

# SAN FRANCISCO BAY ENVIRONMENTAL SENSITIVITY INDEX METADATA

December 1998

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**FILE DESCRIBES:** Digital data for 1998 San Francisco Bay Environmental Sensitivity Index.

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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 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.

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**1.0. IDENTIFICATION INFORMATION**

**1.1. CITATION**

**1.1.1. ORIGINATOR:**

National Oceanic and Atmospheric Administration (NOAA),  
National Ocean Service, Office of Response and Restoration,  
Hazardous Materials Response Division, Seattle, Washington and the  
State of California, Department of Fish and Game, Office of Spill  
Prevention and Response, Sacramento, California

**1.1.2. PUBLICATION DATE:**

199812

**1.1.4. TITLE:**

Sensitivity of Coastal Environments and Wildlife to Spilled Oil: San  
Francisco Bay

**1.1.5. EDITION:**

Second

**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:**

San Francisco Bay

**1.1.8. PUBLICATION INFORMATION**

**1.1.8.1. PUBLICATION PLACE:**

Seattle, Washington

**1.1.8.2. PUBLISHER:**

National Oceanic and Atmospheric Administration (NOAA),  
National Ocean Service, Office of Response and Restoration,  
Hazardous Materials Response Division, Seattle, Washington

**1.1.9. OTHER CITATION DETAILS:**

Prepared by Research Planning, Inc., Columbia, South Carolina for  
the National Oceanic and Atmospheric Administration (NOAA),  
National Ocean Service, Office of Response and Restoration,  
Hazardous Materials Response Division, Seattle, Washington and the

State of California, Department of Fish and Game, Office of Spill Prevention and Response, Sacramento, California

**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 San Francisco Bay. ESI data characterize estuarine 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 shoreline habitats of San Francisco Bay were originally mapped during overflights conducted in January 1986. They were updated onto 1:24,000 U.S. Geological Survey (USGS) topographic maps by an experienced coastal geologist in August 1996 using 1:24,000 natural-color vertical aerial photographs from NOAA. Maps for bayland habitats provided by the San Francisco Estuary Institute (SFEI) were also consulted during the shoreline classification. A series of overflights were conducted 4-6 March 1997 to verify the shoreline classification. In conjunction with the linear shoreline classification, the SFEI baylands data were used to delineate and classify polygonal habitats, including marsh types, tidal flats, and other features. The SFEI data were



originally compiled from unofficial 1985 National Wetlands Inventory (NWI) data, interjected with 1989 State Lands Commission tidal marsh polygons, updated and reviewed by experts using 1995/1996 National Aeronautic and Space Administration (NASA) aerial photography, and pre-released in November 1997. All biological resource data were obtained from a variety of data sources (detailed in this metadata report) and subsequently reviewed by local and regional experts in 1998.

#### **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:**

-122.625

###### **1.5.1.2. EAST BOUNDING COORDINATE:**

-121.75

###### **1.5.1.3. NORTH BOUNDING COORDINATE:**

38.25

###### **1.5.1.4. SOUTH BOUNDING COORDINATE:**

37.375

#### **1.6. KEYWORDS**

##### **1.6.1. THEME**

###### **1.6.1.1. THEME KEYWORD THESAURUS:**

None

###### **1.6.1.2. THEME KEYWORD:**

Sensitivity maps; ESI; coastal resources; oil spill planning; and coastal zone management

##### **1.6.2. PLACE**

###### **1.6.2.1. THESAURUS:**

None

**1.6.2.2. PLACE KEYWORD:**

San Francisco

**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 these data.

Acknowledgment of the publishers and contributing sources listed in 1.11. would be appreciated in products derived from these data.

**1.11. DATA SET CREDIT:**

This project was supported by the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, Office of Response and Restoration, Hazardous Materials Response Division, Seattle, Washington and the State of California, Department of Fish and Game, Office of Spill Prevention and Response, Sacramento, California

**1.13. NATIVE DATA SET ENVIRONMENT:**

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

birds.e00	biofile.e00	bio_lut.e00
biores.e00	breed.e00	breed_dt.e00
esi.e00	fish.e00	fishl.e00
habitats.e00	hydro.e00	index.e00
invert.e00	mgt.e00	m_mammal.e00
nests.e00	reptiles.e00	seasonal.e00
soc_dat.e00	soc_lut.e00	socecon.e00
sources.e00	species.e00	status.e00
t_mammal.e00		

The entire data set is approximately 56 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. Existing digital shoreline and wetlands data are integrated into a study-wide basemap. In order to facilitate digitizing, the entire study area is split into individual quadrangles using the INDEX data layer. The first layer of information digitized is the ESI shoreline classification. The ESI habitat ranking is compiled onto 1:24,000 USGS topographic quadrangles by a geomorphologist. The hardcopy maps are then digitized and then checked using both on-screen and hardcopy reviews. The edited maps are updated, checked once again for completeness and topological and logical consistency. Any errors in the shoreline classification are updated prior to digitization of the biological and human-use layers. All layers use the shoreline as the geographic reference so that there are no slivers in the geographic coordinates.

The hardcopy biological information is compiled onto 1:24,000 USGS topographic quadrangles by a biological expert using data from regional specialists in the form of maps, tables, charts, written descriptions of wildlife distributions, and personal interviews. Concurrently, digital data sources are imported, projected, checked for quality control, and integrated into the data structure. The hardcopy data are digitized, checked using both digital and on-screen procedures, integrated with existing data, 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 reviews the entire series of maps, checks all data, and makes final edits. The data are then merged to form the study-wide layers. The data merging includes a final quality control check where labels, chains, and polygons are checked for attribute accuracy.

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

After the data are delivered to NOAA, they are again subjected to a number of quality and consistency checks. In the process of checking for topological and database consistencies, new IDs and RARNUMs are also generated. The new IDs are a combination of atlas number, element number and record number. In addition, the value used to represent the element is modified to reflect the type of feature being mapped. In the case of an element that is normally represented by a point or polygon, a value of 20 is added to the standard element value for mapping of linear features. In the case where an element usually mapped as a polygon is represented by a point, a value of 30 is added to the regular element value. The RARNUMs are also modified to include the atlas number, so multiple atlases can be combined and RARNUMs remain unique. RARNUMs are redefined on an element basis so resource at risk groupings will contain only a single element.

ESI data are also processed into multiple formats to make them useful to a wider community of GIS/mapping users. Distribution formats include ARC export, MOSS and Shape files, and MARPLOT map folders. An ArcView ESI project and a MARPLOT ESI product are also included on the CDs for ease of use of the ESI data. The database files are also distributed both in the NOAA standard relational database format (see NOAA Technical Memorandum NOS ORCA 115) and in a simplified desktop flat file format. This metadata document includes information on both of these database formats. Section 3.0, outlining Spatial Data Organization, refers to the source files in ARC export format only.

**2.3. COMPLETENESS REPORT:****Shoreline Habitat Mapping:**

The intertidal habitats of San Francisco Bay were originally mapped during overflights conducted in January of 1986. They were updated onto 1:24,000 USGS topographic maps by an experienced coastal geologist in August 1996 using natural-color vertical aerial photographs. Where appropriate, multiple habitats were delineated for each shoreline segment. Portions of the coast were flown in March 1997 to verify the photo-interpretation. The aerial surveys were carried out using a fixed-wing aircraft, flying at elevations of 500-1000 feet and slow air speed. 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, boat wake, tidal action, 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 contributed the biological data. These data denote the key biological resources that are most likely at risk in the event of an oil spill. Seven major categories, or ELEMENTS, of biological resources were considered during data compilation: birds, fish, habitats/rare plants, invertebrates, marine mammals, reptiles/amphibians, and terrestrial mammals.

The ELEMENTs generally correspond to the coverage or geographic data layer names. There are also six attribute, or data tables, BIORES, BREED, SEASONAL, SOURCES, SPECIES, and STATUS, that are used to store the complex biological data (Fig. 1). Each biological coverage is linked to the Biological Resources table (BIORES) using the unique ID and the lookup table BIO\_LUT, or it can be linked directly using RARNUM. The ID is a unique combination of the atlas number (for San Francisco this is 30), an element specific number (birds are layer 1, fish are layer 2, etc.) and a unique record number. The items in BIORES include: RARNUM, SPECIES\_ID, CONC, SEASON\_ID, G\_SOURCE, S\_SOURCE, ELEMENT, EL\_SPE, and EL\_SPE\_SEA. 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 descriptive (LOW, MEDIUM, HIGH, etc.) or an actual count of the number of individuals or nests associated with a polygon or point. SEASON\_ID contains a numeric identifier for the unique monthly presence and life history characteristics of each species at a given location. There can be one seasonality record per species, or the same species can have different monthly presence or breeding activities at different sites. When this occurs, a new record with a different SEASON\_ID is referenced.

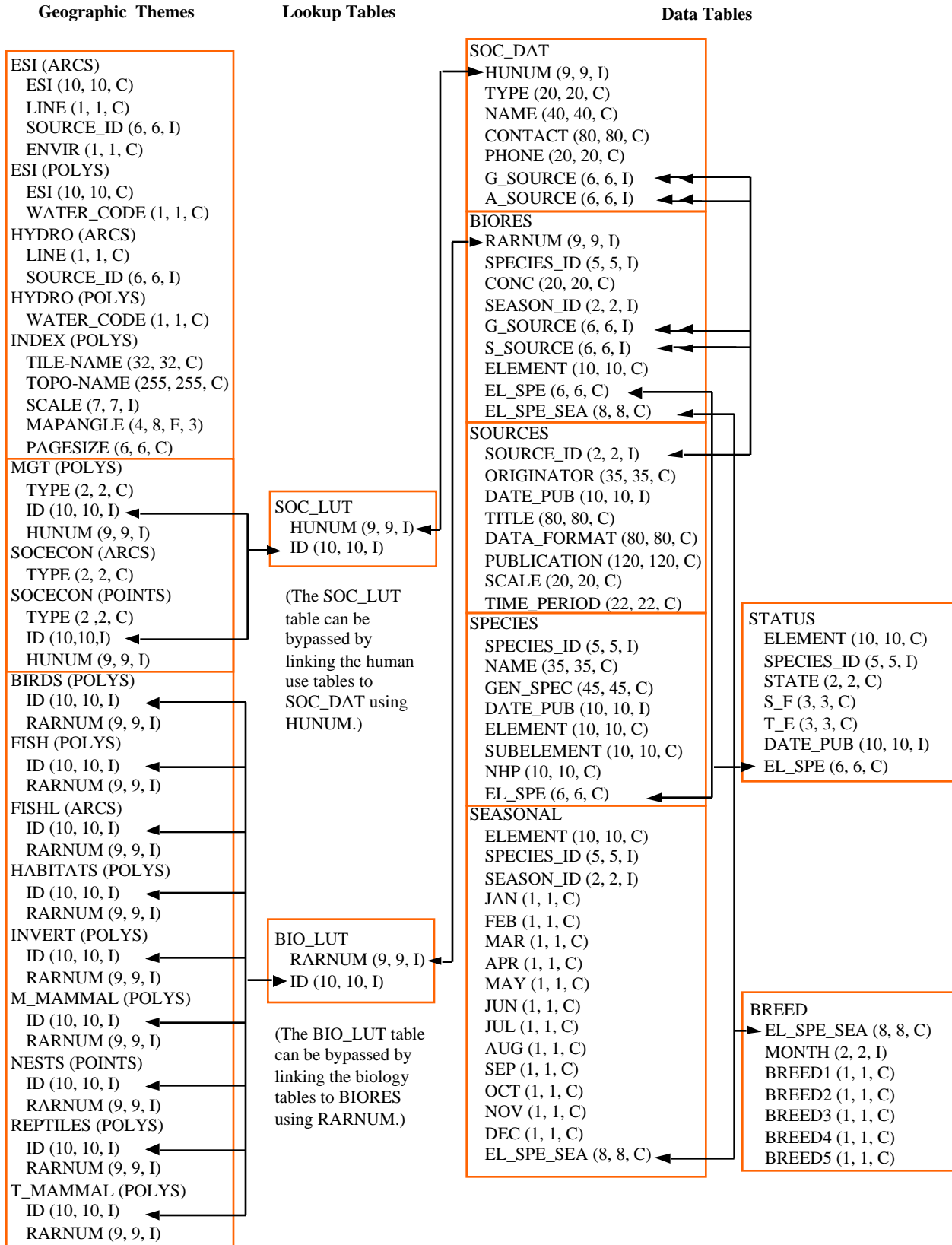


FIGURE 1. Relationship between biology data layers and attribute files.

G\_SOURCE contains the SOURCE\_ID for geographic information and S\_SOURCE contains the SOURCE\_ID for seasonality information. Both items link to the SOURCES data table. EL\_SPE is a concatenation of ELEMENT and SPECIES\_ID and links to other data tables (primarily the SPECIES table) and EL\_SPE-SEA is a concatenation of ELEMENT, SPECIES\_ID, and SEASON\_ID and links to the SEASONAL and BREED data tables.

The SPECIES data table contains the SPECIES\_ID (described above), common name (NAME), scientific name (GEN\_SPEC), date the list of Natural Heritage Program (NHP) ranks was published (DATE\_PUB), biological element (ELEMENT), biological subelement (SUBELEMENT), and the NHP global conservation status rank. The item SUBELEMENT refers to the grouping of the species:

ELEMENT	SUBELEMENT
BIRD	alcid
	diving
	gull_tern
	passerine
	raptor
	shorebird
	wading
FISH	waterfowl
	diadromous
	e_nursery
	e_resident
	freshwater
MARINE MAMMAL	m_benthic
MARINE MAMMAL	pinniped
HABITAT	algae
	plant
	submerged aquatic vegetation (sav)
	wetland
INVERTEBRATE	bivalve
	crab
	insect
	shrimp
REPTILE	amphibian
	turtle
TERRESTRIAL MAMMAL	sm_mammal



The STATUS data table contains records for each species that is threatened or endangered on state or federal lists. The items include: ELEMENT, SPECIES\_ID, STATE (two-letter state abbreviations), S\_F (state or federal status), T\_E (threatened or endangered status), DATE\_PUB, and EL\_SPE.

The SEASONAL data table stores the monthly presence of each species where each species is defined as three-character monthly abbreviations. The BIORES table is linked to the SEASONAL table using either the combination of SPECIES\_ID, ELEMENT, and SEASON\_ID items, or the item EL\_SPE\_SEA, which contains the concatenation of these items.

The BREED data table contains the life stage or life history data for each unique combination of ELEMENT, SPECIES\_ID, and SEASON\_ID (or EL\_SPE\_SEA), and up to 12 records (corresponding to each month of the year) can have different attributes and therefore separate records. The categories for each element of the items BREED1 through BREED5 are:

ELEMENT	BREED 1	BREED 2	BREED 3	BREED 4	BREED 5
BIRD	nesting	laying	hatching	fledging	
FISH	spawning	eggs	larvae	juveniles	adults
INVERT	spawning	eggs	larvae	juveniles	adults
M_MAMMAL	mating	calving	pupping	molting	
REPTILE	nesting	hatching	internesting	juveniles	adults

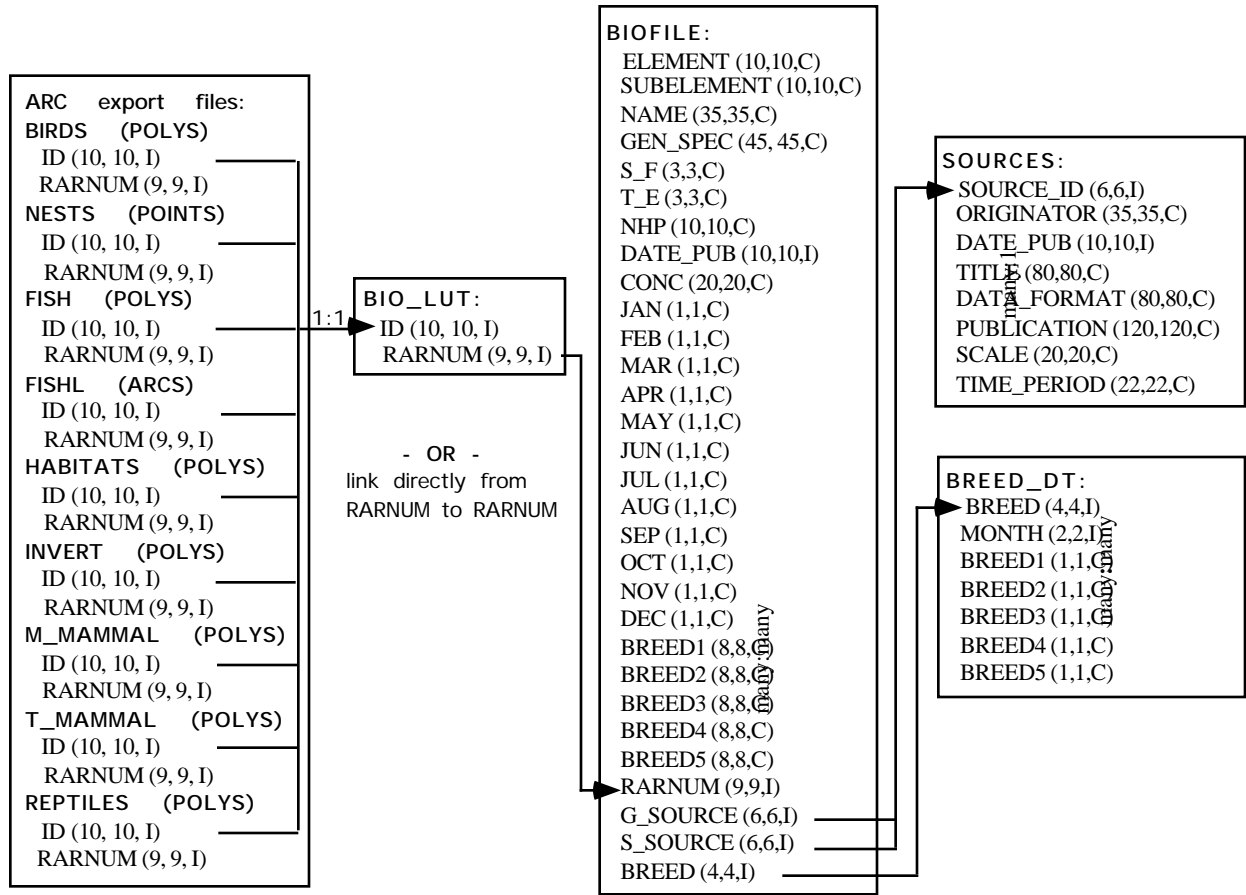
NOTE: There are no BREED variables for HABITAT and TERRESTRIAL MAMMALS.

The SOURCES data table contains metadata for each biological and human-use source listed in the ESI atlas. The items in SOURCES are: SOURCE\_ID, ORIGINATOR (author), DATE\_PUB (date of publication), TITLE (title of the data set), DATA\_FORMAT (digital type, hardcopy maps, etc.), PUBLICATION (additional citation), SCALE (source scale denominator), and TIME\_PERIOD (beginning and ending dates of original data collection). The SOURCES data table is linked to all biological and human-use data at the feature-level.

Due to the complexity of the relational database model, the biological data items are post processed into a flat file format. This file is entitled BIOFILE and it may be used in place of the relational files to ease simple data queries. The items in the flat file are ELEMENT, SUBELEMENT, NAME, GEN\_SPEC,

S\_F, T\_E, NHP, DATE\_PUB, CONC, JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC, BREED1, BREED2, BREED3, BREED4, BREED5, RARNUM, G\_SOURCE, S\_SOURCE and BREED. All of these items are the same as their counterparts in the individual files described above, except the BREED1–BREED5 items. BREED is a newly generated variable used to link to the BREED\_DT file, a modified, more compact version of the aforementioned BREED file. Breed1–Breed5 give a text summary of when each life stage occurs within that polygon. The life stages referred to are the same as those listed in the previous table. The link to the BIOFILE may be made through BIO\_LUT using ID to link to RARNUM, or it may be linked directly to the RARNUM in each of the biology cover's attribute files. As mentioned, BREED\_DT is an auxiliary support file to the flat file structure, which allows the user to do searches based on month for seasonal breeding activities. The link from the flat file to BREED\_DT is the BREED item. A second supporting data file is SOURCE. This is the same as the source file described above and the link from the flat file is both G\_SOURCE and S\_SOURCE.

It should be noted that although the flat file eases data query, it is not a normalized database structure, and actual updates performed by the states and other responsible agencies should be done using the relational files.



**FIGURE 2.** Relationship of the BIOFILE to the biological covers and the supplementary BREED\_DT and SOURCES data tables.

Human-Use Resources:

Several human-use, or socio-economic, features are included in ESI atlases. Entity points and complete chains (arcs) are digitized into the data layer SOCECON and managed area polygonal data are stored in the MGT data layer. Both data sets are linked to the data table SOC\_DAT using the SOC\_LUT lookup table and the items HUNUM and ID. ID is a concatenation of atlas number (30), element number (SOCECON = 10 and MGT = 11), and unique record number.

All features are attributed using the item SOCECON and identify the type of feature:

Entity Points		Polygons	
Feature	TYPE	Feature	TYPE
Access	A2	National Park	NP
Airport	A	State Park	P
Beach	B	Wildlife Refuge	WR
Boat Ramp	BR		
Coast Guard	CG		
Commercial Fishing	CF		
Ferry	F		
Historical Site	HS		
Hoist	H		
Lock and Dam	LD		
Marina	M		
Recreational Fishing	RF		
Water Intake	WI		
<b>Complete Chains</b>			
<b>Feature</b>	<b>TYPE</b>		
Bridge	R		

The table SOC\_DAT contains the human-use number (HUNUM), feature type (TYPE), name of the facility (NAME), contact person (CONTACT), telephone number (PHONE), geographic source (G\_SOURCE), and attribute source (A\_SOURCE).

## 2.4. POSITIONAL ACCURACY

### 2.4.1. HORIZONTAL POSITIONAL ACCURACY

#### 2.4.1.1. HORIZONTAL POSITIONAL ACCURACY REPORT:

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

**2.5. LINEAGE****2.5.1. SOURCE INFORMATION:**

Coverage or theme name: BIRDS

**2.5.1.1. SOURCE CITATION**

<b>2.5.1.1.1</b> <b>Originator</b>	<b>2.5.1.1.2</b> <b>Publication Date</b>	<b>2.5.1.1.4</b> <b>Title</b>	<b>2.5.1.1.6</b> <b>Geospatial Data Presentation Form</b>	<b>2.5.1.1.8</b> <b>Publication Information</b>	<b>2.5.1.2</b> <b>Source Scale Denominator</b>	<b>2.5.1.4</b> <b>Source Time Period</b>
J. Tarpley, California Department of Fish and Game	1998	Various Human Use and Biology Features for San Francisco Bay	Expert knowledge	None	None	1998
D. Hatch, National Park Service	1998	Various Resources for Central San Francisco Bay	Expert knowledge	None	None	1998
F. Botti, California Department of Fish and Game	1998	Salt Marsh Harvest Mouse and Other Resources of Northern San Francisco Bay	Expert knowledge	None	None	1998
J. Albertson and J. Buffa, U.S. Fish and Wildlife Service	1998	Various Biological Resources for Southern San Francisco Bay	Expert knowledge	None	None	1998
J. Hanson and T. Ryan, San Francisco Bay Bird Observatory	1998	Shorebirds and Other Bird Concentration Sites for Southern San Francisco Bay	Expert knowledge	None	None	1998
R. Jurek, California Department of Fish and Game	1998	California Least Tern Nesting Colonies	Expert knowledge	None	None	1992-1998

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<b>2.5.1.1.1</b> <b>Originator</b>	<b>2.5.1.1.2</b> <b>Publication Date</b>	<b>2.5.1.1.4</b> <b>Title</b>	<b>2.5.1.1.6</b> <b>Geospatial Data Presentation Form</b>	<b>2.5.1.1.8</b> <b>Publication Information</b>	<b>2.5.1.2</b> <b>Source Scale Denominator</b>	<b>2.5.1.4</b> <b>Source Time Period</b>
M. Fry, University of California, Davis, Avian Biology Center	1998	Additional Seabird and Wading Bird Colony Information	Expert knowledge	None	None	1998
L. Vincencio, U.S. Fish and Wildlife Service, San Pablo Bay National Wildlife Refuge	1998	Waterfowl Concentration Areas and Other Wildlife Resources for San Francisco Bay	Expert knowledge	None	None	1998
J. Evens, Avocet Research Inc.	1998	Avian Resources Associated with Marsh Habitats of the San Francisco Bay Area	Expert knowledge	None	None	1998
D. Bell, California Academy of Science	1998	Peregrine Falcon Nesting and Seasonality Information	Expert knowledge	None	None	1998
Natural Heritage Division, California Department of Fish and Game	1998	Natural Diversity Database (NDDDB)	Digital points and polys	California Department of Fish and Game, Natural Heritage Division, Sacramento, CA	Unknown	1998
D. Becker, CA Department of Fish and Game, Grizzly Island Wildlife Area	1998	Various Resources for Suisun Marsh and Grizzly Island	Expert knowledge	None	None	1998

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2.5.1.1.1  Originator	2.5.1.1.2  Publication Date	2.5.1.1.4  Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8  Publication Information	2.5.1.2 Source Scale Denomi- nator	2.5.1.4  Source Time Period
D. Feliz, California Department of Fish and Game, Grizzly Island Wildlife Area	1998	Various Resources for Suisun Marsh and Grizzly Island	Expert knowledge	None	None	1998
M. Josselyn, Wetlands Research Association	1998	Various Wetland and Wildlife Resources for San Francisco Bay	Expert knowledge	None	None	1998
J.T. Hanson, San Francisco Bay Bird Observatory	1998	Various Avian Resource Information for South San Francisco Bay	Expert knowledge	None	None	1998
University of California, Davis, Center for Avian Biology	1997	California Seabird Research Coordination Workshop (minutes)	Hardcopy text	None	None	1997
H.R. Carter, G.J. McChesney, J.E. Takekawa, L.K. Ochikubo, D.L. Whitworth, T.W. Keeney, W.R. McIver, and C.S. Strong	1996	Population Monitoring of Seabirds in California: 1993-1995 Aerial Photo- graphic Surveys of Breeding Colonies of Common Murre's, Brant's Cormorant, and Double- Crested Cormorant	Hardcopy text	U.S. Geological Survey, Biological Resources Division, California Science Center, Dixon, CA, 213 pp.	24000	1993-1996

SAN FRANCISCO BAY METADATA

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
B. Grewell, California Department of Water Resources	1994	Summary of Sensitive Plants and Wildlife Resources in Suisun Marsh During Water Years 1984-1994	Hardcopy text and maps	California Department of Water Resources, Environmental Services Office, 107 pp.	Unknown	1984-1994
Research Planning, Inc. (RPI)	1994	Sensitivity of Coastal Environments and Wildlife to Spilled Oil; Central California	Hardcopy maps and tables	California Department of Fish and Game, Office of Spill Prevention and Response, Sacramento CA and NOAA HMRAD, Seattle, WA	24000	1994
J. Tashjian (Hanson) and A.D. Kopec, San Francisco Bay Bird Observatory	1994	Habitat Sites of Wintering and Migrating Shorebirds in South San Francisco Bay	Hardcopy text and maps	San Francisco Bay Bird Observatory, Draft report for the San Francisco Estuary Project	Unknown	1992-1993
H.R. Carter, G.J. McChesney, D.L. Jaques, C.S. Strong, M.W. Parker, J.E. Takekawa, D.L. Jory, and D.L. Whitworth	1992	Breeding Populations of Seabirds in California, Volumes I and II (Draft Report)	Hardcopy text and maps	USGS, Biological Resources Division, California Science Center, Dixon, CA, 491 pp., 327 pp.	24000 80000	1989-1991
T.E. Harvey, K.J. Miller, R.L. Hothem, M.J. Rauzon, G.W. Page, and R.A. Keck	1992	Status and Trends Report on Wildlife of the San Francisco Estuary	Hardcopy text	U.S. DOI, U.S. Fish and Wildlife Service, Sacramento Enhancement Field Office, Sacramento, CA, 283 pp.	None	1992



SAN FRANCISCO BAY METADATA

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
Lewis Environmental Services, Inc. and Wetland Research Associates, Inc.	1992	Napa Salt Ponds Biological Resources	Hardcopy text and maps	Cargill Salt, Newark, CA, 59 pp.	Unknown	1992
L.M. Accurso (Vincencio)	1992	Distribution and Abundance of Wintering Waterfowl on San Francisco Bay	Hardcopy text	Master's Thesis, Humboldt State University, 252 pp.	None	1988-1990
Point Reyes Bird Observatory (PRBO)	1992	Shorebird Concentrations for the San Francisco Area	Hardcopy text and tables	Unknown	None	1988-1989
Botanical Research Group	1992	Atlas of Tidal and Formerly Tidal Wetlands in Contra Costa County, California	Hardcopy maps and tables	Botanical Research Group, Berkeley, CA, 79 pp.	12000	1989-1992
D.C. Zeiner, K.E. Mayer, et. al.	1990	California's Wildlife, Volume II: BIRDS	Hardcopy text and maps	California Department of Fish and Game, California Statewide Wildlife Habitat Relationships System, Sacramento, CA, 731 pp.	Unknown	1990

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
A.L. SOWLS, A.R. DeGange, J.W. Nelson, and G.S. Lester	1980	Catalog of California Seabird Colonies	Hardcopy text and map	Coastal Ecosystems Project, Office of Biological Services, U.S. F&W, U.S. DOI, 371 pp.	24000	1979-1980
F.C. Bellrose	1976	Ducks, Geese, and Swans of North America	Hardcopy text	Stackpole Books, Harrisburg, PA, 540 pp.	None	1976

**2.5.1. SOURCE INFORMATION:**

Coverage 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
San Francisco Estuary Institute	1997	Bayland Habitats	Digital polygons	San Francisco Estuary Institute, Richmond, CA	Unknown	1985-1996
Research Planning, Inc.	N/A	Overflight/ Photointerpreted maps	Hardcopy maps	N/A	24000	1997
Research Planning, Inc.	1994	Sensitivity of Coastal Environments and Wildlife to Spilled Oil: Central California	Hardcopy maps and tables	California Department of Fish and Game, Office of Spill Prevention and Response, Sacramento CA and NOAA HMRAD, Seattle, WA	24000	1994
United States Geological Survey (USGS)	(Various)	7.5 Minute Topographic Quadrangle Maps	Hardcopy maps	United States Geological Survey, Reston, VA	24000	(Various)

**2.5.1. SOURCE INFORMATION:**

Coverage or theme name: FISH and FISHL

**2.5.1.1. SOURCE CITATION**

<b>2.5.1.1.1</b> <b>Originator</b>	<b>2.5.1.1.2</b> <b>Publication Date</b>	<b>2.5.1.1.4</b> <b>Title</b>	<b>2.5.1.1.6</b> <b>Geospatial Data Presentation Form</b>	<b>2.5.1.1.8</b> <b>Publication Information</b>	<b>2.5.1.2</b> <b>Source Scale Denominator</b>	<b>2.5.1.4</b> <b>Source Time Period</b>
J. Albertson and J. Buffa, U.S. Fish and Wildlife Service	1998	Various Biological Resources for Southern San Francisco Bay	Expert knowledge	None	None	1998
California Department of Fish and Game, Bay-Delta Division	1998	Distribution and Concentration Areas for Various Fish and Invertebrates of San Francisco Bay	Expert knowledge	None	None	1998
D. Waters, California Department of Fish and Game, Marine Resources Division	1998	Pacific Herring Spawning Concentration and Related Resources	Expert knowledge	None	None	1998
M. Pierce and J. McLain, U.S. Fish and Wildlife Service	1998	Chinook Salmon Distribution for San Francisco Bay	Expert knowledge	None	None	1998
R. Leidy, Environmental Protection Agency	1997	Distribution of Native Fish in Bay Creeks	Hardcopy map	Pg. 19 In: State of the Estuary 1992-1997 Report, San Francisco Estuary Project, Oakland, CA, 64 pp.	Unknown	1994-1997

SAN FRANCISCO BAY METADATA

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
California State Lands Commission, Environmental Planning Division	1992	Various Fishing Areas and Brown Rockfish Distribution for San Francisco Bay	Digital arcs	California State Lands Commission, Environmental Planning Div., Sacramento, CA	24000-80000	Varies
M. Monaco, D. Nelson, R. Emmet, and S. Hinton	1990	Distribution and Abundance of Fishes and Invertebrates in West Coast Estuaries: Volume I	Hardcopy tables	ELMR Report No. 4, Strategic Assessment Branch, NOS/NOAA, Rockville, MD, 240 pp.	None	1990

**2.5.1. SOURCE INFORMATION:**

Coverage or theme name: HABITATS

**2.5.1.1. SOURCE CITATION**

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denominator	2.5.1.4 Source Time Period
F. Botti, California Department of Fish and Game	1998	Saltmarsh Harvest Mouse and Other Resources of Northern San Francisco Bay	Expert knowledge	None	None	1998
J. Albertson and J. Buffa, U.S. Fish and Wildlife Service	1998	Various Biological Resources for Southern San Francisco Bay	Expert knowledge	None	None	1998

SAN FRANCISCO BAY METADATA

2.5.1.1.1  Originator	2.5.1.1.2  Publication Date	2.5.1.1.4  Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8  Publication Information	2.5.1.2 Source Scale Denomi- nator	2.5.1.4  Source Time Period
R. Langis, CH2M Hill	1998	Richmond- San Rafael Bridge Seismic Retrofit Project, Eelgrass Mitigation Plan	Hardcopy maps	CH2M Hill, Oakland, CA, 8 pp. + Appendix	1200	1996-1998
D. Waters, California Department of Fish and Game, Marine Resources Division	1998	Pacific Herring Spawning Concentration and Related Resources	Expert knowledge	None	None	1998
P. Baye, U.S. Fish and Wildlife Service	1998	Rare and Endangered Plant Locations for San Francisco Bay	Expert knowledge	None	None	1998
M. Josselyn, Wetlands Research Association	1998	Various Wetland and Wildlife Resources for San Francisco Bay	Expert knowledge	None	None	1998
D. Hatch, National Park Service	1998	Various Resources for Central San Francisco Bay	Expert knowledge	None	None	1998
San Francisco Estuary Institute	1997	Known Locations of Mason's Lilaeopsis in the San Francisco Estuary	Digital point	San Francisco Estuary Institute, Richmond, CA	Unknown	1993

SAN FRANCISCO BAY METADATA

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
Science Applications International Corporation and Merkel and Associates	1997	Port of Richmond Eelgrass Surveys	Hardcopy maps	SAIC, Bothell, WA and Merckell and Assoc., San Diego, CA, 27 pp.	Unknown	1997
B. Grewell, California Department of Water Resources	1994	Summary of Sensitive Plants and Wildlife Resources in Suisun Marsh, During Water Years 1984-94	Hardcopy text and maps	California Department of Water Resources, Environmental Services Office, 107 pp.	Unknown	1984-1994
California State Lands Commission, Environmental Planning Division	1992	Eelgrass Beds for San Francisco and San Pablo Bays	Digital polys	California State Lands Commission, Environmental Planning Div., Sacramento, CA	24000	1987
Botanical Research Group	1992	Atlas of Tidal and Formerly Tidal Wetlands in Contra Costa County, Calif.	Hardcopy maps and tables	Botanical Research Group, Berkeley, CA, 79 pp.	12000	1989-1992
S.W. Echeverria and P.J. Rutten	1989	Inventory of Eelgrass ( <i>Zostera marina</i> L.) in San Francisco/San Pablo Bays	Hardcopy maps	NMFS, Southwest Region, Administrative Report SWR-89-05, 18 pp.	Unknown	1987

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denominator	2.5.1.4 Source Time Period
M. Emmett	(Unknown)	Eelgrass ( <i>Zostera marina</i> L.) Distribution Adjacent to the Eastshore State Park	Hardcopy maps	Senior Thesis, University of California, Berkeley, 48 pp.	Approx. 1"=4/5 Nautical Miles	1995-1996

**2.5.1. SOURCE INFORMATION:**

Coverage or theme name: HYDRO

**2.5.1.1. SOURCE CITATION**

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denominator	2.5.1.4 Source Time Period
San Francisco Estuary Institute	1997	Bayland Habitats	Baylands coverage	San Francisco Estuary Institute, Richmond, CA	Unknown	1985-1996
Research Planning, Inc.	N/A	Overflight/ Photointerpreted maps	Hardcopy maps	N/A	24000	1997
Research Planning, Inc.	1994-1995	Sensitivity of Coastal Environments and Wildlife to Spilled Oil: Central California	Hardcopy maps and tables	California Department of Fish and Game, Office of Spill Prevention and Response, Sacramento CA and NOAA HMRAD, Seattle, WA	24000	1994
United States Geological Survey (USGS)	(Various)	7.5 Minute Topographic Quadrangle Maps	Hardcopy maps	United States Geological Survey, Reston, VA	24000	(Various)

**2.5.1. SOURCE INFORMATION:**

Coverage or theme name: INDEX

**2.5.1.1. SOURCE CITATION**

<b>2.5.1.1.1</b>	<b>2.5.1.1.2</b>	<b>2.5.1.1.4</b>	<b>2.5.1.1.6</b>	<b>2.5.1.1.8</b>	<b>2.5.1.2</b>	<b>2.5.1.4</b>
<b>Originator</b>	<b>Publication Date</b>	<b>Title</b>	<b>Geospatial Data Presentation Form</b>	<b>Publication Information</b>	<b>Source Scale Denominator</b>	<b>Source Time Period</b>
Research Planning, Inc.	1998	Map Index	Complex polygons	NOAA	24000	1998

**2.5.1. SOURCE INFORMATION:**

Coverage or theme name: INVERT

**2.5.1.1. SOURCE CITATION**

<b>2.5.1.1.1</b>	<b>2.5.1.1.2</b>	<b>2.5.1.1.4</b>	<b>2.5.1.1.6</b>	<b>2.5.1.1.8</b>	<b>2.5.1.2</b>	<b>2.5.1.4</b>
<b>Originator</b>	<b>Publication Date</b>	<b>Title</b>	<b>Geospatial Data Presentation Form</b>	<b>Publication Information</b>	<b>Source Scale Denominator</b>	<b>Source Time Period</b>
California Department of Fish and Game, Bay-Delta Division	1998	Distribution and Concentration Areas for Various Fish and Invertebrates of San Francisco Bay	Expert knowledge	None	None	1998
D. Hatch, National Park Service	1998	Various Resources for Central San Francisco Bay	Expert knowledge	None	None	1998
J. Tarpley, California Department of Fish and Game	1998	Various Human Use and Biology Features for San Francisco Bay	Expert knowledge	None	None	1998
J. Albertson and J. Buffa, U.S. Fish and Wildlife Service	1998	Various Biological Resources for Southern San Francisco Bay	Expert knowledge	None	None	1998



2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denominator	2.5.1.4 Source Time Period
J. Hanson and T. Ryan, San Francisco Bay Bird Observatory	1998	Shorebirds and Other Bird Concentration Sites for Southern San Francisco Bay	Expert knowledge	None	None	1998
M. Monaco, D. Nelson, R. Emmet, and S. Hinton	1990	Distribution and Abundance of Fishes and Invertebrates in West Coast Estuaries, Volume I	Hardcopy tables	ELMR Report No. 4, Strategic Assessment Branch, NOS/NOAA, Rockville, MD, 240 pp.	None	1990

**2.5.1. SOURCE INFORMATION:**  
Coverage or theme name: MGT

**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
East Bay Regional Parks	1998	East Bay Regional Parklands	Digital polys	East Bay Regional Parks GIS	Unknown	Unknown
California Department of Fish and Game, Natural Heritage Division, Lands and Natural Areas Program	1996	California Department of Fish and Game Lands	Digital polys	California Department of Fish and Game, Natural Heritage Division, Lands and Natural Areas Program, Sacramento, CA	Various	Various

SAN FRANCISCO BAY METADATA

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
Stephen P. Teale Data Center	1995	Government Ownership Datalayer	Digital polys	Teale Data Center, GIS Solutions Group, Sacramento, CA	100000	1995
U.S. Fish and Wildlife Service, Realty Division	1992	Antioch Dunes, San Pablo Bay, and Marin Islands National Wildlife Refuge Real Estate Maps	Hardcopy maps	U.S. Fish and Wildlife Service, Realty Division, Portland, OR	Various	Various
U.S. Fish and Wildlife Service, Realty Division	1990	San Francisco Bay National Wildlife Refuge Potential Additions, Appendix D	Hardcopy maps	U.S. Fish and Wildlife Service, Realty Division, Portland, OR	Approx. 1"=2/3 MI	1990
United States Geological Survey (USGS)	(Various)	7.5 Minute Topographic Quadrangle Maps	Hardcopy maps	United States Geological Survey, Reston, VA	24000	(Various)

**2.5.1. SOURCE INFORMATION:**

Coverage or theme name: M\_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
D.A. Kopec, Earth Island Institute	1998	Additional Harbor Seal Information	Expert knowledge	None	None	1998

2.5.1.1.1  Originator	2.5.1.1.2  Publication Date	2.5.1.1.4  Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8  Publication Information	2.5.1.2 Source Scale Denomi- nator	2.5.1.4  Source Time Period
D.A. Kopec and J.T. Harvey	1995	Toxic Pollutants, Health Indices, and Population Dynamics of Harbor Seals in San Francisco Bay	Hardcopy text	Moss Landing Marine Laboratories, Technical Publication 96- 4, Moss Landing, CA, 138 pp.	None	1989-1992
J.T. Harvey and M.L. Torok	1994	Movements, Dive Behaviors, and Food Habits of Harbor Seals in San Francisco Bay, California	Hardcopy maps	Moss Landing Marine Laboratories, Moss Landing, CA, 90 pp.	Unknown	1990-1994
D.C. Zeiner, K.E. Mayer, et. al	1990	California's Wildlife, Volume III: Mammals	Hardcopy text and maps	California Department of Fish and Game, California Statewide Wildlife Habitat Relationships System, Sacramento, CA. 407 pp.	Unknown	1990

**2.5.1. SOURCE INFORMATION:**

Coverage or theme name: NESTS

**2.5.1.1. SOURCE CITATION**

<b>2.5.1.1.1</b> <b>Originator</b>	<b>2.5.1.1.2</b> <b>Publication Date</b>	<b>2.5.1.1.4</b> <b>Title</b>	<b>2.5.1.1.6</b> <b>Geospatial Data Presentation Form</b>	<b>2.5.1.1.8</b> <b>Publication Information</b>	<b>2.5.1.2</b> <b>Source Scale Denominator</b>	<b>2.5.1.4</b> <b>Source Time Period</b>
J. Kelly, Audobon Canyon Ranch	1998	Heron and Egret Nesting Colonies North of Yerba Buena Island	Hardcopy text	Unknown	None	1998
D.C. Zeiner, K.E. Mayer, et. al	1990	California's Wildlife, Volume II: BIRDS	Hardcopy text and maps	California Department of Fish and Game, California Statewide Wildlife Habitat Relationships System, Sacramento, CA, 731 pp.	N/A	1990

**2.5.1. SOURCE INFORMATION:**

Coverage or theme name: REPTILES

**2.5.1.1. SOURCE CITATION**

<b>2.5.1.1.1</b> <b>Originator</b>	<b>2.5.1.1.2</b> <b>Publication Date</b>	<b>2.5.1.1.4</b> <b>Title</b>	<b>2.5.1.1.6</b> <b>Geospatial Data Presentation Form</b>	<b>2.5.1.1.8</b> <b>Publication Information</b>	<b>2.5.1.2</b> <b>Source Scale Denominator</b>	<b>2.5.1.4</b> <b>Source Time Period</b>
J. Albertson and J. Buffa, U.S. Fish and Wildlife Service	1998	Various Biological Resources for Southern San Francisco Bay	Expert knowledge	None	None	1998
B. Grewell, California Department of Water Resources	1994	Summary of Sensitive Plants and Wildlife Resources in Suisun Marsh, During Water Years 1984-94	Hardcopy text and maps	California Department of Water Resources, Environmental Services Office, 107 pp.	Unknown	1984-1994

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
Wetlands Ecosystem Goals Project	1997	San Francisco Bay Area Wetlands Ecosystem Goals Project: Draft Species Narratives for Mammals, Amphibians, and Reptiles	Hardcopy text	(Unpublished)	None	1997

**2.5.1. SOURCE INFORMATION:**

Coverage 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
J. Tarpley, California Department of Fish and Game	1998	Various Human Use and Biology Features for San Francisco Bay	Expert knowledge	None	None	1998
East Bay Regional Parks	1998	East Bay Regional Parklands	Digital polys	East Bay Regional Parks GIS	Unknown	Unknown
Research Planning, Inc. (RPI)	1998	Boat Ramps and Marinas as Seen from Aerial Photographs	Hardcopy maps	None	24000	1998
United States Coast Guard (USCG)	1997	Area Contingency Plan for CA North and Central Coasts, and San Francisco Bay and Delta	Hardcopy tables	USCG, Marine Safety Office, San Francisco Bay, Alameda, CA	None	1997

SAN FRANCISCO BAY METADATA

2.5.1.1.1  Originator	2.5.1.1.2  Publication Date	2.5.1.1.4  Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8  Publication Information	2.5.1.2 Source Scale Denomi- nator	2.5.1.4  Source Time Period
California State AAA Automobile Association	1996	California State AAA City and County Maps for the San Francisco Bay Area	Hardcopy maps	California State AAA Automobile Association, San Francisco, CA	2640	1996
California Department of Fish and Game, Natural Heritage Division, Lands and Natural Areas Program	1996	California Department of Fish and Game Lands	Digital polys	California Department of Fish and Game, Natural Heritage Division, Lands and Natural Areas Program, Sacramento, CA	Various	Various
Stephen P. Teale Data Center	1995	Government Ownership Datalayer	Digital polys	Teale Data Center, GIS Solutions Group, Sacramento, CA	100000	1995
California State Lands Commission, Environmental Planning Division	1994	San Francisco Bay Area Recreational Pier and Marina Locations	Digital point	California State Lands Commission, Environmental Planning Division, Sacramento, CA	24000	1976-1992
California State Lands Commission, Environmental Planning Division	1992	Various Fishing Areas and Brown Rockfish Distribution for San Francisco Bay	Digital polys and arcs	California State Lands Commission, Environmental Planning Division, Sacramento, CA	24000-80000	Various

2.5.1.1.1 Originator	2.5.1.1.2 Publication Date	2.5.1.1.4 Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8 Publication Information	2.5.1.2 Source Scale Denominator	2.5.1.4 Source Time Period
U.S. Fish and Wildlife Service, Realty Division	1992	Antioch Dunes, San Pablo Bay, and Marin Islands National Wildlife Refuge Real Estate Maps	Hardcopy maps	U.S. Fish and Wildlife Service, Realty Division, Portland, OR	Various	Various
U.S. Fish and Wildlife Service, Realty Division	1990	San Francisco Bay National Wildlife Refuge Potential Additions, Appendix D	Hardcopy maps	U.S. Fish and Wildlife Service, Realty Division, Portland, OR	Approx. 1" = 2/3 MI	1990
DeLorme Mapping Company	1988	Northern California Atlas and Gazetteer, 2nd Edition	Hardcopy maps	DeLorme Mapping, Freeport, ME, 127 pp.	150000	1988
United States Geological Survey (USGS)	(Various)	7.5 Minute Topographic Quadrangle Maps	Hardcopy maps	United States Geological Survey, Reston, VA	24000	(Various)

**2.5.1. SOURCE INFORMATION:**

Coverage 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
F. Botti, California Department of Fish and Game	1998	Saltmarsh Harvest Mouse and Other Resources of Northern San Francisco Bay	Expert knowledge	None	None	1998

SAN FRANCISCO BAY METADATA

2.5.1.1.1  Originator	2.5.1.1.2  Publication Date	2.5.1.1.4  Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8  Publication Information	2.5.1.2 Source Scale Denomi- nator	2.5.1.4  Source Time Period
J. Albertson and J. Buffa, U.S. Fish and Wildlife Service	1998	Various Biological Resources for Southern San Francisco Bay	Expert knowledge	None	None	1998
D. Becker, CA Department of Fish and Game, Grizzly Island Wildlife Area	1998	Various Resources for Suisun Marsh and Grizzly Island	Expert knowledge	None	None	1998
D. Feliz, California Department of Fish and Game, Grizzly Island Wildlife Area	1998	Various Resources for Suisun Marsh and Grizzly Island	Expert knowledge	None	None	1998
M. Josselyn, Wetlands Research Association	1998	Various Wetland and Wildlife Resources for San Francisco Bay	Expert knowledge	None	None	1998
Wetlands Ecosystem Goals Project	1997	San Francisco Bay Area Wetlands Ecosystem Goals Project: Draft Species Narratives for Mammals, Amphibians, and Reptiles	Hardcopy text	(Unpublished)	None	1997
B. Grewell, California Department of Water Resources	1994	Summary of Sensitive Plants and Wildlife Resources in Suisun Marsh, During Water Years 1984-1994	Hardcopy text and maps	California Department of Water Resources, Environmental Services Office, 107 pp.	Unknown	1984-1994



2.5.1.1.1  Originator	2.5.1.1.2  Publication Date	2.5.1.1.4  Title	2.5.1.1.6 Geospatial Data Presentation Form	2.5.1.1.8  Publication Information	2.5.1.2 Source Scale Denomi- nator	2.5.1.4  Source Time Period
Botanical Research Group	1992	Atlas of Tidal and Formerly Tidal Wetlands in Contra Costa County, California	Hardcopy maps and tables	Botanical Research Group, Berkeley, CA, 79 pp.	12000	1989-1992
D.C. Zeiner, K.E. Mayer, et. al.	1990	California's Wildlife, Volume III: Mammals	Hardcopy text and maps	California Department of Fish and Game, California Statewide Wildlife Habitat Relationships System, Sacramento, CA, 407 pp.	Unknown	1990

**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 the map index data layer. The first layer of information digitized was the shoreline with ESI classification. The digital shoreline was attributed with the ESI classification during fieldwork, checked for completeness, topological and logical consistency, and edited for any errors using the original overflight maps. Any errors in the shoreline classification were updated prior to digitization of the biological and human-use layers. All data use the shoreline as the geographic reference so that there are no slivers in the geographic layers. The biological information was compiled onto 1:24,000 USGS topographic quadrangles using the data from regional specialists in the form of verbal discussions, maps, tables, charts, and written

descriptions of wildlife distributions. Concurrently, all digital data were imported, merged into the spatial data structure, and checked for completeness. The hardcopy data were digitized, merged with existing digital data, checked using both digital and on-screen procedures, plotted, checked by the biological expert, edited to remove any errors, and plotted for review by the regional specialists. The reviewed maps were updated on the computer, checked once again, and plotted at final map scale. A team of specialists reviewed the entire series of maps, checked all data, and made final edits. The data were merged to form the study-wide layers that are described in this document. The data merging included a final quality control check where topological consistency, rules for geography, and database to geography were checked and validated for all relationships.

**2.5.2.3. PROCESS DATE:**

199702-199811

**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, Office of Response and  
Restoration

**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.

**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:**

98115-6349

**2.5.2.6.5. CONTACT VOICE TELEPHONE:**

(206) 526-6944

**2.5.2.6.7. CONTACT FACSIMILE TELEPHONE:**

(206) 526-6329

**2.5.2.6.8. CONTACT ELECTRONIC MAIL ADDRESS:**

jill\_petersen@hazmat.noaa.gov.us

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**3.0. SPATIAL DATA ORGANIZATION INFORMATION****3.2. DIRECT SPATIAL REFERENCE METHOD:**

Vector

**3.3. POINT AND VECTOR OBJECT INFORMATION****3.3.1. SDTS TERMS DESCRIPTION:****3.3.1.1. SDTS POINT AND VECTOR OBJECT TYPE, and****3.3.1.2. POINT AND VECTOR OBJECT COUNT:**

Theme	Universe Polygon	GT-Polygons	Area Points	Complete Chains	Line Segments	Label Points	Entity Points	Nodes
BIRDS	1	1,216	1,216	2,834	221,823			2,005
ESI	1	1,270	1,270	5,247	199,876			4,408
FISH	1	595	595	1,386	204,311			1,109
FISHL				20	5,440			1,008
HABITATS	1	230	230	352	57,834			295
HYDRO	1	524	524	3,211	177,536	191		3,227
INDEX	1	27	27	72	72			46
INVERT	1	605	605	1,433	174,679			1,130
MGT	1	200	200	281	17,556			217
M_MAMMAL	1	22	22	24	4,513			24
NESTS							21	
REPTILES	1	11	11	16	4,611			16
SOCECON				17	53		322	117
T_MAMMAL	1	326	326	611	111,136			554

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**4.0. SPATIAL REFERENCE INFORMATION**

**4.1. HORIZONTAL COORDINATE SYSTEM DEFINITION**

**4.1.1. GEOGRAPHIC**

**4.1.1.1. LATITUDE RESOLUTION:**

0.00005

**4.1.1.2. LONGITUDE RESOLUTION:**

0.00005

**4.1.1.3. GEOGRAPHIC COORDINATE UNITS:**

Decimal Degrees

**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

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**5.0. ENTITY AND ATTRIBUTE INFORMATION**

**5.1. DETAILED DESCRIPTION: BIO\_LUT**

Lookup table to link biology coverages to the BIORES data table.

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>Attributes</u>	integer RARNUM
	integer ID

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links the BIO\_LUT table to the BIORES table

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links the biology coverages to the BIO\_LUT table

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

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**5.1. DETAILED DESCRIPTION: BIOFILE**

The data table BIOFILE is a flat file format that provides all of the biology attributes contained in the relational data tables when used in conjunction with the supplementary tables BREED\_DT and SOURCES.

**5.1.1. ENTITY TYPES:****5.1.1.1. ENTITY TYPE LABEL:****5.1.1.2. ENTITY TYPE DEFINITION:**


---

<u>Attributes</u>		
	ELEMENT	character
	SUBELEMENT	character
	NAME	character
	GEN_SPEC	character
	S_F	character
	T_E	character
	NHP	character
	DATE_PUB	integer
	CONC	character
	JAN	character
	FEB	character
	MAR	character
	APR	character
	MAY	character
	JUN	character
	JUL	character
	AUG	character
	SEP	character
	OCT	character
	NOV	character
	DEC	character
	BREED1	character
	BREED2	character
	BREED3	character
	BREED4	character
	BREED5	character
	RARNUM	integer
	G_SOURCE	integer
	S_SOURCE	integer
	BREED	integer

---

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

ELEMENT

**5.1.2.2. ATTRIBUTE DEFINITION:**

Major categories of biological data

**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:**

---

BIRD	Birds
FISH	Fish
HABITAT	Habitats and Rare Plants
INVERT	Invertebrates
M_MAMMAL	Marine Mammals
REPTILE	Reptiles and Amphibians
T_MAMMAL	Terrestrial Mammals

---

**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:**

SUBELEMENT

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species subgroup

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

alcid  
algae  
amphibian  
bivalve  
crab  
diadromous  
diving  
e\_nursery

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

e\_resident  
freshwater  
gull\_tern  
insect  
m\_benthic  
passerine  
pinniped  
plant  
raptor  
sav  
shorebird  
shrimp  
sm\_mammal  
turtle  
wading  
waterfowl  
wetland

---

**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:**

NAME

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species common name

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Alameda song sparrow  
American avocet  
American coot  
American white pelican  
Black oystercatcher  
Black skimmer  
Black-crowned night-heron

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Black-necked stilt  
Brandt's cormorant  
Burrowing owl  
California black rail  
California brown pelican  
California clapper rail  
California gull  
California least tern  
Canada goose  
Canvasback  
Caspian tern  
Cattle egret  
Clark's grebe  
Common moorhen  
Common murre  
Dabbling ducks  
Diving ducks  
Double-crested cormorant  
Egrets  
Forster's tern  
Golden eagle  
Great blue heron  
Great egret  
Greater white-fronted goose  
Gulls  
Heron  
Killdeer  
Little blue heron  
Northern harrier  
Northern pintail  
Pelagic cormorant  
Peregrine falcon  
Pigeon guillemot  
Red-necked (Northern) phalarope  
Ruddy duck  
Saltmarsh common yellowthroat  
San Pablo song sparrow  
Shorebirds  
Short-eared owl

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Snow goose  
 Snowy egret  
 Sora  
 Suisun song sparrow  
 Terns  
 Tundra (whistling) swan  
 Virginia rail  
 Wading birds  
 Waterfowl  
 Western grebe  
 Western gull  
 Western snowy plover  
 White-tailed kite  
 American shad  
 Bat ray  
 Brown rockfish  
 California halibut  
 Chinook salmon  
 Chinook salmon (fall)  
 Chinook salmon (late fall)  
 Chinook salmon (spring)  
 Chinook salmon (winter)  
 Delta smelt  
 English sole  
 Green sturgeon  
 Leopard shark  
 Longfin smelt  
 Pacific herring  
 Rainbow trout (steelhead)  
 Sacramento perch  
 Sacramento splittail  
 Starry flounder  
 Striped bass  
 White croaker  
 White sturgeon  
 Ambiguous indian paintbrush  
 California seablite  
 Contra Costa goldfields  
 Delta tule pea

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Eelgrass  
Gracilaria  
Mason's lilaepsis  
Mojave seablite  
Nootka alkaligrass  
Point Reyes bird's-beak  
Rare plants  
Soft bird's-beak  
Suisun marsh aster  
Suisun thistle  
Vernal pool plants  
Yellowray goldfields  
Blacktail bay shrimp  
California bay shrimp  
Dungeness crab  
Japanese littleneck clam  
Mission blue butterfly  
Pacific rock crab  
Red rock crab  
Vernal pool tadpole shrimp  
California sea lion  
Harbor seal  
California tiger salamander  
Western pond turtle  
Northern river otter  
Salt-marsh harvest mouse  
Saltmarsh wandering shrew  
San Pablo vole  
Suisun ornate shrew

---

**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:**

GEN\_SPEC

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species scientific name

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Melospiza melodia pusillula  
Recurvirostra americana  
Fulica americana  
Pelecanus erythrorhynchos  
Haematopus bachmani  
Rynchops niger  
Nycticorax nycticorax  
Himantopus mexicanus  
Phalacrocorax penicillatus  
Athene cunicularia hypugea  
Laterallus jamaicensis coturniculus  
Pelecanus occidentalis californicus  
Rallus longirostris obsoletus  
Larus californicus  
Sterna antillarum browni  
Branta canadensis  
Aythya valisineria  
Sterna caspia  
Bubulcus ibis  
Aechmophorus clarkii  
Gallinula chloropus  
Uria aalge  
Phalacrocorax auritus  
Sterna forsteri  
Aquila chrysaetos  
Ardea herodias  
Ardea alba  
Anser albifrons  
Charadrius vociferus  
Egretta caerulea  
Circus cyaneus

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Anas acuta  
Phalacrocorax pelagicus  
Falco peregrinus  
Cepphus columba  
Phalaropus lobatus  
Oxyura jamaicensis  
Geothlypis trichas sinuosa  
Melospiza melodia samuelis  
Asio flammeus  
Chen caerulescens  
Egretta thula  
Porzana carolina  
Melospiza melodia maxillaris  
Cygnus columbianus  
Rallus limicola  
Aechmophorus occidentalis  
Larus occidentalis  
Charadrius alexandrinus nivosus  
Elanus leucurus  
Alosa sapidissima  
Myliobatis californica  
Sebastes auriculatus  
Paralichthys californicus  
Oncorhynchus tshawytscha (late fall)  
Oncorhynchus tshawytscha (spring)  
Oncorhynchus tshawytscha (winter)  
Oncorhynchus tshawytscha  
Oncorhynchus tshawytscha (fall)  
Hypomesus transpacificus  
Pleuronectes vetulus  
Acipenser medirostris  
Triakis semifasciata  
Spirinchus thaleichthys  
Clupea pallasii  
Oncorhynchus mykiss  
Archoplites interruptus  
Pogonichthys macrolepidotus  
Platichthys stellatus  
Morone saxatilis

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

*Genyonemus lineatus*  
*Acipenser transmontanus*  
*Castilleja ambigua*  
*Suaeda californica*  
*Lasthenia conjugens*  
*Lathyrus jepsonii jepsonii*  
*Zostera marina*  
*Gracilaria sp.*  
*Lilaeopsis masonii*  
*Suaeda moquinii*  
*Puccinellia nutkaensis*  
*Cordylanthus maritimus palustris*  
*Cordylanthus mollis mollis*  
*Aster lentus*  
*Cirsium hydrophilum hydrophilum*  
*Lasthenia glabrata*  
*Crangon nigricauda*  
*Crangon franciscorum*  
*Cancer magister*  
*Tapes philippinarum*  
*Icaricia icariodes missionensis*  
*Cancer antennarius*  
*Cancer productus*  
*Lepidurus packardi*  
*Zalophus californianus*  
*Phoca vitulina*  
*Ambystoma californiense*  
*Clemmys marmorata*  
*Lutra canadensis*  
*Reithrodontomys raviventris*  
*Sorex vagrans halicoetes*  
*Microtus californicus sanpabloensis*  
*Sorex ornatus sinuosus*

---

**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:**

S\_F

**5.1.2.2. ATTRIBUTE DEFINITION:**

State and Federal status

**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:**

F	Federally listed
S	State listed
S/F	State and Federally listed

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

USFWS, CDFG

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

T\_E

**5.1.2.2. ATTRIBUTE DEFINITION:**

Threatened and endangered status

**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:**

E	Endangered
E/E	Endangered on Federal and State lists
T	Threatened
T/T	Threatened on Federal and State lists

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

USFWS, CDFG

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

NHP

**5.1.2.2. ATTRIBUTE DEFINITION:**

Natural Heritage Program global conservation status ranking (see Master, 1991, Conservation Biology, 5:559-563, for full definitions)

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NHP

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

---

G1	Critically imperiled
G1G2	Range rank, critically imperiled to imperiled
G1T1	Critically imperiled species and subspecies
G2	Imperiled
G2G3	Range rank, imperiled to vulnerable
G2T1	Imperiled species, critically imperiled subspecies
G3	Vulnerable
G3T2	Vulnerable species, imperiled subspecies
G4	Apparently secure
G4G5	Range rank, apparently secure to secure
G4T1	Apparently secure species, critically imperiled subspecies
G4T2	Apparently secure species, imperiled subspecies
G4T2T3	Apparently secure species, subspecies rang rank of imperiled to vulnerable
G4T3	Apparently secure species, vulnerable subspecies
G5	Secure
G5T1	Secure species, critically imperiled subspecies
G5T1T2	Secure species, subspecies range rank of critically imperiled to imperiled
G5T2	Secure species, imperiled subspecies
G5T2?	Secure species, imperiled subspecies, inexact rank

---

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

NHP

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

ordinal

**5.1.2.1. ATTRIBUTE LABEL:**

DATE\_PUB

**5.1.2.2. ATTRIBUTE DEFINITION:**

Date of NHP listing

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

31998

91995

---

**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:**

CONC

**5.1.2.2. ATTRIBUTE DEFINITION:**

Relative or actual count of a species concentration at a specific location. Field is blank if no data are available.

**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

**5.1.2.1. ATTRIBUTE LABEL:**

JAN

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in January

**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:**

X

Present  
Not Present

**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:**

FEB

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in February

**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:**

X

Present  
Not Present

**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:**

MAR

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in March

**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:**

X

Present

Not Present

**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:**

APR

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in April

**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:**

X

Present

Not Present

**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:**

MAY

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in May

**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:**

X

Present  
Not Present

**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:**

JUN

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in June

**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:**

X

Present  
Not Present

**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:**

JUL

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in July

**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:**

X

Present

Not Present

**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:**

AUG

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in August

**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:**

X

Present

Not Present

**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:**

SEP

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in September

**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:**

X

Present  
Not Present

**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:**

OCT

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in October

**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:**

X

Present  
Not Present

**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:**

NOV

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in November

**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:**

X

Present

Not Present

**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:**

DEC

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in December

**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:**

X

Present

Not Present

**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:**

BREED1

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage textual summary where:

if ELEMENT = BIRD then BREED1 = nesting;

if ELEMENT = FISH then BREED1 = spawning;

if ELEMENT = INVERT then BREED1 = spawning;

if ELEMENT = REPTILE then BREED1 = nesting;

if ELEMENT = M\_MAMMAL then BREED1 = mating

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED  
DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN  
VALUE DEFINITION:**

JUL-DEC	3 character abbreviation of start and end month of breed1 activities
-	Not Occurring
N/A	No breed1 activities for this element

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

BREED2

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage textual summary where:

if ELEMENT = BIRD then BREED2 = laying;

if ELEMENT = FISH then BREED2 = eggs;

if ELEMENT = INVERT then BREED2 = eggs;

if ELEMENT = REPTILE then BREED2 = hatching;

if ELEMENT = M\_MAMMAL then BREED2 = calving

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
JUL-DEC	3 character abbreviation of start and end month of breed2 activities
-	Not Occurring
N/A	No breed2 activities for this element

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

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

BREED3

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage textual summary where:

if ELEMENT = BIRD then BREED3 = hatching;

if ELEMENT = FISH then BREED3 = larvae;

if ELEMENT = INVERT then BREED3 = larvae;

if ELEMENT = REPTILE then BREED3 = internesting;

if ELEMENT = M\_MAMMAL then BREED3 = pupping

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
JUL-DEC	3 character abbreviation of start and end month of breed3 activities
-	Not Occurring
N/A	No breed3 activities for this element

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

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

BREED4

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage textual summary where:

if ELEMENT = BIRD then BREED4 = fledging;

if ELEMENT = FISH then BREED4 = juveniles;

if ELEMENT = INVERT then BREED4 = juveniles;

if ELEMENT = REPTILE then BREED4 = juveniles;

if ELEMENT = M\_MAMMAL then BREED4 = molting

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED  
DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN  
VALUE DEFINITION:**

JUL-DEC	3 character abbreviation of start and end month of breed4 activities
-	Not Occurring
N/A	No breed4 activities for this element

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

BREED5

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage textual summary where:

if ELEMENT = FISH then BREED5 = adults;

if ELEMENT = INVERT then BREED5 = adults;

if ELEMENT = REPTILE then BREED5 = adults;

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
JUL-DEC	3 character abbreviation of start and end month of breed5 activities
-	Not Occurring
N/A	No breed5 activities for this element

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

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links directly back to the biological data layers or to the BIO\_LUT lookup table

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

G\_SOURCE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Geographic source identifier that links to the flat file's supplementary data table SOURCES

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
1-N	Unique number



**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:**  
S\_SOURCE

**5.1.2.2. ATTRIBUTE DEFINITION:**  
Seasonality source identifier that links to the flat file's  
supplementary data table SOURCES

**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-N

Unique number

---

**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:**  
BREED

**5.1.2.2. ATTRIBUTE DEFINITION:**  
Breed identifier that links to the flat file's supplementary data  
table BREED\_DT and allows searches of breeding activities by  
month.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**  
NOAA

**5.1.2.4.1.1. ENUMERATED  
DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN  
VALUE DEFINITION:**

---

1-N

Unique number

---

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1. DETAILED DESCRIPTION: BIORES**

The data table BIORES contains the attributes necessary for linking to several spatial data layers and other data tables.

**5.1.1. ENTITY TYPES:**

<b>5.1.1.1. ENTITY TYPE LABEL:</b>	<b>5.1.1.2. ENTITY TYPE DEFINITION:</b>
<u>Attributes</u>	RARNUM integer SPECIES_ID integer CONC character SEASON_ID integer G_SOURCE integer S_SOURCE integer ELEMENT character EL_SPE character EL_SPE_SEA character

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links to the BIO\_LUT table and directly back to the biology coverages.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
1-N	Unique number

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

SPECIES\_ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

Numeric identifier for each species that is unique within each element and refers to a nationwide ESI species list maintained by NOAA

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

1-N

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

Unique number

**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:**

CONC

**5.1.2.2. ATTRIBUTE DEFINITION:**

Relative or actual count of a species concentration at a specific location. Field is blank if no data are available.

**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

**5.1.2.1. ATTRIBUTE LABEL:**

SEASON\_ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

A link from the BIORES table to the seasonality 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:**

---

1-N

Unique number

---

**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:**

G\_SOURCE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Geographic source identifier that links to the SOURCES 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:**

---

1-N

Unique number

---

**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:**

S\_SOURCE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Seasonality source identifier that links to the SOURCES 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:**

1-N

Unique number

**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:**

ELEMENT

**5.1.2.2. ATTRIBUTE DEFINITION:**

Major categories of biological data

**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:**

BIRD  
FISH  
HABITAT  
INVERT  
M\_MAMMAL  
REPTILE  
T\_MAMMAL

Birds  
Fish  
Habitats and Rare Plants  
Invertebrates  
Marine Mammals  
Reptiles and Amphibians  
Terrestrial Mammals

**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:**

EL\_SPE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Concatenation of the first character of the ELEMENT and the SPECIES\_ID that provides a link to the species 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.

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

EL\_SPE\_SEA

**5.1.2.2. ATTRIBUTE DEFINITION:**

Concatenation of the first character of the ELEMENT, the SPECIES\_ID, and the SEASON\_ID that provides a link to the seasonality 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.

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

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## 5.1. DETAILED DESCRIPTION: BIRDS

Birds in this atlas are divided into several species subgroups based on taxonomy, morphology, behavior, and oil spill vulnerability and sensitivity. The species table lists all the birds included on the maps, sorted by subgroup. These species are included either because of their likelihood of direct or indirect impact by an oil spill or similar incident, their general rarity or imperilment, or their special protection status as threatened or endangered. Migratory or wintering concentration areas, nesting sites and colonies, and protected species are especially emphasized.

For birds closely associated with wetland habitats, tidal flats, salt ponds, storage/treatment ponds, etc., expert and published sources were used in conjunction with the SFEI bayland habitat data and USGS topographic maps to identify and delineate specific locations for each species or assemblage of birds. California clapper rails, black rails, several passerine species, shorebirds, wading birds, waterfowl, certain raptors, etc. were mapped in this manner. Other species, many of them associated with certain open water habitats (e.g., diving ducks, grebes, common murre, etc.), linear shoreline segments, bridges (e.g., peregrine falcon), breakwaters, etc. were mapped by resource experts using USGS topographic maps and NOAA nautical charts as reference materials. Specific nesting colonies and nesting sites for seabirds (gulls, terns, diving birds, etc.) were mapped using published sources and USGS topographic maps. Wading bird colonies in many areas are depicted as polygons, although some sites in the northern section of the study area were mapped as points (see the NESTS data layer). CDFG's Natural Diversity Database (NDDDB) records were used in assisting resource experts during data development and review, however, nearly all NDDDB records were omitted from the final digital data set. The CDFG's Natural Heritage Division (telephone number 916/445-6383) should be contacted for the most complete and up-to-date digital NDDDB information.

At the request of local resource managers and experts, several species of shorebirds and waterfowl have been grouped into functional categories in the database based on their behavior and habitat utilization. The species listed in each category (Table 1) represent the most commonly occurring species in the San Francisco Bay region. It is not meant to be an inclusive list of all

shorebird and waterfowl species ever observed in the study area. It should also be noted that category names represent the general habitat or behavior of the group and exceptions do occur. For instance: “Salt Pond” shorebirds occur primarily in salt ponds, but will also be found in shallow water mudflat habitats in ponded, muted tidal or managed marshes throughout the bay area; dabbling ducks occur primarily in shallow ponds of all marsh habitats but can also be found occasionally in shallow nearshore open bay waters. Likewise, not all species within each group behave the same or utilize the exact same habitat; some may prefer different habitats or vegetation types, different water depths, sand versus mud bottoms, etc.

**TABLE 1.** Shorebird and waterfowl assemblages.

<b>Assemblage</b>	<b>Species</b>
Tidal Flat Shorebirds	Black-bellied plover, Black turnstone, Dunlin, Greater yellowlegs, Least sandpiper, Lesser yellowlegs, Long-billed curlew, Marbled godwit, Red knot, Ruddy turnstone, Sanderling, Semipalmated plover, Western sandpiper, Whimbrel, Willet
Salt Pond Shorebirds	American avocet, Black-necked stilt, Killdeer, Red-necked phalarope, Western snowy plover, Various other shorebirds depending on location
Dabbling Ducks	American wigeon, Blue-winged teal, Cinnamon teal, Gadwall, Green-winged teal, Mallard, Northern pintail, Northern shoveler
Diving Ducks	Barrow’s goldeneye, Bufflehead, Canvasback, Common goldeneye, Greater scaup, Lesser scaup, Red-breasted merganser, Redhead, Ruddy duck, Surf scoter, White-winged scoter

In addition to the use of shorebird and waterfowl assemblages, a limited number of species of special interest were also listed separately in the database, as requested by resource managers and expert sources. Species nesting in an area, threatened or endangered species, and unique species of special management or spill response concern were listed separately on the maps and data tables (Table 2).

**TABLE 2.** Supplemental shorebird and waterfowl species.

<b>Shorebirds</b>	<b>Waterfowl</b>
Western snowy plover (endangered, nesting)	Canvasback (declining species, unique habitat association)
Red-necked phalarope (unique habitat association)	Ruddy duck (unique habitat association and behavior)
Black oystercatcher (nesting, unique habitat association)	Northern pintail (declining species)
American avocet (nesting)	Greater white-fronted goose (unique to delta and Suisun marsh region)
Black-necked stilt (nesting)	Canada goose (unique to delta and Suisun marsh region)
Killdeer (nesting)	Snow goose (unique to delta and Suisun marsh region)
	Tundra swan (unique to delta and Suisun marsh region)

For birds, concentration was indicated as “present,” “potential,” “very high,” “high,” “medium,” or “low,” or as a numerical value representing the number of nests (for nesting records), or the number of individuals (for non-nesting records) occurring at a site. “Present” was used for endangered, rare, or special interest species that were known to occur at a site, where more detailed concentration information was not appropriate or not available. “Potential” was used for rare, endangered, or special interest species that were likely or suspected to occur at a site, or that were expected to re-occupy a site in the very near future, based on expert information (e.g., potential return of least tern nesting following predator control at a site). The “very high,” “high,” “medium,” and “low” categories or numerical values were used whenever possible. Descriptive concentration values represent the opinion of local resource managers or experts, based on relative concentrations in the study area. Numerical concentration values are based on the maximum number of birds recorded during recent surveys. Numerical concentrations at any particular site may fluctuate seasonally and annually based on local or regional conditions, or other factors. Nesting refers to the entire nesting period, while laying, hatching, and fledging are discrete subsets of the nesting time period. For many species there is a temporal shift in seasonality and

reproduction along with spatial changes in location. Temporal information included in the tables is specific to the one polygon or point that it references.

The following BIRDS species are found in the San Francisco Bay ESI atlas:

<b>SPECIES ID</b>	<b>NAME</b>
7	Western grebe
8	Double-crested cormorant
9	Brandt's cormorant
10	Pelagic cormorant
11	Tundra (whistling) swan
12	Canada goose
14	Greater white-fronted goose
15	Snow goose
17	Northern pintail
21	Canvasback
34	American coot
37	Western gull
39	California gull
46	Common murre
47	Pigeon guillemot
53	Red-necked (Northern) phalarope
54	Great blue heron
68	Black oystercatcher
70	Killdeer
85	California least tern
87	Little blue heron
88	Great egret
89	Snowy egret
90	Black-crowned night heron
93	Cattle egret
107	Peregrine falcon
131	White-tailed kite
133	Black skimmer
136	Caspian tern
138	Forster's tern
141	American avocet
142	Black-necked stilt
148	Ruddy duck
151	Saltmarsh common yellowthroat
173	American white pelican
174	Golden eagle
176	Short-eared owl

SPECIES ID	NAME
181	Northern harrier
187	Virginia rail
188	Sora
192	Common moorhen
194	Suisun song sparrow
204	California clapper rail
206	California black rail
233	San Pablo song sparrow
239	Clark's grebe
259	Alameda song sparrow
270	Western snowy plover
282	California brown pelican
349	Burrowing owl
1,001	Gulls
1,002	Shorebirds
1,003	Waterfowl
1,004	Wading birds
1,008	Terns
1,013	Dabbling ducks
1,014	Diving ducks
1,015	Egrets
1,016	Heron

**5.1.1. ENTITY TYPES:**

**5.1.1.1. ENTITY TYPE LABEL:**

GT-Polygons

**5.1.1.2. ENTITY TYPE DEFINITION:**

ID	integer
RARNUM	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 BIO\_LUT table. ID is a concatenation of atlas number (30), element number (1), and record number. ID values of 9999 are holes in polygons and do not contain information.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

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

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:  
nominal**

**5.1.2.1. ATTRIBUTE LABEL:  
RARNUM**

**5.1.2.2. ATTRIBUTE DEFINITION:  
An identifier that links directly to the BIORES table or the flat  
format BIOFILE table**

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:  
NOAA**

**5.1.2.4.1.1. ENUMERATED  
DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN  
VALUE DEFINITION:**

---

1-N

Unique number

---

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

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:  
nominal**

**5.1. DETAILED DESCRIPTION: BREED**

The data table BREED identifies the life stages and abundances, by month, for each species. (There are no breeding activities for HABITAT or T\_MAMMAL elements.)

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:	
<u>Attributes</u>	EL_SPE_SEA	character
	MONTH	integer
	BREED1	character
	BREED2	character
	BREED3	character
	BREED4	character
	BREED5	character

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

EL\_SPE\_SEA

**5.1.2.2. ATTRIBUTE DEFINITION:**

Concatenation of the first character of the ELEMENT, the SPECIES\_ID, and the SEASON\_ID. Links to BIORES and SEASONAL data tables. If a species has any different monthly presence or breeding activity, a new seasonality record is used to accommodate the variable nature of the species across the study area

**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

**5.1.2.1. ATTRIBUTE LABEL:**

MONTH

**5.1.2.2. ATTRIBUTE DEFINITION:**

Two-digit integer corresponding to the calendar month. Can have up to 12 records to account for each month of the year

**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:**

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1	January
2	February
3	March
4	April
5	May
6	June
7	July
8	August
9	September
10	October
11	November
12	December

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**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:**

BREED1

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage information where:  
 if EL\_SPE\_SEA contains "B" then BREED1 = nesting;  
 if EL\_SPE\_SEA contains "F" then BREED1 = spawning;  
 if EL\_SPE\_SEA contains "I" then BREED1 = spawning;  
 if EL\_SPE\_SEA contains "R" then BREED1 = nesting;  
 if EL\_SPE\_SEA contains "M" then BREED1 = mating



**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:**

---

N	Not occurring
Y	Occurring

---

**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:**

BREED2

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage information where:  
 if EL\_SPE\_SEA contains "B" then BREED2 = laying;  
 if EL\_SPE\_SEA contains "F" then BREED2 = eggs;  
 if EL\_SPE\_SEA contains "I" then BREED2 = eggs;  
 if EL\_SPE\_SEA contains "R" then BREED2 = hatching;  
 if EL\_SPE\_SEA contains "M" then BREED2 = calving

**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:**

---

N	Not occurring
Y	Occurring

---

**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:**

BREED3

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage information where:  
 if EL\_SPE\_SEA contains "B" then BREED3 = hatching;  
 if EL\_SPE\_SEA contains "F" then BREED3 = larvae;  
 if EL\_SPE\_SEA contains "I" then BREED3 = larvae;  
 if EL\_SPE\_SEA contains "R" then BREED3 = interesting;  
 if EL\_SPE\_SEA contains "M" then BREED3 = pupping

**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:**

N	Not occurring
Y	Occurring

**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:**

BREED4

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage information where:  
 if EL\_SPE\_SEA contains "B" then BREED4 = fledging;  
 if EL\_SPE\_SEA contains "F" then BREED4 = juveniles;  
 if EL\_SPE\_SEA contains "I" then BREED4 = juveniles;  
 if EL\_SPE\_SEA contains "R" then BREED4 = juveniles;  
 if EL\_SPE\_SEA contains "M" then BREED4 = molting

**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:
N	Not occurring
Y	Occurring

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:  
BREED5

5.1.2.2. ATTRIBUTE DEFINITION:  
Species' breeding or life stage information where:  
if EL\_SPE\_SEA contains "F" then BREED5 = adults;  
if EL\_SPE\_SEA contains "I" then BREED5 = adults;  
if EL\_SPE\_SEA contains "R" then BREED5 = adults

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:
N	Not occurring
Y	Occurring

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: BREED\_DT**

The data table BREED\_DT is a supplement to the flat format BIOFILE that allows searches to be conducted for life stage activities by month. This is a condensed version of the BREED table where multiple species of the same element may link to the same BREED\_DT records. (There are no breeding activities for HABITAT or T\_MAMMAL elements.)

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>Attributes</u>	BREED integer MONTH integer BREED1 character BREED2 character BREED3 character BREED4 character BREED5 character

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

BREED

**5.1.2.2. ATTRIBUTE DEFINITION:**

An integer value that links from the BIOFILE to the BREED\_DT table

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
1-N	Unique number

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

MONTH

**5.1.2.2. ATTRIBUTE DEFINITION:**

Two-digit integer corresponding to the calendar month. Each month is listed whether any special life activity is occurring or not.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

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1	January
2	February
3	March
4	April
5	May
6	June
7	July
8	August
9	September
10	October
11	November
12	December

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

BREED1

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage information where:  
 if EL\_SPE\_SEA contains "B" then BREED1 = nesting;  
 if EL\_SPE\_SEA contains "F" then BREED1 = spawning;  
 if EL\_SPE\_SEA contains "I" then BREED1 = spawning;  
 if EL\_SPE\_SEA contains "R" then BREED1 = nesting;  
 if EL\_SPE\_SEA contains "M" then BREED1 = mating

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
N	Not occurring
Y	Occurring
-	No Breed1 activity for this element

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

BREED2

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage information where:  
 if EL\_SPE\_SEA contains "B" then BREED2 = laying;  
 if EL\_SPE\_SEA contains "F" then BREED2 = eggs;  
 if EL\_SPE\_SEA contains "I" then BREED2 = eggs;  
 if EL\_SPE\_SEA contains "R" then BREED2 = hatching;  
 if EL\_SPE\_SEA contains "M" then BREED2 = calving

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
N	Not occurring
Y	Occurring
-	No Breed2 activity for this element

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

BREED3

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage information where:  
 if EL\_SPE\_SEA contains "B" then BREED3 = hatching;  
 if EL\_SPE\_SEA contains "F" then BREED3 = larvae;  
 if EL\_SPE\_SEA contains "I" then BREED3 = larvae;  
 if EL\_SPE\_SEA contains "R" then BREED3 = interesting;  
 if EL\_SPE\_SEA contains "M" then BREED3 = pupping

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED  
DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN  
VALUE DEFINITION:**

N	Not occurring
Y	Occurring
-	No Breed3 activity for this element

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

BREED4

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species' breeding or life stage information where:  
 if EL\_SPE\_SEA contains "B" then BREED4 = fledging;  
 if EL\_SPE\_SEA contains "F" then BREED4 = juveniles;  
 if EL\_SPE\_SEA contains "I" then BREED4 = juveniles;  
 if EL\_SPE\_SEA contains "R" then BREED4 = juveniles;  
 if EL\_SPE\_SEA contains "M" then BREED4 = molting

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA



5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
N	Not occurring
Y	Occurring
-	No Breed4 activity for this element

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:  
NOAA

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:  
nominal

5.1.2.1. ATTRIBUTE LABEL:  
BREED5

5.1.2.2. ATTRIBUTE DEFINITION:  
Species' breeding or life stage information where:  
if EL\_SPE\_SEA contains "F" then BREED5 = adults;  
if EL\_SPE\_SEA contains "I" then BREED5 = adults;  
if EL\_SPE\_SEA contains "R" then BREED5 = adults

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:  
NOAA

5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
N	Not occurring
Y	Occurring
-	No Breed5 activity for this element

5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:  
NOAA

5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:  
nominal

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**5.1. DETAILED DESCRIPTION: ESI**

The data layer ESI contains arc (Complete Chains) and polygonal (GT-Polygons) features for the ESI shoreline classification and is based on *Environmental Sensitivity Index Guidelines, Version 2.0* (Halls, J., J. Michel, S. Zengel, J. Dahlin, and J. Petersen, 1997, Hazardous Materials Response and Assessment Division, NOAA). The ESI classification was performed in February 1997.

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>Complete Chains</u>	ESI character LINE character SOURCE_ID integer ENVIR character
<u>GT-Polygons</u>	ESI character WATER_CODE character

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

ESI

**5.1.2.2. ATTRIBUTE DEFINITION:**

The intertidal shoreline habitats of San Francisco Bay were originally mapped during overflights conducted in January 1986. In February 1997, the linear shoreline classification was updated onto 1:24,000 U.S. Geological Survey (USGS) topographic maps by an experienced coastal geologist using 1:24,000 natural color vertical aerial photography produced by the National Oceanic and Atmospheric Administration (NOAA), National Ocean Service, National Geodetic Survey, in August 1996. Maps for bayland habitats provided by the San Francisco Estuary Institute (SFEI) were also consulted during the shoreline classification. A series of overflights were conducted 4-6 March 1997 to verify the shoreline classification, using fixed-wing aircraft, flying at elevations of 500-1,000 feet and slow air speed. Air support was provided by the California Department of Fish and Game (CDFG). In

conjunction with the linear shoreline classification, digital baylands habitat data developed by SFEI were used to delineate and classify polygonal habitats including marsh types, tidal flats, and other features. The SFEI data were originally compiled from unofficial 1985 National Wetlands Inventory (NWI) data, interjected with 1989 State Lands Commission tidal marsh polygons, updated and reviewed by experts using 1995/1996 National Aeronautic and Space Administration (NASA) aerial photography, and pre-released in November 1997.

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 sensitivity of a particular intertidal habitat is an integration of the following factors:

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

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

These concepts have been used in the development of the ESI, which ranks shoreline environments as to their relative

sensitivity to oil spills, potential biological injury, and ease of cleanup. Generally speaking, areas exposed to high levels of physical energy, such as wave action and tidal currents, and low biological activity rank low on the scale, whereas sheltered areas with associated high biological activity have the highest ranking. A comprehensive shoreline habitat ranking system has been developed for the entire United States. The shoreline habitats delineated in San Francisco Bay are listed below in order of increasing sensitivity to spilled oil.

- 1A) Exposed Rocky Shores
- 1B) Exposed, Solid Man-made Structures
- 2A) Exposed Wave-cut Platforms in Bedrock
- 3A) Fine-to Medium-grained Sand Beaches
- 3B) Scarps and Steep Slopes in Sand
- 4) Coarse-grained Sand Beaches
- 5) Mixed Sand and Gravel Beaches
- 6A) Gravel Beaches
- 6B) Riprap
- 7) Exposed Tidal Flats
- 8A) Sheltered Rocky Shores
- 8B) Sheltered, Solid Man-made Structures
- 8C) Sheltered Riprap
- 9A) Sheltered Tidal Flats
- 9B) Vegetated Low Riverine Banks
- 10A) Salt- and Brackish-water Marshes

The item ESI contains values according to the ESI ranking of the shorelines and polygons. The ESI rankings progress from

low to high susceptibility to oil spills. In many cases, the shorelines are also ranked with multiple codes such as 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. ESI polygons for wetlands (ESI = 10) and tidal flats (ESI = 7, 9A) were derived from SFEI bayland habitat data. ESI = 10 polygons include tidal marshes and muted tidal marshes from SFEI.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
1A	Exposed Rocky Shores
1A/2A	Exposed Rocky Shores/Exposed Wave-cut Platforms in Bedrock
1A/4	Exposed Rocky Shores/Coarse-grained Sand Beaches
1A/4/9A	Exposed Rocky Shores/Coarse-grained Sand Beaches/ Sheltered Tidal Flats
1A/5	Exposed Rocky Shores/Mixed Sand and Gravel Beaches
1A/5/7	Exposed Rocky Shores/Mixed Sand and Gravel Beaches/ Exposed Tidal Flats
1A/6A	Exposed Rocky Shores/Gravel Beaches
1A/6A/7	Exposed Rocky Shores/Gravel Beaches/Exposed Tidal Flats
1A/6A/9A	Exposed Rocky Shores/Gravel Beaches/Sheltered Tidal Flats
1A/6B	Exposed Rocky Shores/Riprap
1A/7	Exposed Rocky Shores/Exposed Tidal Flats
1A/9A	Exposed Rocky Shores/Sheltered Tidal Flats
1B	Exposed, Solid Man-made Structures
1B/3A/9A	Exposed, Solid Man-made Structures/Fine- to Medium-grained Sand Beaches/Sheltered Tidal Flats
1B/4	Exposed, Solid Man-made Structures/Coarse-grained Sand Beaches
1B/5	Exposed, Solid Man-made Structures/Mixed Sand and Gravel Beaches
1B/6A	Exposed, Solid Man-made Structures/Gravel Beaches
1B/6A/9A	Exposed, Solid Man-made Structures/Gravel Beaches/Sheltered Tidal Flats

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
1B/6B	Exposed, Solid Man-made Structures/Riprap
1B/6B/4	Exposed, Solid Man-made Structures/Riprap/Coarse-grained Sand Beaches
1B/6B/9A	Exposed, Solid Man-made Structures/Riprap/Sheltered Tidal Flats
1B/8B	Exposed, Solid Man-made Structures/Sheltered, Solid Man-made Structures
1B/9A	Exposed, Solid Man-made Structures/Sheltered Tidal Flats
1B/10A	Exposed, Solid Man-made Structures/Salt- and Brackish-water Marshes
1B/10A/9A	Exposed, Solid Man-made Structures/Salt- and Brackish-water Marshes/Sheltered Tidal Flats
2A	Exposed Wave-cut Platforms in Bedrock
2A/9A	Exposed Wave-cut Platforms in Bedrock/Sheltered Tidal Flats
3A	Fine- to Medium-grained Sand Beaches
3A/7	Fine- to Medium-grained Sand Beaches/Exposed Tidal Flats
3A/9A	Fine- to Medium-grained Sand Beaches/Sheltered Tidal Flats
3A/10A	Fine- to Medium-grained Sand Beaches/Salt- and Brackish-water Marshes
3B	Scarps and Steep Slopes in Sand
3B/2A/9A	Scarps and Steep Slopes in Sand/Exposed Wave-cut Platforms in Bedrock/Sheltered Tidal Flats
3B/3A/9A	Scarps and Steep Slopes in Sand/Fine- to Medium-grained Sand Beaches/Sheltered Tidal Flats
3B/5	Scarps and Steep Slopes in Sand/Mixed Sand and Gravel Beaches
3B/5/9A	Scarps and Steep Slopes in Sand/Mixed Sand and Gravel Beaches/Sheltered Tidal Flats
3B/6A	Scarps and Steep Slopes in Sand/Gravel Beaches
3B/6A/9A	Scarps and Steep Slopes in Sand/Gravel Beaches/Sheltered Tidal Flats
3B/6B/9A	Scarps and Steep Slopes in Sand/Riprap/Sheltered Tidal Flats
3B/9A	Scarps and Steep Slopes in Sand/Sheltered Tidal Flats

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
3B/10A	Scarps and Steep Slopes in Sand/Salt- and Brackish-water Marshes
3B/10A/9A	Scarps and Steep Slopes in Sand/Salt- and Brackish-water Marshes/Sheltered Tidal Flats
4	Coarse-grained Sand Beaches
4/7	Coarse-grained Sand Beaches/Exposed Tidal Flats
4/9A	Coarse-grained Sand Beaches/Sheltered Tidal Flats
5	Mixed Sand and Gravel Beaches
5/7	Mixed Sand and Gravel Beaches/Exposed Tidal Flats
5/9A	Mixed Sand and Gravel Beaches/Sheltered Tidal Flats
6A	Gravel Beaches
6A/6B	Gravel Beaches/Riprap
6A/9A	Gravel Beaches/Sheltered Tidal Flats
6A/10A	Gravel Beaches/Salt- and Brackish-water Marshes
6B/3A	Riprap/Fine- to Medium-grained Sand Beaches
6B/3A/9A	Riprap/Fine- to Medium-grained Sand Beaches/Sheltered Tidal Flats
6B/5	Riprap/Mixed Sand and Gravel Beaches
6B/6A	Riprap/Gravel Beaches
6B/6A/9A	Riprap/Gravel Beaches/Sheltered Tidal Flats
6B/7	Riprap/Exposed Tidal Flats
6B/9A	Riprap/Sheltered Tidal Flats
6B/10A	Riprap/Salt- and Brackish-water Marshes
6B	Riprap
6B/10A/9A	Riprap/Salt- and Brackish-water Marshes/Sheltered Tidal Flats
8A	Sheltered Rocky Shores
8A/5	Sheltered Rocky Shores/Mixed Sand and Gravel Beaches
8A/5/9A	Sheltered Rocky Shores/Mixed Sand and Gravel Beaches/Sheltered Tidal Flats
8A/9A	Sheltered Rocky Shores/Sheltered Tidal Flats
8B	Sheltered, Solid Man-made Structures
8B/8C	Sheltered, Solid Man-made Structures/Sheltered Riprap
8B/9A	Sheltered, Solid Man-made Structures/Sheltered Tidal Flats



**5.1.2.4.1.1.  
ENUMERATED  
DOMAIN VALUE:**

**5.1.2.4.1.2.  
ENUMERATED DOMAIN  
VALUE DEFINITION:**

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8B/10A/9A	Sheltered, Solid Man-made Structures/Salt- and Brackish-water Marshes
8C	Sheltered Riprap
8C/3A	Sheltered Riprap/Fine- to Medium-grained Sand Beaches
8C/8B	Sheltered Riprap/Sheltered, Solid Man-made Structures
8C/9A	Sheltered Riprap/Sheltered Tidal Flats
8C/10A	Sheltered Riprap/Salt- and Brackish-water Marshes
8C/10A/9A	Sheltered Riprap/Salt- and Brackish-water Marshes/ Sheltered Tidal Flats
9A	Sheltered Tidal Flats
9A/1B/9A	Sheltered Tidal Flats/Exposed, Solid Man-made Structures/Sheltered Tidal Flats
9A/8B/9A	Sheltered Tidal Flats/Sheltered, Solid Man-made Structures/Sheltered Tidal Flats
9B	Vegetated Low Riverine Banks
9B/6A	Vegetated Low Riverine Banks/Gravel Beaches
9B/9A	Vegetated Low Riverine Banks/Sheltered Tidal Flats
9B/10A	Vegetated Low Riverine Banks/Salt- and Brackish-water Marshes
9B/10A/9A	Vegetated Low Riverine Banks/Salt- and Brackish-water Marshes/Sheltered Tidal Flats
10A	Salt- and Brackish-water Marshes
10A/1B	Salt- and Brackish-water Marshes/Exposed, Solid Man- made Structures
10A/1B/9A	Salt- and Brackish-water Marshes/Exposed, Solid Man- made Structures/Sheltered Tidal Flats
10A/3A	Salt- and Brackish-water Marshes/Fine- to Medium- grained Sand Beaches
10A/3A/9A	Salt- and Brackish-water Marshes/Fine- to Medium- grained Sand Beaches/Sheltered Tidal Flats
10A/3B	Salt- and Brackish-water Marshes/Scarps and Steep Slopes in Sand
10A/3B/5	Salt- and Brackish-water Marshes/Scarps and Steep Slopes in Sand/Mixed Sand and Gravel Beaches
10A/3B/9A	Salt- and Brackish-water Marshes/Scarps and Steep Slopes in Sand/Sheltered Tidal Flats
10A/5	Salt- and Brackish-water Marshes/Mixed Sand and Gravel Beaches

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
10A/5/9A	Salt- and Brackish-water Marshes/Mixed Sand and Gravel Beaches/Sheltered Tidal Flats
10A/6B	Salt- and Brackish-water Marshes/Riprap
10A/6B/9A	Salt- and Brackish-water Marshes/Riprap/Sheltered Tidal Flats
10A/8B	Salt- and Brackish-water Marshes/Sheltered, Solid Man- made Structures
10A/8B/9A	Salt- and Brackish-water Marshes/Sheltered, Solid Man- made Structures/Sheltered Tidal Flats
10A/8C	Salt- and Brackish-water Marshes/Sheltered Riprap
10A/8C/3A	Salt- and Brackish-water Marshes/Sheltered Riprap/Fine- to Medium-grained Sand Beaches
10A/8C/9A	Salt- and Brackish-water Marshes/Sheltered Riprap/ Sheltered Tidal Flats
10A/9A	Salt- and Brackish-water Marshes/Sheltered Tidal Flats
10A/9B	Salt- and Brackish-water Marshes/Vegetated Low Riverine Banks
10A/9B/9A	Salt- and Brackish-water Marshes/Vegetated Low Riverine Banks/Sheltered Tidal 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:**

ordinal

**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:**

---

B	Breakwater
F	Flat
H	Hydrography or stream features
I	Index
M	Marsh
P	Pier
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:**

---

1	Digital
3	Aerial photography
5	Digitized from scanned USGS quadangles
7	Research Planning, Inc. (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:**

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:**

E  
U

**5.1.2.4.1.2. ENUMERATED DOMAIN  
VALUE DEFINITION:**

Estuarine  
Unranked

**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:**

L  
W

**5.1.2.4.1.2. ENUMERATED DOMAIN  
VALUE DEFINITION:**

Land  
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. DETAILED DESCRIPTION: FISH

The data layer FISH contains polygons for fish species.

Fish species depicted for San Francisco Bay include selected marine, estuarine, anadromous, and freshwater species. Species of commercial, recreational, ecological, and/or conservation interest are emphasized. Fish (and invertebrates such as bay shrimp and crabs) are mapped as multi-species assemblages to the greatest extent possible. For different regions of the Bay area, assemblages are broken into two major categories: shoals, shallow creeks, and sloughs (< or = 20 feet below MLLW) versus deeper channels (>20 foot depths). Polygons for “shallows” versus “channels” were developed from digital data provided by SFEI. Often, the same species, but different life stages, were associated with adjacent “shallows” and “channels.” Regional fish and invertebrate distributions were provided mainly by fisheries scientists with the CDFG Bay-Delta Division. Sacramento River-run chinook salmon distributions were depicted with the added assistance of USFWS biologists. Estuarine salinity zone distribution and seasonality data compiled by NOAA’s Biogeographic Characterization Branch and Estuarine Living Marine Resources program were also consulted. It should be noted that fish (and invertebrate) resource distributions depicted on the maps may be more widespread in some locations than would actually occur in any given year, due to inter-annual variation in river discharge and salinity. During dry years, distributions for several species may shift towards the upstream or upper estuary portions of the areas depicted on the maps, the opposite being true during wet years.

In addition to the multi-species assemblages depicted on the maps, specific concentration areas or other key habitats for a few individual species are mapped separately. For instance, Pacific herring spawning locations are mapped for Central San Francisco Bay based on: expert sources; rock, gravel, and man-made shoreline types (ESI = 1A, 1B, 5, 6A, 6B, 8A, 8B, 8C); eelgrass and *Gracilaria* (algae) distributions; and nearshore structures depicted on USGS topographic maps and NOAA nautical charts.

Polygons from California State Lands Commission (SLC) data sets were also used to depict locations for certain fish species. To avoid redundancy on the

final maps, resource locations generated from expert and published sources, SFEI data, and USGS topographic maps took precedence over the SLC data. CDFG's NDDDB records were used in assisting resource experts during data development and review, however, all NDDDB records were omitted from the final digital data set. The CDFG Natural Heritage Division (telephone number: 916/445-6383) should be consulted for the most complete and up-to-date digital NDDDB information.

Fish concentrations are listed as "high," "medium," "low," or "rare" in most cases, based on expert opinion. Some records for rare and endangered species may also contain "present" in the concentration field, where more detailed concentration descriptions were not appropriate or not available.

The following fish species (polygons) are found in the San Francisco Bay ESI atlas:

<b>SPECIES ID</b>	<b>NAME</b>
11	English sole
12	Starry flounder
38	Brown rockfish
43	White sturgeon
44	Green sturgeon
66	Pacific herring
68	Chinook salmon
74	Rainbow trout (steelhead)
87	American shad
104	Striped bass
172	Longfin smelt
177	Leopard shark
225	California halibut
473	Bat ray
474	Sacramento splittail
475	Delta smelt
476	Sacramento perch
490	Chinook salmon (fall)
491	Chinook salmon (late fall)
492	Chinook salmon (winter)
493	Chinook salmon (spring)
494	White croaker

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>GT-Polygons</u>	ID integer
	RARNUM 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 BIO\_LUT table. ID is a concatenation of atlas number (30), element number (22) indicating linear fish data, and record number. ID values of 9999 are holes in polygons and do not contain information.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links directly to the BIORES table or the flat format BIOFILE table

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

1-N

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

Unique number

**5.1.2.4.1.3. ENUMERATED DOMAIN VALUE**

**DEFINITION SOURCE:**

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal



### 5.1. DETAILED DESCRIPTION: FISHL

The data layer FISHL contains arcs for fish species.

Fish species depicted for San Francisco Bay include selected marine, estuarine, anadromous, and freshwater species. Species of commercial, recreational, ecological, and/or conservation interest are emphasized.

The lower sections (mouths) of known anadromous rainbow trout (steelhead) and chinook salmon (non-Sacramento R.) spawning streams were mapped based on published sources, information provided by local resource managers, and USGS topographic maps. National Marine Fisheries Service (NMFS) and U.S. Forest Service (USFS) personnel were consulted to confirm the locations of existing anadromous salmonid runs in the estuary. In a few cases, the names and/or locations of streams reported to have steelhead or chinook runs could not be identified using the USGS topographic maps, or were located just outside of the study area. Therefore, existing salmonid streams in the Bay area reported by Leidy (1997) or local resource managers are listed below (Table 3). Historic runs were not mapped as a part of this project, even though they might potentially hold salmonid runs in the future. It should also be recognized that steelhead and chinook juveniles and adults can be found migrating or feeding throughout the estuarine and riverine waters of the study area, not just in the spawning streams identified.

**TABLE 3.** Anadromous salmonid streams in the Bay area.

<b>Stream Name</b>	<b>Species</b>
Arroya Corte Madera Del Presidio Creek	steelhead
Corte Madera Creek	steelhead
Miller Creek	steelhead
Novato Creek	steelhead
Petaluma River (and some tribs.)	steelhead
Sonoma Creek (and tribs.)	steelhead, chinook
Napa River (and tribs.)	steelhead, chinook
Green Valley Creek	steelhead
Suisun Creek (and tribs.)	steelhead
Sacramento-San Joaquin Rivers and Tribs.	steelhead, chinook

<b>Stream Name</b>	<b>Species</b>
Walnut Creek	steelhead, chinook
Pinole River	steelhead
San Pablo Creek	steelhead
Tolay Creek	steelhead
Wildcat Creek	steelhead
San Leandro Creek	steelhead
San Lorenzo Creek	steelhead
Alameda Creek	steelhead
Coyote Creek	steelhead, chinook
Guadalupe River	steelhead, chinook
Saratoga Creek	steelhead
Redwood Creek	steelhead
Permanente Creek	steelhead
San Francisquito Creek	steelhead

Fish concentrations are listed as “high,” “medium,” “low,” or “rare” in most cases, based on expert opinion. Some records for rare and endangered species may also contain “present” in the concentration field, where more detailed concentration descriptions were not appropriate or not available. For the several anadromous species (sturgeon, shad, striped bass, longfin smelt, steelhead, chinook), spawning is only indicated for locations where actual spawning is known to occur. Where the beginning of spawning runs are indicated (e.g., steelhead trout), but actual spawning activity takes place upstream of the mapped distribution or study area (or specific spawning stretches of streams were not known), the adult time-period is used, but not the spawning category.

The following FISH species (arcs) are found in the San Francisco Bay ESI atlas:

<b>SPECIES ID</b>	<b>NAME</b>
68	Chinook salmon
74	Rainbow trout (steelhead)

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:	
<u>Complete Chains</u>	ID	integer
	RARNUM	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 BIO\_LUT table. ID is a concatenation of atlas number (30), element number (2+20, to indicate line data 22), and record number. ID values of 9999 are holes in polygons and do not contain information.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links directly to the BIORES table or the flat format BIOFILE table.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

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## 5.1. DETAILED DESCRIPTION: HABITATS

Submersed habitats depicted in San Francisco Bay include eelgrass beds and *Gracilaria* (algae) beds. Eelgrass beds were mapped initially using digital data provided by SLC (after Echeverria and Rutten, 1989). Additional eelgrass beds were depicted using a wide variety of published sources, reports, and expert information. *Gracilaria* beds were mapped using expert opinion for limited portions of the Central Bay region, mainly areas associated with Pacific herring spawning activity. Additional *Gracilaria* beds may be present in other portions of the study area.

Individual plant species depicted on the maps include a wide variety of rare or endangered wetland and upland species. Certain wetland species are emphasized, although other species are included if they occur near estuarine shorelines or habitats, or if they are located near potential staging or access sites (where spill-related disturbance would be possible).

Mason's lilaepsis is one species particularly emphasized. This species was mapped using digital point records provided by SFEI. Because the exact locations of individual Mason's lilaepsis occurrences shift somewhat rapidly over time, SFEI records were used in conjunction with the ESI shoreline classification to develop polygons that represent areas where Mason's lilaepsis is most likely to occur. Actual locations for this species will not cover the entire area indicated, but will occur at several discreet (though ephemeral) locations within the polygons. Additional records for Mason's lilaepsis from other sources were also retained in some instances.

Other rare plant species emphasized in the atlas included: Suisun marsh aster, Alkali milk-vetch, Suisun thistle, Point Reyes bird's-beak, Soft bird's-beak, Delta tule pea, and California sea-blite. Rare plants were mainly mapped using expert and published sources in conjunction with SFEI baylands habitat data, and USGS topographic maps. USFWS and other experts were particularly helpful in locating certain key species. CDFG's NDDDB records were used in assisting resource experts during data development and review, however, all NDDDB records were omitted from the final digital data set. The CDFG Natural Heritage Division (telephone

number: 916/445-6383) should be consulted for the most complete and up-to-date digital NDDDB information.

Concentration was generally listed using a descriptive term, such as “high,” “medium,” or “low”. Records for rare and endangered species and submersed habitats may also contain “present” or “potential” in the concentration field, where more detailed concentration descriptions were not appropriate or not available.

The following HABITATS species are found in the San Francisco Bay ESI atlas:

SPECIES ID	NAME
1	Eelgrass
72	Soft bird's-beak
214	Rare plants
322	Mason's lilaeopsis
324	Suisun marsh aster
328	Suisun thistle
336	Contra Costa goldfields
356	California seablite
366	Delta tule pea
388	Point Reyes bird's-beak
396	Yellowray goldfields
397	Ambiguous indian paintbrush
398	Gracilaria
399	Nootka alkaligrass
400	Mojave seablite
1029	Vernal pool plants

**5.1.1. ENTITY TYPES:**

**5.1.1.1. ENTITY TYPE LABEL:**

GT-Polygons

**5.1.1.2. ENTITY TYPE DEFINITION:**

ID integer

RARNUM 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 BIO\_LUT table. ID is a concatenation of atlas number (30), element number (3), and record number. ID values of 9999 are holes in polygons and do not contain information.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links directly to the BIORES table or the flat format BIOFILE table

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

1-N

Unique number

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

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**5.1. DETAILED DESCRIPTION: HYDRO**

The data layer HYDRO contains polygonal water and land features as well as linear features for rivers and streams.

**5.1.1. ENTITY TYPES:**

<b>5.1.1.1. ENTITY TYPE LABEL:</b>	<b>5.1.1.2. ENTITY TYPE DEFINITION:</b>
<u>GT-Polygons</u>	WATER_CODE character
<u>Complete Chains</u>	LINE character
	SOURCE_ID integer

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

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

WATER\_CODE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Specifies a polygon as either water or land

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

L	Land
W	Water

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

Research Planning, Inc.

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

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:**

---

B	Breakwater
H	Hydrography or stream features
I	Index
P	Pier
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:**

---

1	Digital
3	Aerial photography
5	Digitized from scanned USGS quadrangles
7	Research Planning, Inc. (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. DETAILED DESCRIPTION: INDEX**

The data layer INDEX contains the map or polygon boundaries for each map in the atlas.

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>GT-Polygons</u>	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 38

**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 1:24,000 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:**

---

ANTIOCH NORTH, CA. (1978)

BENICIA, CA. (1980)

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

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CUTTINGS WHARF, CA. (1981)  
DENVERTON, CA. (1980)  
FAIRFIELD SOUTH, CA. (1980)  
HONKER BAY, CA. (1980)  
HUNTERS POINT, CA. (1993)  
MARE ISLAND, CA. (1980)  
MILPITAS, CA. (1980)  
MOUNTAIN VIEW, CA. (1991)  
NEWARK, CA. (1993)  
NOVATO, CA. (1980)  
OAKLAND EAST, CA. (1993)  
OAKLAND WEST, CA. (1993)  
PALO ALTO, CA. (1991)  
PETALUMA POINT, CA. (1980)  
PETALUMA RIVER, CA. (1980)  
REDWOOD POINT, CA. (1993)  
RICHMOND, CA. (1993)  
SAN FRANCISCO NORTH, CA. (1993)  
SAN FRANCISCO SOUTH, CA. (1993)  
SAN LEANDRO, CA. (1993)  
SAN MATEO, CA. (1993)  
SAN QUENTIN, CA. (1993)  
SAN RAFAEL, CA. (1993)  
SEARS POINT, CA. (1968)  
VINE HILL, CA. (1980)

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**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:**

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:**

---

45,000

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**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

1.096

1.171

1.247

1.322

1.398

1.474

1.549

---

**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

### 5.1. DETAILED DESCRIPTION: INVERT

Invertebrate species depicted for San Francisco Bay mainly include bay shrimp (*Crangon* spp.) and crabs (*Cancer* spp.) of commercial, recreational, or ecological importance. Japanese littleneck clam harvest sites are also depicted in a few areas. Certain rare and endangered species, including tadpole shrimp and insects are also included in the atlas. Rare and endangered species are shown only when they occur near estuarine shorelines or habitats, or when they are located near potential staging or access sites (where spill-related disturbance would be possible). Estuarine bay shrimp and crabs (and fish species) are mapped as multi-species assemblages to the greatest extent possible. For different regions of the Bay area, assemblages are divided into two major categories: (1) shoals, shallow creeks, and sloughs (< or = 20 feet below MLLW) and (2) deeper channels (>20 foot depths). Polygons for “shallows” versus “channels” were developed from digital data provided by SFEI. Often, the same species, but different life stages, were associated with adjacent “shallows” and “channels.” Bay shrimp, crab, and fish distributions were provided mainly by fisheries scientists with the CDFG Bay-Delta Division. Estuarine salinity zone distribution and seasonality data compiled by NOAA’s Biogeographic Characterization Branch and Estuarine Living Marine Resources program were also consulted. It should be noted that bay shrimp, crab, and fish resource distributions depicted on the maps may be more widespread in some locations than would actually occur in any given year, due to inter-annual variation in river discharge and salinity. During dry years, distributions for several species may shift towards the upstream or upper estuary portions of the areas depicted on the maps, the opposite being true during wet years.

In addition to the multi-species assemblages depicted on the maps, special concentration areas or other key habitats for a few individual species are mapped separately. For instance, Pacific rock crab and Red rock crab concentration areas are mapped based on expert sources, ESI shoreline types, and nearshore structures depicted on USGS topographic maps and NOAA nautical charts. Rock crabs are shown in certain portions of the Bay where rock or riprap shorelines predominated (ESI = 1A, 6B, 8A, 8C).

Expert sources were used to depict locations for rare and endangered invertebrates. NDDDB records were used by resource experts during data development and review; however, all NDDDB records were omitted from the final digital data set. The CDFG Natural Heritage Division (telephone number: 916/445-6383) should be consulted for the most complete and up-to-date digital NDDDB information.

Concentration is listed as “high,” “medium,” or “low” in most cases, based on expert opinion. Some records for rare and endangered species may also contain “present” in the concentration field, where more detailed concentration descriptions were not appropriate or not available. For many species there may be temporal shifts in seasonality and life-history time periods, depending on location. Temporal information included in the tables is specific to the one polygon or site that it references.

The following INVERT species are found in the San Francisco Bay ESI atlas:

SPECIES ID	NAME
2	Vernal pool tadpole shrimp
3	California bay shrimp
9	Blacktail bay shrimp
14	Dungeness crab
26	Japanese littleneck clam
53	Red rock crab
57	Pacific rock crab
295	Mission blue butterfly

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>GT-Polygons</u>	ID                    integer
	RARNUM            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 BIO\_LUT table. ID is a concatenation of atlas number (30, element number (7), and record number. ID values of 9999 are holes in polygons and do not contain information.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links directly to the BIORES table or the flat format BIOFILE table

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

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1-N

Unique number

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

NOAA

**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 area polygons.

**5.1.1. ENTITY TYPES:**

<b>5.1.1.1. ENTITY TYPE LABEL:</b>	<b>5.1.1.2. ENTITY TYPE DEFINITION:</b>
<u>GT-Polygons</u>	TYPE character ID integer HUNUM integer

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

TYPE

**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\_DAT table.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
NP	National Park
P	Park
WR	Wildlife Refuge

**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 that links to the SOC\_LUT table. ID is a concatenation of atlas number (30), element number (11), and record number

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

HUNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links directly to the SOC\_DAT table.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

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1-N

Unique number

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1. DETAILED DESCRIPTION: M\_MAMMAL**

Marine mammals depicted in the San Francisco Bay atlas include harbor seals and California sea lions. Seal areas represent major haul-out sites and pupping areas. Certain harbor seal feeding concentrations are also represented. A few California sea lion haul-outs also occur in the Bay area, and these are depicted also (note that sea lions do not pup in the Bay). Seal and sea lion haul-outs and other locations were compiled from several recent surveys and reports, using USGS topographic maps and NOAA nautical charts for spatial referencing. Seal and sea lion locations were augmented and carefully refined based on the opinion of local resource managers and expert biologists. In addition to haul-outs and pupping areas shown on the maps, harbor seals and California sea lions are distributed throughout the estuarine waters of the bay, and may even venture up some of the rivers. Harbor seal feeding concentrations are often located in waters adjacent to the major haul-out sites, but occur in other areas as well. Feeding concentrations depicted on the maps are limited to a few sites that are not directly adjacent to haul-out locations. Though not considered threatened or endangered species, it should be noted that harbor seals and California sea lions are legally protected by the Marine Mammal Protection Act.

Concentration for harbor seals is usually represented as a number value indicating the highest number of seals documented at each haul-out or pupping site during recent surveys. Sea lion haul-outs are represented as descriptive concentrations, such as “high,” “medium,” or “low”. Descriptive concentrations are based on the opinion of local resource managers or experts concerning relative concentrations within the study area.

The final columns list the time periods for sensitive life-history activities, such as pupping and molting for harbor seals. Pupping refers to the time-period when pups are born. Molting refers to the time-period when seals haul-out to shed.

The following M\_MAMMAL species are found in the San Francisco Bay ESI atlas:

SPECIES ID	NAME
2	Harbor seal
22	California sea lion

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>GT-Polygons</u>	ID integer
	RARNUM 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 BIO\_LUT table. ID is a concatenation of atlas number (30), element number (4), and record number. ID values of 9999 are holes in polygons and do not contain information.

**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

**5.1.2.1. ATTRIBUTE LABEL:**

RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links directly to the BIORES table or the flat format BIOFILE table

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

1-N

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

Unique number

**5.1.2.4.1.3. ENUMERATED DOMAIN VALUE**

**DEFINITION SOURCE:**

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

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**5.1. DETAILED DESCRIPTION: NESTS**

Most wading bird nesting colonies for the northern section of the study area (Yerba Buena Island northward) are mapped as points in the NESTS data layer using latitude and longitude coordinates provided by resource experts. Wading bird colonies in other areas are depicted as polygons in the BIRD data layer. Nesting sites or colonies for other species, including colonial nesting seabirds, are mapped as polygons, and are included in the BIRD data layer.

The following species are found in the NESTS coverage of the San Francisco Bay ESI atlas:

SPECIES ID	NAME
54	Great blue heron
88	Great egret
89	Snowy egret
90	Black-crowned night-heron

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>Entity Points</u>	ID                    integer
	RARNUM            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 BIO\_LUT table. ID is a concatenation of atlas number (30), element number (5), and record number.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links directly to the BIORES table or the flat format BIOFILE table

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED  
DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN  
VALUE DEFINITION:**

---

1-N

Unique number

---

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1. DETAILED DESCRIPTION: REPTILES**

Reptiles and amphibians depicted in the San Francisco Bay atlas are limited to rare and endangered species including Western pond turtle and California tiger salamander. These species are only shown when they occur near estuarine shorelines or habitats, or when they are located near potential staging or access sites (where spill-related disturbance would be possible). In most cases, these species were mapped from published and expert sources, using USGS topographic maps and/or SFEI baylands habitat data for spatial referencing. CDFG’s NDDDB records were used to assist data development and review, however, all NDDDB records were omitted from the final digital data set. The CDFG Natural Heritage Division (telephone number: 916/445-6383) should be consulted for the most complete and up-to-date digital NDDDB information.

Concentration is indicated as “present” where more detailed concentration information was not appropriate or not available. “High,” “medium,” or “low” concentrations were used whenever possible. For turtles and amphibians, the life-history columns indicate nesting, hatching, juvenile, and adult time-periods. For turtles, nesting refers to the time when adults construct nests and deposit eggs. Hatching refers to the time when young turtles are hatching and emerging from the nests. For amphibians, nesting refers to the general time when adults are breeding and laying eggs.

The following REPTILES species are found in the San Francisco Bay ESI atlas:

SPECIES ID	NAME
53	California tiger salamander
58	Western pond turtle

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>GT-Polygons</u>	ID            integer RARNUM      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 BIO\_LUT table. ID is a concatenation of atlas number (30), element number (6), and record number. ID values of 9999 are holes in polygons and do not contain information.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links directly to the BIORES table or the flat format BIOFILE table

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

1-N

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

Unique number

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1. DETAILED DESCRIPTION: SEASONAL**

The data table SEASONAL specifies the month when each species is present.

**5.1.1. ENTITY TYPES:**

<b>5.1.1.1. ENTITY TYPE LABEL:</b>	<b>5.1.1.2. ENTITY TYPE DEFINITION:</b>	
<u>Attributes</u>	ELEMENT	character
	SPECIES_ID	integer
	SEASON_ID	integer
	JAN	character
	FEB	character
	MAR	character
	APR	character
	MAY	character
	JUN	character
	JUL	character
	AUG	character
	SEP	character
	OCT	character
	NOV	character
	DEC	character
	EL_SPE_SEA	character

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

ELEMENT

**5.1.2.2. ATTRIBUTE DEFINITION:**

Major categories of biological data

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
BIRD	Birds
FISH	Fish
HABITAT	Habitats and Rare Plants
INVERT	Invertebrates
M_MAMMAL	Marine Mammals
REPTILE	Reptiles and Amphibians
T_MAMMAL	Terrestrial Mammals

**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:**

SPECIES\_ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

Numeric identifier for each species that is unique within each element and refers to a nationwide ESI species list maintained by NOAA.

**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-N

Unique number

**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:**

SEASON\_ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

Numeric identifier for the unique monthly presence and life history characteristics of each species at a given location. There can be one seasonality record per species, or the same species can have different monthly presence or breeding activities at different sites. When this occurs, a new record with a different SEASON\_ID is referenced

**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-N

Unique number

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:  
JAN

5.1.2.2. ATTRIBUTE DEFINITION:  
Present in January

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:
--	---

X

Present  
(blank) Not present

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:  
FEB

5.1.2.2. ATTRIBUTE DEFINITION:  
Present in February

5.1.2.3. ATTRIBUTE DEFINITION SOURCE:  
Research Planning, Inc.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
X	Present (blank) Not present
<b>5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:</b>	
Research Planning, Inc.	
<b>5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:</b> nominal	
<b>5.1.2.1. ATTRIBUTE LABEL:</b> MAR	
<b>5.1.2.2. ATTRIBUTE DEFINITION:</b> Present in March	
<b>5.1.2.3. ATTRIBUTE DEFINITION SOURCE:</b> Research Planning, Inc.	
<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
X	Present (blank) Not present
<b>5.1.2.4.1.3. ENUMERATED DOMAIN VALUE DEFINITION SOURCE:</b>	
Research Planning, Inc.	
<b>5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:</b> nominal	
<b>5.1.2.1. ATTRIBUTE LABEL:</b> APR	
<b>5.1.2.2. ATTRIBUTE DEFINITION:</b> Present in April	
<b>5.1.2.3. ATTRIBUTE DEFINITION SOURCE:</b> Research Planning, Inc.	



5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:	5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:
X	Present (blank) Not present

**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:**  
MAY

**5.1.2.2. ATTRIBUTE DEFINITION:**  
Present in May

**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:
X	Present (blank) Not present

**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:**  
JUN

**5.1.2.2. ATTRIBUTE DEFINITION:**  
Present in June

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**  
Research Planning, Inc.

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

X	Present (blank) Not present
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**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:**

JUL

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in July

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
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X	Present (blank) Not present
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**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:**

AUG

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in August

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
X	Present (blank) Not present

- 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:**  
SEP
- 5.1.2.2. ATTRIBUTE DEFINITION:**  
Present in September
- 5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**  
Research Planning, Inc.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
X	Present (blank) Not present

- 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:**  
OCT
- 5.1.2.2. ATTRIBUTE DEFINITION:**  
Present in October
- 5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**  
Research Planning, Inc.

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

X	Present (blank) Not present
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**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:**

NOV

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in November

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

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

X	Present (blank) Not present
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**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:**

DEC

**5.1.2.2. ATTRIBUTE DEFINITION:**

Present in December

**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:**

X

Present  
(blank) Not present

**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:**

EL\_SPE\_SEA

**5.1.2.2. ATTRIBUTE DEFINITION:**

Concatenation of the first character of the ELEMENT, the SPECIES\_ID, and the SEASON\_ID that provides a link from the BIORES table to the BREED 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.

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

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**5.1. DETAILED DESCRIPTION: SOC\_DAT**

The data table SOC\_DAT contains the human-use attributes and links to the data layers MGT and SOCECON either directly using HUNUM or through the unique ID using SOC\_LUT.

**5.1.1. ENTITY TYPES:**

**5.1.1.1. ENTITY TYPE LABEL:**

Attributes

**5.1.1.2. ENTITY TYPE DEFINITION:**

HUNUM integer  
 TYPE character  
 NAME character  
 CONTACT character  
 PHONE character  
 G\_SOURCE integer  
 A\_SOURCE integer

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

HUNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

A unique identifier that links to the SOC\_LUT lookup table or directly back to the MGT and SOCECON coverages

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

1-N

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

Unique link

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

TYPE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Identifies the feature type

**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:**

---

ACCESS	Access
AIRPORT	Airport
BEACH	Beach
BOAT RAMP	Boat Ramp
COAST GUARD	Coast Guard
COMMERCIAL FISHING	Commercial Fishing
FERRY	Ferry
HISTORICAL SITE	Historical Site
HOIST	Hoist
LOCK AND DAM	Lock and Dam
MARINA	Marina
NATIONAL PARK	National Park
PARK	Park
RECREATIONAL FISHING	Recreational Fishing
WATER INTAKE	Water Intake
WILDLIFE REFUGE	Wildlife Refuge

---

**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:**

NAME

**5.1.2.2. ATTRIBUTE DEFINITION:**

The feature name

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.



**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

24th Street Pier  
5th Avenue Marina  
Access  
Aeolian Yacht Club  
Alameda Estuary State Fishing Access  
Alameda Gateway Ferry Terminal  
Alameda Marina  
Alameda Naval Air Station  
Alameda Park Public Ramp  
Alameda Yacht Harbor  
Albany Mudflats State Ecological Reserve  
Alcatraz Island  
Alviso Marina  
Andersons Boat Yard  
Angel Island State Park  
Anthony Chabot Regional Park  
Antioch Boat Ramp  
Antioch Dunes National Wildlife Refuge  
Antioch Fishing Pier  
Antioch Marina  
Antioch Regional Shoreline  
Anza Expedition Historical Marker  
Ardenwood Historic Farm Regional Pres.  
Army Corp. of Engineers - Hist. Vessels  
Bair Island State Ecological Reserve  
Bakers Beach  
Ballena Isle Marina  
Barnhill Marina  
Bel Marin Keys Lagoon with Locks  
Belden's Landing State Fishing Access  
Benecia Marina  
Benecia Marina Boat Ramp  
Benecia State Recreation Area  
Berkeley State Fishing Pier

**ENUMERATED DOMAIN VALUE:**

---

Berkley Fishing Pier  
Berkley Marina  
Berkley Marina Sport Center Berkley Marine Center  
Black Point Boat Ramp  
Black Point Launching Ramp  
Boat Ramp  
Brickyard Cover Marina  
Brisbane Fishing Pier  
Brisbane Marina  
Brisbane Shoreline and Lagoon  
Brisbane State Fishing Pier  
Brooks Island Regional Preserve  
Bucks Landing  
Cal Coast Marine  
Candlestick Park Fishing Pier  
Carquinez Strait Regional Shoreline  
Carusos Sportfishing Center  
Central Harbor Marina  
Channel Marina  
Charles Lee Tilden Regional Park  
China Beach  
China Camp  
China Camp Fishing Pier  
China Camp State Park  
Claremont Canyon Regional Preserve  
Clipper Yacht Harbor #1  
Clipper Yacht Harbor (# 2, 3, 4)  
Coast Guard  
Coast Guard Reservation  
Coastal Access Location  
Corinthian Yacht Club  
Corte Madera Marsh State Ecological Res.  
Coyote Hills Regional Park

**ENUMERATED DOMAIN VALUE:**

---

Coyote Point Marina  
Coyote Point State Public Access  
Crissy Field Beach Crockett Marine Service  
Curtola Parkway Ramp  
Cutoff Slough State Public Access  
Cutting's Wharf Boat Ramp  
Deckers Richmond Yacht Harbor  
Docktown Marina  
Don O. Edwards San Francisco Bay NWR  
East Bay Launching Facility  
Edgerly Island Boat Ramp  
Embarcadero Cove Enterprise  
Embarcadero Cove Marina  
Emery Cove Marina  
Emeryville Fishing Pier  
Emeryville Marina  
Emeryville Sport Fishing  
Encinal Boat Ramp  
Encinal Yacht Club  
Estuary Park Ramp  
Fagan Marsh State Ecological Reserve  
Ferry  
Ferry Terminal  
Fisherman's Wharf  
Fishermans Wharf  
Fishing Pier  
Fort Mason Piers  
Fort Point National Historic Site  
Fort Point Pier  
Fortmann Marina  
Foster City Water Intake  
Franklin D. Roosevelt State Fishing Pier  
Garin/Dry Creek Pioneer Regional Parks  
Gas House Cove Marina

**ENUMERATED DOMAIN VALUE:**

---

George Lowy Marina  
George Miller Jr./John T. Knox Reg. Shor  
Glen Cove Marina  
Glen Cove Waterfront Park and Marina  
Gnoss Field  
Golden Gate National Recreation Area  
Grand St. Municipal Ramp  
Grizzly Island State Wildlife Area  
Grove Street Pier  
Harris Yacht Harbor  
Hayward Air Terminal  
Hayward Regional Shoreline  
Heliport  
Herring Gillnet Fishery  
Hill Slough State Wildlife Area  
Historical Site  
Hoist  
Horizons Charter and Yachting  
Huckleberry Botanic Regional Preserve  
Hudeman Slough State Fishing Access  
Hyde Street Pier (Historical Ships)  
Jack London Marina  
Josephs Fishing Resort  
Kappas Yacht Harbor  
Kennedy Grove Regional Recreation Area  
Knowland State Arboretum and Park  
Lake Merritt Boat House  
Landing Field  
Landing Strip  
Lani Kai Harbor  
Larkspur Landing Ferry Terminal  
Leona Heights Open Space Regional Pres.  
Loch Lomond Marina  
Lower Sherman Island State Wildlife Area  
Lowrie Yacht Harbor

**ENUMERATED DOMAIN VALUE:**

---

Marin Mare Island Power Plant  
Islands National Wildlife Refuge  
Marin Yacht Club  
Marina  
Marina Bay Boathouse  
Marina Bay Yacht Harbor  
Marina Green Jetty  
Marina Lagoon - Parkside Aquatic  
Marina Village Yacht Harbor  
Marinship Yacht Harbor  
Mariposa Hunters Point YC  
Martin Luther King, Jr. Reg. Shoreline  
Martinez Marina  
Martinez Regional Shoreline  
Martinez State Fishing Pier  
Matthew Turner Shipyard Park  
Mcavoy Yacht Harbor  
Mcinnis Park Boat Ramp  
Mcnear's Beach State Fishing Pier  
Mcnears Beach Park  
Metropolitan Oakland Int'l. Airport  
Mira Monte Marina  
Mission Creek Harbor Assoc.  
Mission Peak Regional Preserve  
Mission Rock Pier  
Montezuma Boat Ramp  
Montezuma Slough State Public Access  
Mount Tamalpais State Park  
Muir Wood National Monument  
Napa County Airport  
Napa Valley Marina  
Napa-Sonoma Marshes State Wildlife Area  
Norcal Boat Yard  
Oakland Airport Boat Ramp  
Oakland Yacht Club

**ENUMERATED DOMAIN VALUE:**

---

Oyster Bay Regional Shoreline  
Oyster Cove Marina  
Oyster Point Fishing Pier  
Oyster Point Marina  
Oyster Point State Fishing Pier  
Palo Alto Airport  
Palo Alto Yacht Club  
Palo Alto Yacht Harbor  
Paradise Beach Fishing Pier  
Paradise Beach Park  
Paradise Beach State Fishing Pier  
Paradise Cay Yacht Harbor  
Pauls Boat Harbor  
Pelican Yacht Harbor  
Peninsula Marina  
Petaluma Marsh State Wildlife Area  
Petaluma River State Fishing Access  
Petes Harbor  
Peytonia Slough State Ecological Reserve  
Pier 39 Marina  
Pier 7 Fishing Pier  
Pierce Harbor  
Pierce Harbor Boat Ramp  
Pittsburg Fishing Pier  
Pittsburg Marina  
Pittsburg State Fishing Pier  
Point Benicia Fishing Pier  
Point Benicia State Fishing Pier  
Point Edith State Wildlife Area  
Point Isabel Regional Shoreline  
Point Pinole Fishing Pier  
Point Pinole Regional Shoreline  
Point Pinole State Fishing Pier  
Point San Pablo Yacht Club

**ENUMERATED DOMAIN VALUE:**

---

Point San Pablo Yacht Harbor  
Port of Redwood City  
Port of Redwood City Launch Ramp  
Port Sonoma Marina  
Port Suisun  
Presidio Drinking Water Intake  
Presidio Yacht Club  
Procedures Seafood Inc.  
Public Boat Ramp  
Recreational Fishing  
Red And White Ferry  
Redrock Marina  
Redwood Regional Park  
Redwood Shores State Ecological Reserve  
Richmond Boat Works  
Richmond Marina Bay  
Richmond Municipal Pier  
Richmond Yacht Club  
Richmond Yacht Harbor Ltd.  
Richmond Yacht Service  
Riverview Harbor Marina  
Robert Crown Memorial State Beach  
Robert Sibley Volcanic Regional Preserve  
Robert W. Crown Memorial State Beach  
Rodeo Marina  
San Bruno Mountain State Ecological Res.  
San Carlos Airport  
San Francisco International Airport  
San Francisco Marina  
San Francisco Municipal Pier  
San Francisco Yacht Club  
San Leandro Fishing Pier  
San Leandro Marina  
San Mateo County Fishing Pier

**ENUMERATED DOMAIN VALUE:**

---

San Mateo Marina  
San Mateo State Fishing Pier  
San Pablo Bay National Wildlife Refuge  
San Pablo Bay Regional Shoreline  
San Pablo Bay State Wildlife Area  
San Rafael Yacht Harbor  
Sanford Wood Boatyard  
Sausalito Ferry  
Sausalito Yacht Harbor  
Schoonmaker Marina  
Seabird Sailing  
Seabreeze Yacht Center  
Sharp Park State Beach  
Sharp Park State Public Access  
Sherman Island Boat Ramp  
Sky Sailing Airport  
Sobrante Ridge Botanic Regional Preserve  
Solano Yacht Club  
South Bay Boat Works Inc.  
South Beach Harbor  
South Beach Harbor - Pier 40  
St. Francis Yacht Club  
Steinberger Slough Water Intake  
Suisun City Boat Landing  
Suisun City Boat Ramp  
Suisun Marina and Boat Works  
Suisun Marsh State Public Access  
Temescal Regional Recreation Area  
Tiburon Ferry  
Tiburon Yacht Club  
Travis Air Force Base  
Treasure Island Marina  
Turney Street Launching Ramp  
Union Point Basin Marina



**ENUMERATED DOMAIN VALUE:**

---

U.S. Coast Guard Support Center  
U.S. Naval Air Station  
Vallejo Fishing Pier  
Vallejo Municipal Marina  
Vallejo Transit Ferry Dock  
Vallejo Yacht Club  
Water Intake  
Western Boat Shop  
Wildcat Canyon Regional Park  
Wilson's Marina Market

---

**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:**

CONTACT

**5.1.2.2. ATTRIBUTE DEFINITION:**

Contact person

**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:**

PHONE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Telephone number

**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:**

G\_SOURCE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Geographic source identifier that links to the SOURCES 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:**

---

1-N

Unique link

---

**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:**

A\_SOURCE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Attribute source identifier that links to the SOURCES 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:**

---

1-N

Unique link

---

**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: SOC\_LUT**

Lookup table to link SOC\_DAT to SOCECON and MGT data layers.

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>Attributes</u>	HUNUM integer
	ID integer

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

HUNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

A unique identifier that links SOCECON and MGT to the SOC\_DAT data table

**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:**

ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

A unique identifier that links SOC\_LUT to the SOCECON and MGT data layers

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

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**5.1. DETAILED DESCRIPTION: SOCECON**

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

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>Complete Chains</u>	TYPE character
<u>Entity Points</u>	TYPE character
	ID integer
	HUNUM integer

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

TYPE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Identifies a line or point with a socio-economic, or human-use, feature. This attribute allows direct access to the type of feature instead of linking to the more detailed SOC\_DAT 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:
A2	Access (Point)
A	Airport (Point)
B	Beach (Point)
BR	Boat Ramp (Point)
CG	Coast Guard (Point)
CF	Commercial Fishing (Point)
F	Ferry (Point)
HS	Historical Site (Point)
H	Hoist (Point)
LD	Lock and Dam (Point)
M	Marina (Point)
R	Road
RF	Recreational Fishing (Point)
WI	Water Intake (Point)

**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 that links to the SOC\_LUT table. ID is a concatenation of atlas number (30), element number (10), and record number.

**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

**5.1.2.1. ATTRIBUTE LABEL:**

HUNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links directly to the SOC\_DAT table.

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED  
DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN  
VALUE DEFINITION:**

---

1-N

Unique number

---

**5.1.2.4.1.3. ENUMERATED DOMAIN VALUE**

**DEFINITION SOURCE:**

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1. DETAILED DESCRIPTION: SOURCES**

The data table SOURCES contains the primary sources used to create the ESI atlas.

**5.1.1. ENTITY TYPES:**

**5.1.1.1. ENTITY TYPE LABEL:**

**5.1.1.2. ENTITY TYPE DEFINITION:**

---

<u>Attributes</u>	SOURCE_ID	integer
	ORIGINATOR	character
	DATE_PUB	integer
	TITLE	character
	DATA_FORMAT	character
	PUBLICATION	character
	SCALE	character
	TIME_PERIOD	character

---

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

SOURCE\_ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

Source identifier that links to G\_SOURCE, S\_SOURCE, and A\_SOURCE found in the BIORES, BIOFILE and SOC\_DAT tables.

**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-N	Unique number
-----	---------------

---

**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:**  
ORIGINATOR

**5.1.2.2. ATTRIBUTE DEFINITION:**  
Author of the data set

**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:**  
DATE\_PUB

**5.1.2.2. ATTRIBUTE DEFINITION:**  
Date of data collection or publication

**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-N

The first two integers are the month and the last four are the year. If month is unknown, only the four-digit year is entered

**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:**  
TITLE

**5.1.2.2. ATTRIBUTE DEFINITION:**  
Title of the source data set or document

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**  
Originator who provided data, or RPI for personal interviews with resource experts

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**  
nominal



**5.1.2.1. ATTRIBUTE LABEL:**

DATA\_FORMAT

**5.1.2.2. ATTRIBUTE DEFINITION:**

The format of the source data set

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Digital Point

Digital Point, Digital Polygons

Digital Polygons

Digital Polygons and Arcs

Expert

Hardcopy Maps

Hardcopy Maps and Tables

Hardcopy Tables

Hardcopy Tables and Text

Hardcopy Text

Hardcopy Text and Maps

---

**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:**

PUBLICATION

**5.1.2.2. ATTRIBUTE DEFINITION:**

Additional citation information

**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:**

SCALE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Source scale denominator

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

ordinal

**5.1.2.1. ATTRIBUTE LABEL:**

TIME\_PERIOD

**5.1.2.2. ATTRIBUTE DEFINITION:**

Date(s) of data collection

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1. DETAILED DESCRIPTION: SPECIES**

The data table SPECIES identifies all species used in the ESI atlas.

**5.1.1. ENTITY TYPES:**

5.1.1.1. ENTITY TYPE LABEL:	5.1.1.2. ENTITY TYPE DEFINITION:
<u>Attributes</u>	
	SPECIES_ID integer
	NAME character
	GEN_SPEC character
	ELEMENT character
	SUBELEMENT character
	NHP character
	DATE_PUB integer
	EL_SPE character

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

SPECIES\_ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

Numeric identifier for each species that is unique within each element and refers to a nationwide ESI species list maintained by NOAA

**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-N	Unique number

**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:**

NAME

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species common name

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Alameda song sparrow  
American avocet  
American coot  
American white pelican  
Black oystercatcher  
Black skimmer  
Black-crowned night-heron  
Black-necked stilt  
Brandt's cormorant  
Burrowing owl  
California black rail  
California brown pelican  
California clapper rail  
California gull  
California least tern  
Canada goose  
Canvasback  
Caspian tern  
Cattle egret  
Clark's grebe  
Common moorhen  
Common murre  
Dabbling ducks  
Diving ducks  
Double-crested cormorant  
Egrets  
Forster's tern  
Golden eagle  
Great blue heron  
Great egret  
Greater white-fronted goose

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Gulls  
 Heron  
 Killdeer  
 Little blue heron  
 Northern harrier  
 Northern pintail  
 Pelagic cormorant  
 Peregrine falcon  
 Pigeon guillemot  
 Red-necked (Northern) phalarope  
 Ruddy duck  
 Saltmarsh common yellowthroat  
 San Pablo song sparrow  
 Shorebirds  
 Short-eared owl  
 Snow goose  
 Snowy egret  
 Sora  
 Suisun song sparrow  
 Terns  
 Tundra (whistling) swan  
 Virginia rail  
 Wading birds  
 Waterfowl  
 Western grebe  
 Western gull  
 Western snowy plover  
 White-tailed kite  
 American shad  
 Bat ray  
 Brown rockfish  
 California halibut  
 Chinook salmon  
 Chinook salmon (fall)  
 Chinook salmon (late fall)  
 Chinook salmon (spring)  
 Chinook salmon (winter)  
 Delta smelt  
 English sole

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Green sturgeon  
Leopard shark  
Longfin smelt  
Pacific herring  
Rainbow trout (steelhead)  
Sacramento perch  
Sacramento splittail  
Starry flounder  
Striped bass  
White croaker  
White sturgeon  
Ambiguous indian paintbrush  
California seablite  
Contra Costa goldfields  
Delta tule pea  
Eelgrass  
Gracilaria  
Mason's lilaepsis  
Mojave seablite  
Nootka alkaligrass  
Point Reyes bird's-beak  
Rare plants  
Soft bird's-beak  
Suisun marsh aster  
Suisun thistle  
Vernal pool plants  
Yellowray goldfields  
Blacktail bay shrimp  
California bay shrimp  
Dungeness crab  
Japanese littleneck clam  
Mission blue butterfly  
Pacific rock crab  
Red rock crab  
Vernal pool tadpole shrimp  
California sea lion  
Harbor seal  
California tiger salamander  
Western pond turtle

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Northern river otter  
Salt-marsh harvest mouse  
Saltmarsh wandering shrew  
San Pablo vole  
Suisun ornate shrew

---

**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:**

GEN\_SPEC

**5.1.2.2. ATTRIBUTE DEFINITION:**

Species scientific name

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Melospiza melodia pusillula  
Recurvirostra americana  
Fulica americana  
Pelecanus erythrorhynchos  
Haematopus bachmani  
Rynchops niger  
Nycticorax nycticorax  
Himantopus mexicanus  
Phalacrocorax penicillatus  
Athene cunicularia hypugea  
Laterallus jamaicensis coturniculus  
Pelecanus occidentalis californicus  
Rallus longirostris obsoletus  
Larus californicus  
Sterna antillarum browni  
Branta canadensis  
Aythya valisineria  
Sterna caspia  
Bubulcus ibis

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Aechmophorus clarkii  
Gallinula chloropus  
Uria aalge  
Phalacrocorax auritus  
Sterna forsteri  
Aquila chrysaetos  
Ardea herodias  
Ardea alba  
Anser albifrons  
Charadrius vociferus  
Egretta caerulea  
Circus cyaneus  
Anas acuta  
Phalacrocorax pelagicus  
Falco peregrinus  
Cepphus columba  
Phalaropus lobatus  
Oxyura jamaicensis  
Geothlypis trichas sinuosa  
Melospiza melodia samuelis  
Asio flammeus  
Chen caerulescens  
Egretta thula  
Porzana carolina  
Melospiza melodia maxillaris  
Cygnus columbianus  
Rallus limicola  
Aechmophorus occidentalis  
Larus occidentalis  
Charadrius alexandrinus nivosus  
Elanus leucurus  
Alosa sapidissima  
Myliobatis californica  
Sebastes auriculatus  
Paralichthys californicus  
Oncorhynchus tshawytscha  
Oncorhynchus tshawytscha (fall)  
Oncorhynchus tshawytscha (late fall)



**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

*Oncorhynchus tshawytscha* (spring)  
*Oncorhynchus tshawytscha* (winter)  
*Hypomesus transpacificus*  
*Pleuronectes vetulus*  
*Acipenser medirostris*  
*Triakis semifasciata*  
*Spirinchus thaleichthys*  
*Clupea pallasii*  
*Oncorhynchus mykiss*  
*Archoplites interruptus*  
*Pogonichthys macrolepidotus*  
*Platichthys stellatus*  
*Morone saxatilis*  
*Genyonemus lineatus*  
*Acipenser transmontanus*  
*Castilleja ambigua*  
*Suaeda californica*  
*Lasthenia conjugens*  
*Lathyrus jepsonii jepsonii*  
*Zostera marina*  
*Gracilaria* sp.  
*Lilaeopsis masonii*  
*Suaeda moquinii*  
*Puccinellia nutkaensis*  
*Cordylanthus maritimus palustris*  
*Cordylanthus mollis mollis*  
*Aster lentus*  
*Cirsium hydrophilum hydrophilum*  
*Lasthenia glabrata*  
*Crangon nigricauda*  
*Crangon franciscorum*  
*Cancer magister*  
*Tapes philippinarum*  
*Icaricia icariodes missionensis*  
*Cancer antennarius*  
*Cancer productus*  
*Lepidurus packardii*  
*Zalophus californianus*

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

Phoca vitulina  
 Ambystoma californiense  
 Clemmys marmorata  
 Lutra canadensis  
 Reithrodontomys raviventris  
 Sorex vagrans halicoetes  
 Microtus californicus sanpabloensis  
 Sorex ornatus sinuosus

---

**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:**

ELEMENT

**5.1.2.2. ATTRIBUTE DEFINITION:**

Biological element

**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:**

---

BIRD	Birds
FISH	Fish
HABITAT	Habitats and Rare Plants
INVERT	Invertebrates
M_MAMMAL	Marine Mammals
REPTILE	Reptiles and Amphibians
T_MAMMAL	Terrestrial Mammals

---

**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:**  
SUBELEMENT

**5.1.2.2. ATTRIBUTE DEFINITION:**  
Species subgroup

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**  
Research Planning, Inc.

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

alcid  
algae  
amphibian  
bivalve  
crab  
diadromous  
diving  
e\_nursery  
e\_resident  
freshwater  
gull\_tern  
insect  
m\_benthic  
passerine  
pinniped  
plant  
raptor  
sav  
shorebird  
shrimp  
sm\_mammal  
turtle  
wading  
waterfowl  
wetland

---

**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:**

NHP

**5.1.2.2. ATTRIBUTE DEFINITION:**

Natural Heritage Program global conservation status ranking (see Master, 1991, Conservation Biology, 5:559-563, for full definitions)

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NHP

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

---

G1	Critically imperiled
G1G2	Range rank, critically imperiled to imperiled
G1T1	Critically imperiled species and subspecies
G2	Imperiled
G2G3	Range rank, imperiled to vulnerable
G2T1	Imperiled species, critically imperiled subspecies
G3	Vulnerable
G3T2	Vulnerable species, imperiled subspecies
G4	Apparently secure
G4G5	Range rank, apparently secure to secure
G4T1	Apparently secure species, critically imperiled subspecies
G4T2	Apparently secure species, imperiled subspecies
G4T2T3	Apparently secure species, subspecies rang rank of imperiled to vulnerable
G4T3	Apparently secure species, vulnerable subspecies
G5	Secure
G5T1	Secure species, critically imperiled subspecies
G5T1T2	Secure species, subspecies range rank of critically imperiled to imperiled
G5T2	Secure species, imperiled subspecies
G5T2?	Secure species, imperiled subspecies, inexact rank

---

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

NHP

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

ordinal

**5.1.2.1. ATTRIBUTE LABEL:**

DATE\_PUB

**5.1.2.2. ATTRIBUTE DEFINITION:**

Date of NHP listing

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED  
DOMAIN VALUE:**

0  
121996

**5.1.2.4.1.2. ENUMERATED DOMAIN  
VALUE DEFINITION:**

Not listed by NHP  
Date of NHP list

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

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

EL\_SPE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Concatenation of the first character of the ELEMENT and the SPECIES\_ID, which provides the link from the BIORES 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.

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

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**5.1. DETAILED DESCRIPTION: STATUS**

The data table STATUS identifies the species that are listed as either threatened or endangered on state or federal lists.

**5.1.1. ENTITY TYPES:**

<b>5.1.1.1. ENTITY TYPE LABEL:</b>	<b>5.1.1.2. ENTITY TYPE DEFINITION:</b>
<u>Attributes</u>	ELEMENT character SPECIES_ID integer STATE character S_F character T_E character DATE_PUB integer EL_SPE character

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

ELEMENT

**5.1.2.2. ATTRIBUTE DEFINITION:**

Major categories of biological data

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

<b>5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:</b>	<b>5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:</b>
BIRD	Birds
FISH	Fish
HABITAT	Habitats and Rare Plants
INVERT	Invertebrates
M_MAMMAL	Marine Mammals
REPTILE	Reptiles and Amphibians
T_MAMMAL	Terrestrial Mammals

**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:**  
SPECIES\_ID

**5.1.2.2. ATTRIBUTE DEFINITION:**  
Numeric identifier for each species and is unique within each element and refers to a nationwide ESI species list maintained by NOAA

**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-N

Unique number

---

**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:**  
STATE

**5.1.2.2. ATTRIBUTE DEFINITION:**  
Two-letter state abbreviation

**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:**

---

CA

California

---

**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:**

S\_F

**5.1.2.2. ATTRIBUTE DEFINITION:**

State and Federal status

**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:**

---

F	Federally listed
S	State listed
S/F	State and Federally listed

---

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

USFWS, CDFG

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

T\_E

**5.1.2.2. ATTRIBUTE DEFINITION:**

Threatened and endangered status

**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:**

---

E	Endangered
E/E	Endangered on Federal and State lists
T	Threatened
T/T	Threatened on Federal and State lists

---

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

USFWS, CDFG

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

**5.1.2.1. ATTRIBUTE LABEL:**

DATE\_PUB

**5.1.2.2. ATTRIBUTE DEFINITION:**

Date of NHP listing

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

---

31998

91995

---

**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:**

EL\_SPE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Concatenation of the first character of the ELEMENT and the SPECIES\_ID, which provides the link from the BIORES and SPECIES tables.

**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

Terrestrial mammals depicted in this atlas emphasize rare and endangered small mammals that are closely associated with wetland habitats of the Bay, such as the salt-marsh harvest mouse, San Pablo vole, Suisun ornate shrew, and salt-marsh wandering shrew. In addition, areas with highly abundant populations of semi-aquatic fur-bearing mammals, such as the northern river otter, are also shown on the maps. For species closely associated with wetland habitats (such as tidal marshes), expert sources were used in conjunction with the SFEI bayland habitat maps and digital data to identify and delineate specific locations for each species. River otter distributions are based on expert opinion, and are depicted mainly in aquatic habitats such as in or along certain rivers and sloughs. CDFG's NDDDB records were used in assisting resource experts during data development and review, however, all NDDDB records were omitted from the final digital data set. The CDFG Natural Heritage Division (telephone number: 916/445-6383) should be consulted for the most complete and up-to-date digital NDDDB information.

Concentrations for terrestrial mammals are indicated using descriptive terms such as "present," "potential," "very high," "high," "medium," "low," etc. "Present" is used for endangered or rare species that were known to occur at a site, where more detailed concentration information was not appropriate or not available. "Potential" is used for rare or endangered species that are likely or suspected to occur at a site. The "high," "medium," and "low" categories are used whenever possible, and represent the opinion of local resource managers or experts on relative concentrations in the study area.

The following T\_MAMMAL species are found in the San Francisco Bay ESI atlas:

SPECIES ID	NAME
2	Saltmarsh wandering shrew
3	Suisun ornate shrew
7	San Pablo vole
8	Northern river otter
41	Salt-marsh harvest mouse

**5.1.1. ENTITY TYPES:**

**5.1.1.1. ENTITY TYPE LABEL:**

GT-Polygons

**5.1.1.2. ENTITY TYPE DEFINITION:**

ID	integer
RARNUM	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 BIO\_LUT table. ID is a concatenation of atlas number (30), element number (4), and record number. ID values of 9999 are holes in polygons and do not contain information.

**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

**5.1.2.1. ATTRIBUTE LABEL:**

RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**

An identifier that links directly to the BIORES table or the flat format BIOFILE table

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

NOAA

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

1-N

**5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION:**

Unique number

**5.1.2.4.1.3. ENUMERATED DOMAIN VALUE**

**DEFINITION SOURCE:**

NOAA

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

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## 6.0. DISTRIBUTION INFORMATION

### 6.1. DISTRIBUTOR

#### 6.1.1. CONTACT PERSON PRIMARY

##### 6.1.1.1. CONTACT PERSON:

John Kaperick

##### 6.1.1.2. CONTACT ORGANIZATION:

NOAA, Office of Response and Restoration

#### 6.1.4. CONTACT ADDRESS

##### 6.1.4.1. ADDRESS TYPE:

Physical Address

##### 6.1.4.2. ADDRESS:

7600 Sand Point Way N.E.

##### 6.1.4.3. CITY:

Seattle

##### 6.1.4.4. STATE OR PROVINCE:

WA

##### 6.1.4.5. POSTAL CODE:

98115-6349

#### 6.1.5. CONTACT VOICE TELEPHONE:

(206) 526-6400

#### 6.1.7. CONTACT FACSIMILE TELEPHONE:

(206) 526-6329

### 6.2. RESOURCE DESCRIPTION:

ESI Atlas for San Francisco Bay

### 6.3. DISTRIBUTION LIABILITY:

Although these data have 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:**

199901

**7.2. METADATA REVIEW DATE:**

199901

**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, Office of Response and Restoration

**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.

**7.4.4.3. CITY:**

Seattle

**7.4.4.4. STATE OR PROVINCE:**

Washington

**7.4.4.5. POSTAL CODE:**

98115-6349

**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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