the plant (herbaceous or woody), the type of oil or product involved, and other factors. Extensive disturbance of contaminated soils in the vicinity of rare plants or sensitive habitats should generally be limited, especially in wetland environments, to avoid working oil into the substrate. In addition, the use of destructive cleanup methods (e.g., cutting, burning, etc.) should be carefully evaluated. Finally, disturbance, cutting, trampling, etc. of rare plants should be avoided during response activities such as gaining access to remote sites, staging equipment, etc.

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 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 (68), element number (3), and record number. RARNUM links to RARNUM in the BIORES data table. In the BIORES data look up table, the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, CONC, 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. SEASON_ID is blank for this atlas.

The following HABITAT species are found in the Leaf River, Mississippi RSI atlas:

SPECIES ID	NAME
211	Southern three-awned grass
212	Pine barren ruellia

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

5.1. DETAILED DESCRIPTION: HYDRO

The data layer HYDRO contains polygonal water and land features as well as linear features for rivers and streams. The LINE, SOURCE_ID, and WATER_CODE attributes are the same as in the RSI coverage.

5.1.1. ENTITY TYPES:

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

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:
nominal

5.1.2.1. ATTRIBUTE LABEL:
LINE

5.1.2.2. ATTRIBUTE DEFINITION:
Type of geographic feature

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:
Research Planning, Inc.

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

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 RSI

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:
R	Riverine

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 polygon 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 9.

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

5.1.2.1. ATTRIBUTE LABEL:

TOPO-NAME

5.1.2.2. ATTRIBUTE DEFINITION:

USGS 1:100,000 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.

CITRONELLE, ALABAMA-MISSISSIPPI (1992)

HATTIESBURG, MISSISSIPPI-ALABAMA (1994)

LAUREL, MISSISSIPPI (1994)

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 map 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:

100000

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 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

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: MGT

The data layer MGT contains the managed lands polygons for human-use data.

5.1.1. ENTITY TYPES:

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

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

SOCECON

5.1.2.2. ATTRIBUTE DEFINITION:

Identifies polygons 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.

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
NF	National Forest

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:

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 (68), element number (11), and record number. HUNUM is the link to the

socio-economic data found in the SOC_DATA data table. The data table SOC_DATA contains the feature type (SOC_TYPE), the name of the feature (NAME), the contact agency or person (CONTACT), the telephone number (PHONE), the geographic source number (G_SOURCE), and the attribute source number (A_SOURCE).

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: NESTS

The data layer NESTS contains the entity points with bird species. Birds are divided into species subgroups based on traditional groupings and oil vulnerability/sensitivity. Bird occurrences shown in the atlas include American swallow-tailed kite (raptors) and red-cockaded woodpeckers (passerine-like birds). Swallow-tailed kites occur in swamps, along rivers, in bottomland hardwood forests, etc. They nest in trees in bottomland hardwood forests, cypress, or pine flatwoods. Swallow-tailed kites skim the water surface to drink and bathe, and may primarily be at risk to oil spills while engaging in this activity. Kites could also be impacted by disturbance in nesting areas during response operations. Red-cockaded woodpeckers live in old-growth pine flatwoods. Nest cavities are excavated in living trees infected with red heart disease. Red-cockaded woodpeckers would rarely be impacted by oil spills, unless response activities such as clearing access sites in remote areas disturbed their declining habitat. Other types of birds not included on the maps may also be at risk to oil spills. Generally, waterfowl (e.g., wood ducks and hooded mergansers) and birds that dive for prey (e.g., belted kingfisher and osprey) are at greatest risk during spills because they spend a great deal of time on or in the water or they become immersed while feeding. Wading birds may also occur in the area, and could also be impacted, usually to a lesser extent that waterfowl or diving birds.

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 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 (68), element number (5), and record number. RARNUM links to RARNUM in the BIORES data table. In the BIORES data

table, the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, CONC, 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. SEASON_ID is blank for this atlas.

The following NESTS species are found in the Leaf River, Mississippi RSI atlas:

SPECIES ID	NAME
280	Swallow-tailed kite
305	Red-cockaded woodpecker

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: REPTILES

The data layer REPTILES contains the entity points with reptile species. Reptile occurrences depicted in the Leaf River atlas include alligators, turtles, tortoises, and snakes. Amphibian occurrences include salamanders. Other amphibians are also likely to occur in the study area, including frogs and toads.

Aside from conditions of heavy oil coating, reptiles as a group are generally less sensitive to oil, as compared to most other animal groups considered here. Reptiles are exothermic, and thus do not rely on insulation from fur or feathers to maintain body temperature, a major factor which puts some types of mammals and birds at risk. Also, reptilian skin is relatively impermeable, in contrast to the more permeable skin possessed by amphibians, who may absorb toxic components of materials such as oil across the majority of their body surfaces. Furthermore, as air breathers, aquatic reptiles are not susceptible to the acute water column toxicity displayed by fishes, aquatic invertebrates, and amphibian species which rely on gills or skin surfaces for respiration. In general, smaller aquatic reptiles are usually at greater risk during spills. Primary attributes which place some aquatic reptiles at risk are reproductive: eggs and nesting behavior. Similar to bird eggs, reptiles eggs are very sensitive to oil contamination. Reptile eggs can also be quite vulnerable to spills, because many aquatic species bury their eggs in the substrate near the shoreline, on sand bars, etc. (e.g., map turtles). Small amounts of oil directly contacting egg surfaces, and oil overlying nesting cavities, have both been shown to affect hatching success and embryonic development in reptiles. Additionally, in the event of land-based spills, terrestrial reptiles which use burrows (e.g., gopher tortoise and indigo snake) may also be at high risk.

Amphibians are generally at great risk during oil spills due to their permeable skin, and the reliance of most species on aquatic and wetland habitats, especially for reproduction and juvenile life stages. Juvenile (and adult) forms relying on gills for respiration are particularly at risk from oil which becomes mixed into the water column or accumulates in shallow, stagnant, backwater areas. Forms relying on moist skin for respiration are also at high risk, as are burrowing terrestrial species. The two salamander species included in the atlas (e.g., mud salamander and red salamander) are not extremely rare, although they are considered vulnerable to extirpation within

the state of Mississippi. Both species are lungless forms relying on moist skin for respiration. Larval stages are aquatic.

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 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 (68), element number (6), and record number. RARNUM links to RARNUM in the BIORES data table. In the BIORES data lookup table, the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, CONC, 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 unknown. SEASON_ID contains a numeric value according to the monthly presence of the species. SEASON_ID is unknown for this atlas.

The following REPTILES species are found in the Leaf River, Mississippi RSI atlas:

SPECIES ID	NAME
3	American alligator
21	Gopher tortoise
22	Yellow-blotched map turtle
23	Black pine snake
24	Eastern indigo snake
25	Rainbow snake
26	Gulf crayfish snake
27	Mud salamander
28	Red salamander

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: RSI

The data layer RSI contains arc (Complete Chains) and polygonal (GT-Polygons) features for the RSI shoreline classification and is based on *A Strategy for Mapping Sensitive Resources of Rivers and Streams in EPA Region 4: Final Report* (Hazardous Materials Response and Assessment Division, NOAA, HAZMAT Report 96-11, 1996). The RSI classification was performed 3-9 March 1996.

5.1.1. ENTITY TYPES:

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

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

RSI

5.1.2.2. ATTRIBUTE DEFINITION:

Based on observations made to-date, the RSI classification relates the different types of reaches of the piedmont and coastal plain rivers and streams of the Southeastern United States to oil-spill sensitivity. The classification scale is 1-10, with the most sensitive reaches being ranked 10. Key determinants of rank were: 1) potential difficulties anticipated for containing and recovering the spilled oil; and 2) wetland sensitivity and vulnerability. A navigable stream is defined as one on which it is relatively easy to operate a motorized Jon boat or inflatable craft. The RSI classification scheme has the following characteristics:

RSI Class 1

Quiet water pools with low-sensitive banks. There are no vulnerable wetlands. Oil could be recovered from water surface or collected against low-sensitive banks.

RSI Class 2
Small, non-navigable channel with moderate currents and low-sensitive banks. There are no vulnerable wetlands. Underflow dam could be constructed or oil could be collected against low-sensitive banks.

RSI Class 3
Navigable channel with moderate currents and low-sensitive banks. There are no vulnerable wetlands. Oil could be collected against low-sensitive banks. More difficult than RSI-2.

RSI Class 4
Small, non-navigable channel with rapids over bedrock. There are no vulnerable wetlands. Oil would be moved quickly through area with water column impacts likely. Underflow dam a remote possibility if stream is small enough.

RSI Class 5
Navigable channel with rapids over bedrock. There are no vulnerable wetlands. Oil could not be collected and would move quickly through area. Water column impacts greater than those of RSI-4, with significant fish kills likely.

RSI Class 6A
Small, non-navigable channel with associated low-vulnerable *upper bottomland hardwoods*. *Upper bottomland hardwoods* and rare *cypress-tupelo swamps* present but not highly vulnerable because of elevated or remote location. Collect oil against low-sensitive channel banks.

RSI Class 6B
Navigable channel with associated low-vulnerable *upper bottomland hardwoods*. *Upper bottomland hardwoods* and rare *cypress-tupelo swamps* present but not highly vulnerable because of elevated or remote location. Collect oil against low-sensitive channel banks.

RSI Class 7

Navigable. Low gradient and variable currents (usually <1.5 knots). Wide and low flood plain. Stream hugs old valley wall with steep banks composed of muddy sediments or bedrock against the wall. Other side of channel has leakage of waters into an associated wide *cypress-tupelo swamps.* Highly sensitive wetlands present on one side of the stream that are vulnerable to oiling. It should be possible to collect oil against the low-sensitive banks adjacent to the high wall.

RSI Class 8

Navigable. Low gradient and variable currents (usually <1.5 knots) with flow mostly confined to relatively straight channel with well-defined low banks. Wide and low flood plain. Associated wide *cypress-tupelo swamps*. Highly sensitive wetlands present on both sides of stream that are vulnerable to oiling at normal high water. Because of channel confinement of the main flow of the stream, may be possible to direct oil to a collection point further downstream.

RSI Class 9A

Small, non-navigable meandering channel with abundant leakage points into associated *cypress-tupelo swamps* and ox-bows. Highly vulnerable *cypress-tupelo swamps* present on both sides of channel. Points of leakage difficult to close. Recovery and storage very difficult. Access by foot.

RSI Class 9B

Navigable meandering channel with abundant leakage points into associated *cypress-tupelo swamps* and ox-bow lakes. Highly vulnerable *cypress-tupelo swamps* present on both sides of channel. Multiple points of leakage difficult to close. Recovery and storage very difficult. Access by boat.

RSI Class 10A

Small, non-navigable anastomosing channel with abundant leakage points into adjacent *cypress-tupelo swamps*. Highly vulnerable *cypress-tupelo swamps* present on both sides of

channel. Multiple points of leakage difficult to close. Recovery and storage very difficult. Access by foot.

RSI Class 10B

Navigable anastomosing channel with abundant leakage points into associated *cypress-tupelo swamps*. Highly vulnerable *cypress-tupelo swamps* present on both sides of channel. Multiple entry points of leakage difficult to close. Recovery and storage very difficult. Access by boat.

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:
1	Quiet water pools with low-sensitive banks
2	Small, non-navigable channel with moderate currents and low sensitive banks
3	Navigable channel with moderate currents and low-sensitive banks
4	Small, non-navigable channel with rapids over bedrock
5	Navigable channel with rapids over bedrock
6A	Small, non-navigable channel with associated low-vulnerable upper bottomland hardwoods
6B	Navigable channel with associated low-vulnerable upper bottomland hardwoods
9A	Small, non-navigable meandering channel with abundant leakage points into associated cypress-tupelo swamps and ox-bows
9B	Navigable meandering channel with abundant leakage points into associated cypress-tupelo swamps and ox-bow lakes
10B	Navigable anastomosing channel with abundant leakage points into associated cypress-tupelo swamps

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
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 EPA River Reach (RF3)

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:
ENVIR

5.1.2.2. ATTRIBUTE DEFINITION:
Regional environment

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:
R	Riverine

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. All polygons must be attributed and all RSI values are "U"

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:

nominal

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5.1. DETAILED DESCRIPTION: SHELLFSH

The data layer SHELLFSH contains the entity points with shellfish species. Shellfish occurrences depicted in the Leaf River atlas include freshwater mussels and crayfish. The Southeastern United States contains the most diverse assemblage of native freshwater mussels in the world. Unfortunately, an estimated 67-72 percent of freshwater mussel species nationwide are at risk from extinction, and roughly 10 percent of species have become extinct in the past 100 years, including many in the southeast. As compared to other aquatic invertebrates and fish, freshwater mussels may be less likely to experience acute toxicity and mortality due to short term exposure to oil spills, although mortality or significant injury could certainly occur under heavy concentrations or chronic exposures, especially if mussels are already stressed due to other environmental factors. Bivalves can uptake hydrocarbons from the water column, concentrate them in their tissues, and depurate over time. This characteristic, and the fact that they are largely sedentary, makes freshwater mussels popular study organisms to assess the degree and duration of hydrocarbon exposure and impact in aquatic ecosystems and species. Wild mussels may be harvested from the field and analyzed, or test animals may be placed in cages in-situ for monitoring purposes. Due to the protected status of some mussel species, and the rarity or imperilment of many others, sampling programs should be careful not to harvest or disturb species of conservation interest or concern. Also, exotic (non-native) bivalve species should not be introduced as monitoring organisms into water bodies where they are not already present, as competition with exotics is one factor leading to the decline of many native species. In addition, response activities which could result in sedimentation, siltation, or physical damaging of mussel beds should be avoided.

Similar to the mussels, crayfish are relatively imperiled in comparison to other major animal groups considered here, with roughly 65 percent of crayfish species nationwide at risk from extinction. Crayfish occur in a variety of aquatic habitats in the southeast including streams, ditches, ponds, wetlands, seepage areas, etc. In addition, most crayfish will burrow in response to drought conditions or low water levels, and many species build and use burrows frequently, regardless of hydrologic conditions. Other crayfish species are largely restricted to burrows, and some even occur in

habitats considered to be more terrestrial than aquatic. Crayfish in aquatic environments are somewhat similar to fish in oil sensitivity and vulnerability, with oil mixed into the water column or stranded in shallow stagnant waters presenting major threats, especially for species associated or restricted to specific habitats. Crayfish using or restricted to burrows are additionally at risk. Oil entering the burrows would likely extensively contaminate and kill most crayfish. In addition, oil which penetrates invertebrate burrows can be extremely persistent and difficult to remove, perhaps resulting in long-term contamination of the habitat, especially where heavier oils are involved.

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 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 (68), element number (7), and record number. RARNUM links to RARNUM in the BIORES data table. In the BIORES data table, the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, CONC, 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 unknown. SEASON_ID contains a numeric value according to the monthly presence of the species. SEASON_ID is unknown for this atlas.

The following SHELLFSH species are found in the Leaf River, Mississippi RSI atlas:

SPECIES ID	NAME
103	Camp Shelby burrowing crawfish
104	Mississippi pigtoe
105	White heelsplitter
106	Alabama spike
107	Squawfoot
108	Alabama hickorynut

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: SOCECON

The coverage SOCECON contains the 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:	
Entity Points	SOCECON	character
	ID	integer

5.1.2. ATTRIBUTES:

5.1.2.1. ATTRIBUTE LABEL:

SOCECON

5.1.2.2. ATTRIBUTE DEFINITION:

Identifies a 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. Collection points have additional data in the SOC_DATA table where they can be cut banks, sandy banks, or point bars.

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:
BR	Boat Ramp
CP	Collection Point
OF	Oil Facility
WI	Water Intake

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:

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 (68), element number (10), and record number. HUNUM is the link to the socio-economic data found in the SOC_DATA data table. The data table SOC_DATA contains the feature type (SOC_TYPE), the name of the feature (NAME), the contact agency or person (CONTACT), the telephone number (PHONE), the geographic source number (G_SOURCE), and the attribute source number (A_SOURCE).

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: T_MAMMAL

The data layer T_MAMMAL contains the points with terrestrial mammal species. Terrestrial mammals included in the Leaf River atlas are limited to the Louisiana black bear. Black bears use terrestrial habitats and wetland areas such as swamps. Black bears will also wade in streams and shallow lakes while preying on fish. Though not shown on the maps, small, semi-aquatic, fur-bearing mammals such as river otter, beaver, muskrat, and mink are usually at greatest risk during oil spills. These types of species can be severely impacted by swimming through oil slicks or coming into contact with oiled vegetation or debris. Oiling of small, semi-aquatic, fur-bearers reduces the buoyancy, water repellency, and insulation provided by the fur, and may result in death by drowning or hypothermia. Grooming of oiled fur may also result in ingestion of oil resulting in irritation, sickness, or death.

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 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 (68), element number (9), and record number. RARNUM links to RARNUM in the BIORES data table. In the BIORES data table, the value of RARNUM is determined for each unique combination of ELEMENT, SPECIES_ID, SEASON_ID, CONC, 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 unknown. SEASON_ID contains a numeric value according to the monthly presence of the species. SEASON_ID for this atlas is unknown.

The following T_MAMMAL species are found in the Leaf River, Mississippi RSI atlas:

SPECIES ID	NAME
102	Louisiana black bear

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:

Research Planning, Inc.

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:

nominal

6.0. DISTRIBUTION INFORMATION

6.1. DISTRIBUTOR

6.1.1. CONTACT PERSON PRIMARY

6.1.1.1. CONTACT PERSON:
Robert Pavia

6.1.1.2. CONTACT ORGANIZATION:
NOAA

6.1.4. CONTACT ADDRESS

6.1.4.1. ADDRESS TYPE:
Physical Address

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

6.1.4.3. CITY:
Seattle

6.1.4.4. STATE OR PROVINCE:
W A

6.1.4.5. POSTAL CODE:
98115

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

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

6.2. RESOURCE DESCRIPTION:
ESI Atlas for Leaf River, Mississippi Watershed

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:
19961202

7.2. METADATA REVIEW DATE:
19970128

7.4. METADATA CONTACT

7.4.1. CONTACT PERSON PRIMARY

7.4.1.1. CONTACT PERSON:
Jill Petersen

7.4.1.2. CONTACT ORGANIZATION:
NOAA HMRAD

7.4.3. CONTACT POSITION:
GIS Manager

7.4.4. CONTACT ADDRESS

7.4.4.1. ADDRESS TYPE:
Physical Address

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

7.4.4.3. CITY:
Seattle

7.4.4.4. STATE OR PROVINCE:
Washington

7.4.4.5. POSTAL CODE:
98115

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

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

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

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

7.6. METADATA STANDARD VERSION:
19940608

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