# 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. Data were compiled and digitized at Research Planning, Inc., Columbia, South Carolina.

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COMMENTS: Information was developed using the U.S. Federal Geographic Data Committee's Content Standards for Digital Geospatial Metadata, June 8, 1994. The numbering scheme matches the 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 98115-0070; State of California, Department of Fish and Game, Office of Oil Spill Response and Prevention, Sacramento, California; and Research Planning, Inc. (RPI), 1121 Park Street, Post Office Box 328, Columbia, South Carolina 29202

### 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 98115-0070

**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 98115-0070

**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 this data. Acknowledgment of NOAA, RPI, and other 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 98115-0070 and the State of California, Department of Fish and Game, Office of Oil Spill Response and Prevention, 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:

| | | |
|---|---|---|
| arc_lut.e00 | birds.e00 | biores.e00 |
| breed.e00 | esi.e00 | fish.e00 |
| habitats.e00 | hydro.e00 | index.e00 |
| invert.e00 | mgt.e00 | m_mammal.e00 |
| nests.e00 | pnts_lut.e00 | poly_lut.e00 |
| reptile.e00 | seasonal.e00 | soc_data.e00 |
| soc_lut.e00 | socecon.e00 | sources.e00 |
| species.e00 | status.e00 | |

The entire data set is approximately 30 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 review the entire series of maps, check all data, and make final edits. The data are then merged to form the study-wide layers. The data merging includes a final quality control check where labels, chains, and polygons are checked for attribute accuracy.

To finalize the data checking process, each coverage is checked using a standardized form by two GIS personnel (a technician and the GIS manager), and each attribute database is checked using several programs that test the files for missing or duplicate data, rules for proper coding, GIS topological consistencies (such as dangles, unnecessary nodes, etc.), and ORACLE® to ARC/INFO® consistencies. A final review is made by the GIS manager, where data is written to tape and metadata is written.

## 2.3. COMPLETENESS REPORT:

Shoreline Habitat Mapping:

The 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 polygon coverage (BIRDS, FISH, HABITATS, INVERT, M_MAMMAL, REPTILES and T_MAMMAL) is linked to the Biological Resources table (BIORES) using the lookup table POLY_LUT. The bird point coverage (NESTS) is linked to the BIORES table using the lookup table PNTS_LUT. The FISH line (arc) coverage is linked to the BIORES table using the lookup table ARC_LUT. The items in BIORES are: 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.

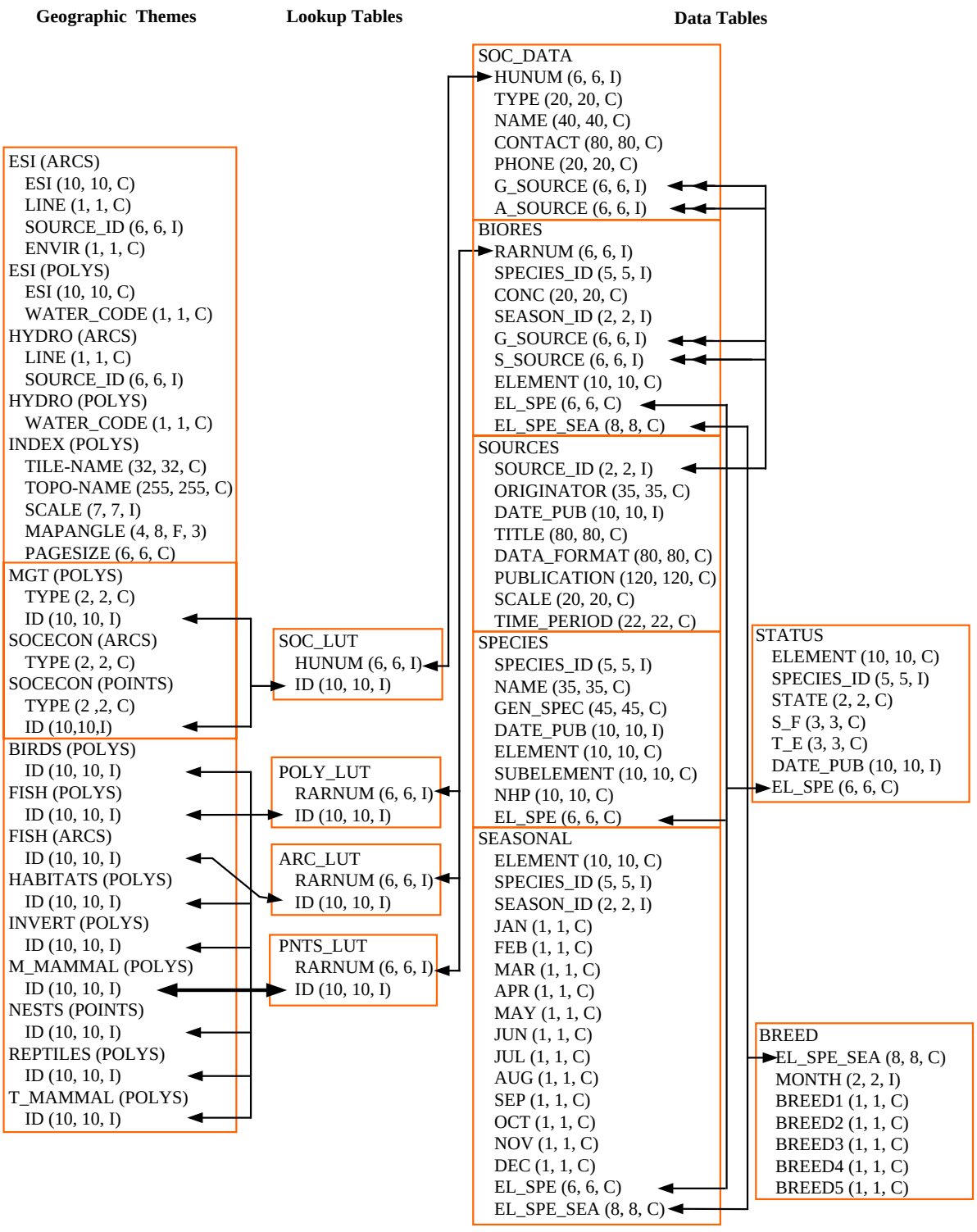


**FIGURE 1.** Relationship between biology coverages and attribute files.

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 |
| | waterfowl |
| FISH | diadromous |
| | e_nursery |
| | e_resident |
| | freshwater |
| | m_benthic |
| MARINE MAMMAL | pinniped |
| HABITAT | algae |
| | plant |
| | 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 HABITATS 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.

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 coverage SOCECON and managed area polygonal data are stored in the MGT coverage.

Both data sets are linked to the data table SOC_DATA 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 | | |
| | | | |
| **Complete Chains** | | | |
| **Feature** | **TYPE** | | |
| Bridge | R | | |

The table SOC_DATA 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 uses USGS 1:24,000 topographic quadrangles as the base map. It is estimated that the ESI has a minimum mapping unit of 50 feet. The biological data sets are developed primarily using regional experts who estimate concentration areas. Unlike shorelines, which maintain relative spatial stability through time, the biological data by nature migrate across the landscape. Therefore, the 1:24,000

USGS quadrangles are used as a base map in gathering the data but the data have "fuzzy" boundaries which must be understood when utilizing this information.

## 2.5. LINEAGE

### 2.5.1. SOURCE INFORMATION:

Coverage or theme name: BIRDS

#### 2.5.1.1. SOURCE CITATION

| 2.5.1.1.1 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. 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 |

| 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 |
|---|---|---|---|---|---|---|
| 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 (NDDB) | 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 |

| 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 |

| 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 |
|---|---|---|---|---|---|---|
| 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 |

| 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 Denomi-nator | 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 Ecosys-tems 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 Denomi-nator | 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/ Photointer-preted 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

### 2.5.1.1. SOURCE CITATION

| 2.5.1.1.1 Originator | 2.5.1.1.2 Publication Date | 2.5.1.1.4 Title | 2.5.1.1.6 Geospatial Data Presentation Form | 2.5.1.1.8 Publication Information | 2.5.1.2 Source Scale Denomi-nator | 2.5.1.4 Source Time Period |
|---|---|---|---|---|---|---|
| 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 |

| 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 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 Denomi-nator | 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 |

| 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 |

| 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 |
|---|---|---|---|---|---|---|
| Science Applications International Corporation and Merkel and Associates | 1997 | Port of Richmond Eelgrass Surveys | Hardcopy maps | SAIC, Bothell, WA and Merkell 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 Wet-lands 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 (*Zostera marina L.*) in San Fran-cisco/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 Denomi-nator | 2.5.1.4 Source Time Period |
|---|---|---|---|---|---|---|
| M. Emmett | (Unknown) | Eelgrass (*Zostera marina 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 Denomi-nator | 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/ Photoiner-preted 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

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

### 2.5.1. SOURCE INFORMATION:

Coverage or theme name: INVERT

#### 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 |
|---|---|---|---|---|---|---|
| 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 Denomi-nator | 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 Abun-dance 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 Denomi-nator | 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 |

| 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 |
|---|---|---|---|---|---|---|
| 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 Denomi-nator | 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**

| 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. 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**

| 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 |
| 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 Denomi-nator | 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 Denomi-nator | 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 |

| 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 Denomi-nator | 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 Denomi-nator | 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 |

| 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 coverage. The first layer of information digitized was the shoreline with ESI classification. The digital shoreline was attributed with the ESI classification during field work, 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 was 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 HAZMAT

**2.5.2.6.3. CONTACT POSITION:**
GIS Manager

**2.5.2.6.4. CONTACT ADDRESS**

**2.5.2.6.4.1. ADDRESS TYPE:**
Physical Address

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

**2.5.2.6.4.3. CITY:**
Seattle

**2.5.2.6.4.4. STATE OR PROVINCE:**
W A

**2.5.2.6.4.5. POSTAL CODE:**
98115-0070

**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

# 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 | 1,220 | 1,220 | 2,838 | 221,892 | | | 2,005 |
| ESI | 1 | 1,274 | 1,274 | 5,357 | 200,113 | | | 4,515 |
| FISH | 1 | 646 | 646 | 1,528 | 208,075 | | | 1,202 |
| HABITATS | 1 | 234 | 234 | 356 | 58,017 | | | 295 |
| HYDRO | 1 | 526 | 526 | 3,226 | 177,555 | 191 | | 3,227 |
| INDEX | 1 | 27 | 27 | 72 | 72 | | | 46 |
| INVERT | 1 | 639 | 639 | 1,472 | 175,352 | | | 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 | 332 | 332 | 619 | 111,434 | | | 554 |

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## 4.0. SPATIAL REFERENCE INFORMATION

### 4.1. HORIZONTAL COORDINATE SYSTEM DEFINITION

#### 4.1.2. PLANAR

##### 4.1.2.1. MAP PROJECTION

**4.1.2.1.1. MAP PROJECTION NAME:**

ALBERS CONICAL EQUAL AREA

**4.1.2.1.1.2. MAP PROJECTION PARAMETERS :**

1st **STANDARD PARALLEL:**
34.0
2nd **STANDARD PARALLEL:**
40.5
**LONGITUDE OF CENTRAL MERIDIAN:**
-120.0
**LATITUDE OF PROJECTION ORIGIN:**
0
**FALSE EASTING:**
0
**FALSE NORTHING:**
-4,000,000

##### 4.1.2.4. PLANAR COORDINATE INFORMATION

**4.1.2.4.1. PLANAR COORDINATE ENCODING METHOD:**

Coordinate Pair

**4.1.2.4.2. COORDINATE REPRESENTATION:**

**4.1.2.4.2.1. ABSCISSA RESOLUTION:**

50 feet

**4.1.2.4.2.2. ORDINATE RESOLUTION:**

50 feet

#### 4.1.4. GEODETIC MODEL

**4.1.4.1. HORIZONTAL DATUM NAME:**

North American Datum of 1927

**4.1.4.2. ELLIPSOID NAME:**

Clarke, 1866

**4.1.4.3. SEMI-MAJOR AXIS:**

6,378,206.4

**4.1.4.4. DENOMINATOR OF FLATTENING RATIO:**

294.98

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## 5.0. ENTITY AND ATTRIBUTE INFORMATION

### 5.1. DETAILED DESCRIPTION: ARC_LUT

Lookup table to link NESTS to BIORES data table.

#### 5.1.1. ENTITY TYPES:

| 5.1.1.1. ENTITY TYPE LABEL: | 5.1.1.2. ENTITY TYPE DEFINITION: | |
|---|---|---|
| Attributes | RARNUM | integer |
| | ID | integer |

#### 5.1.2. ATTRIBUTES:

**5.1.2.1. ATTRIBUTE LABEL:**
RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**
An identifier that links to the BIORES to FISH arcs

**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:**
An identifier that links PNTS_LUT to the NESTS data layer

**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: 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:

| 5.1.1.1. ENTITY TYPE LABEL: | 5.1.1.2. ENTITY TYPE DEFINITION: | |
|---|---|---|
| Attributes | 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 POLY_LUT, PNTS_LUT, and ARC_LUT lookup 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:**
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 at RPI and 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:**
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 is 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:**
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:**
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 | 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:**
EL_SPE

**5.1.2.2. ATTRIBUTE DEFINITION:**
Concatenation of the first character of the ELEMENT and SPECIES_ID

**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:**
EL_SPE_SEA

**5.1.2.2. ATTRIBUTE DEFINITION:**
Concatenation of the first character of the ELEMENT, SPECIES_ID, and SEASON_ID

**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. 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 murres, 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 Data Base (NDDB) records were used in assisting resource experts during data development and review, however, nearly all NDDB 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 NDDB 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.

| Assemblage | Species |
|---|---|
| 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 which were 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.

| **Shorebirds** | **Waterfowl** |
|---|---|
| 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.

**5.1.1. ENTITY TYPES:**

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

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

A unique identifier that links to the POLY_LUT table. ID is a concatenation of atlas number (30), element number (1), and record number. ID values of zero are holes in polygons and do not contain information.

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

| SPECIES ID | NAME |
|---|---|
| 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 |

| SPECIES ID | NAME |
|---|---|
| 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 |
| 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 |

**5.1.2.3. 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: 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: | |
|---|---|---|
| Attributes | 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, SPECIES_ID, and 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.

| 5.1.2.4.1.1. 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:**

MONTH

**5.1.2.2. ATTRIBUTE DEFINITION:**

Two-digit calendar month where each species for a particular seasonality. 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: |
|---|---|
| 1 | January |
| 2 | February |
| 3 | March |
| 4 | April |
| 5 | May |
| 6 | June |
| 7 | July |
| 8 | August |
| 9 | September |
| 10 | October |
| 11 | November |
| 12 | December |

**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 = internesting;
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: 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: | |
|---|---|---|
| Complete Chain | ESI | character |
| | LINE | character |
| | SOURCE_ID | integer |
| | ENVIR | character |
| GT-Polygons | ESI | character |
| | WATER_CODE | character |

### 5.1.2. ATTRIBUTES:

#### 5.1.2.1. ATTRIBUTE LABEL:

ESI

#### 5.1.2.2. ATTRIBUTE DEFINITION:

The 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.

| 5.1.2.4.1.1. ENUMERATED DOMAIN VALUE: | 5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION: |
|---|---|
| 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 |

| 5.1.2.4.1.1. ENUMERATED DOMAIN VALUE: | 5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION: |
|---|---|
| 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 |

| 5.1.2.4.1.1. ENUMERATED DOMAIN VALUE: | 5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION: |
|---|---|
| 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: |
|---|---|
| 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 |

| 5.1.2.4.1.1. ENUMERATED DOMAIN VALUE: | 5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION: |
|---|---|
| 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:**

ordered

**5.1.2.1. ATTRIBUTE LABEL:**

LINE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Type of geographic feature

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

| 5.1.2.4.1.1. ENUMERATED DOMAIN VALUE: | 5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION: |
|---|---|
| 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 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

**5.1.2.1. ATTRIBUTE LABEL:**

ENVIR

**5.1.2.2. ATTRIBUTE DEFINITION:**

Regional environment

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

| 5.1.2.4.1.1. ENUMERATED DOMAIN VALUE: | 5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION: |
|---|---|
| E | Estuarine |
| U | 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: | 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. DETAILED DESCRIPTION: FISH

The data layer FISH contains polygons and 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. 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.

The lower sections (mouths) of known anadromous rainbow trout (steelhead) and chinook salmon (non-Sacramento R.) spawning streams were

also 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.

| Stream Name | Species |
|---|---|
| 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 |
| 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 |

**TABLE 3.** Continued.

| Stream Name | Species |
|---|---|
| Coyote Creek | steelhead, chinook |
| Guadelupe River | steelhead, chinook |
| Saratoga Creek | steelhead |
| Redwood Creek | steelhead |
| Permanente Creek | steelhead |
| San Francisquito Creek | steelhead |

Polygons from California State Lands Commission (SLC) datasets 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 NDDB records were used in assisting resource experts during data development and review, however, all NDDB records were omitted from the final digital dataset. The CDFG Natural Heritage Division (telephone number: 916/445-6383) should be consulted for the most complete and up-to-date digital NDDB 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. 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.

**5.1.1. ENTITY TYPES:**

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

### 5.1.2. ATTRIBUTES:

#### 5.1.2.1. ATTRIBUTE LABEL:

ID

#### 5.1.2.2. ATTRIBUTE DEFINITION:

A unique identifier that links to the POLY_LUT table. ID is a concatenation of atlas number (30), element number (2), and record number. ID values of zero are holes in polygons and do not contain information.

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

| SPECIES ID | NAME |
|---|---|
| 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 |

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

| SPECIES ID | NAME |
|---|---|
| 68 | Chinook salmon |
| 74 | Rainbow trout (steelhead) |

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

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

Research Planning, Inc.

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

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## 5.1. DETAILED DESCRIPTION: HABITATS

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 lilaeopsis is one species particularly emphasized. This species was mapped using digital point records provided by SFEI. Because the exact locations of individual Mason's lilaeopsis 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 lilaeopsis is most likely to occur. Actual locations for this species will not cover the entire area indicated, but will occur at several discreet (though emphemeral) locations within the polygons. Additional records for Mason's lilaeopsis 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 NDDB records were used in assisting resource experts during data development and review, however, all NDDB records were omitted from the final digital dataset. The CDFG Natural Heritage Division (telephone

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

**5.1.1. ENTITY TYPES:**

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

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

A unique identifier that links to the POLY_LUT table. ID is a concatenation of atlas number (30), element number (3), and record number. ID values of zero are holes in polygons and do not contain information.

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 |

| SPECIES ID | NAME |
|---|---|
| 398 | Gracilaria |
| 399 | Nootka alkaligrass |
| 400 | Mojave seablite |
| 1029 | Vernal pool plants |

**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: 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:

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

The 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: | |
|---|---|---|
| GT-Polygons | TILE-NAME | character |
| | TOPO-NAME | character |
| | SCALE | integer |
| | MAPANGLE | floating point |
| | PAGESIZE | character |

### 5.1.2. ATTRIBUTES:

**5.1.2.1. ATTRIBUTE LABEL:**
TILE-NAME

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

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

ANTIOCH NORTH, CA. (1978)
BENICIA, CA. (1980)
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)

**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 |

**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. NDDB records were used by resource experts during data development and review, however, all NDDB records were omitted from the final digital dataset. The CDFG Natural Heritage Division (telephone number: 916/445-6383) should be consulted for the most complete and up-to-date digital NDDB 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.

**5.1.1. ENTITY TYPES:**

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

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

A unique identifier that links to the POLY_LUT table. ID is a concatenation of atlas number (30, element number (7), and record number. ID values of zero are holes in polygons and do not contain information.

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 |

| SPECIES ID | NAME |
|---|---|
| 26 | Japanese littleneck clam |
| 53 | Red rock crab |
| 57 | Pacific rock crab |
| 295 | Mission blue butterfly |

**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: MGT

The data layer MGT contains the managed area polygons.

### 5.1.1. ENTITY TYPES:

| 5.1.1.1. ENTITY TYPE LABEL: | 5.1.1.2. ENTITY TYPE DEFINITION: | |
|---|---|---|
| GT-Polygons | TYPE | character |
| | ID | 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_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: |
|---|---|
| NP | National Park |
| P | Park |
| W R | 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:**

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: 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.

### 5.1.1. ENTITY TYPES:

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

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

A unique identifier that links to the POLY_LUT table. ID is a concatenation of atlas number (30), element number (4), and record number. ID values of zero are holes in polygons and do not contain information.

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

| SPECIES ID | NAME |
|---|---|
| 2 | Harbor seal |
| 22 | California sea lion |

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

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

Research Planning, Inc.

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

## 5.1. DETAILED DESCRIPTION: NESTS

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 BIRDS data layer. Nesting sites or colonies for other species, including colonial nesting seabirds, are mapped as polygons, and are included in the BIRDS data layer.

### 5.1.1. ENTITY TYPES:

| 5.1.1.1. ENTITY TYPE LABEL: | 5.1.1.2. ENTITY TYPE DEFINITION: | |
|---|---|---|
| Entity Points | ID | integer |

### 5.1.2. ATTRIBUTES:

**5.1.2.1. ATTRIBUTE LABEL:**

ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

A unique identifier that links to the PNTS_LUT table. ID is a concatenation of atlas number (30), element number (5), and record number.

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 |

**5.1.2.3. 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: PNTS_LUT

Lookup table to link NESTS to BIORES data table.

### 5.1.1. ENTITY TYPES:

| 5.1.1.1. ENTITY TYPE LABEL: | 5.1.1.2. ENTITY TYPE DEFINITION: | |
|---|---|---|
| Attributes | RARNUM | integer |
| | ID | integer |

### 5.1.2. ATTRIBUTES:

**5.1.2.1. ATTRIBUTE LABEL:**
RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**
An identifier that links to the BIORES to PNTS_LUT

**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:**
An identifier that links PNTS_LUT to the NESTS data layer

**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: POLY_LUT

Lookup table to link biology polygon data layers to BIORES data table.

### 5.1.1. ENTITY TYPES:

| 5.1.1.1. ENTITY TYPE LABEL: | 5.1.1.2. ENTITY TYPE DEFINITION: | |
|---|---|---|
| Attributes | RARNUM | integer |
| | ID | integer |

### 5.1.2. ATTRIBUTES:

**5.1.2.1. ATTRIBUTE LABEL:**
RARNUM

**5.1.2.2. ATTRIBUTE DEFINITION:**
An identifier that links BIORES to the POLY_LUT

**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:**
An identifier that links POLY_LUT to the biology polygon 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: 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 NDDB records were used to assist data development and review, however, all NDDB records were omitted from the final digital dataset. The CDFG Natural Heritage Division (telephone number: 916/445-6383) should be consulted for the most complete and up-to-date digital NDDB 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.

### 5.1.1. ENTITY TYPES:

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

### 5.1.2. ATTRIBUTES:

**5.1.2.1. ATTRIBUTE LABEL:**
ID

**5.1.2.2. ATTRIBUTE DEFINITION:**
A unique identifier that links to the POLYS_LUT table. ID is a concatenation of atlas number (30), element number (6), and record number. ID values of zero are holes in polygons and do not contain information.

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

| SPECIES ID | NAME |
|---|---|
| 53 | California tiger salamander |
| 58 | Western pond turtle |

**5.1.2.3. 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: SEASONAL

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

### 5.1.1. ENTITY TYPES:

| 5.1.1.1. ENTITY TYPE LABEL: | 5.1.1.2. ENTITY TYPE DEFINITION: | |
|---|---|---|
| Attributes | 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 | 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.

| 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:**
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 at RPI and 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 |

**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 |

**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 |

**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 |

**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 |

**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 |

**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 |

**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 |

**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 |

**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 |

**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 |

**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 |

**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 SPECIES_ID

**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:**
EL_SPE_SEA

**5.1.2.2. ATTRIBUTE DEFINITION:**
Concatenation of the first character of the ELEMENT, SPECIES_ID, and SPECIES_ID

**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. DETAILED DESCRIPTION: SOC_DATA

The data table SOC_DATA contains the human-use attributes and links to the data layers MGT and SOCECON using SOC_LUT.

### 5.1.1. ENTITY TYPES:

| 5.1.1.1. ENTITY TYPE LABEL: | 5.1.1.2. ENTITY TYPE DEFINITION: | |
|---|---|---|
| Attributes | 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

**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:**
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 |

**ENUMERATED DOMAIN VALUE:**

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
Benicia Marina Boat Ramp
Benicia State Recreation Area
Berkeley State Fishing Pier
Berkley Fishing Pier
Berkley Marina
Berkley Marina Sport Center

**ENUMERATED DOMAIN VALUE:**

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
Coyote Point Marina
Coyote Point State Public Access
Crissy Field Beach

**ENUMERATED DOMAIN VALUE:**

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
George Lowy Marina
George Miller Jr./John T. Knox Reg. Shor

**ENUMERATED DOMAIN VALUE:**

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
Mare Island Power Plant

**ENUMERATED DOMAIN VALUE:**

Marin 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
Wilsons 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_DATA 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: | |
|---|---|---|
| Attributes | 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_DATA 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: | |
|---|---|---|
| Complete Chains | TYPE | character |
| Entity Points | TYPE | character |
| | ID | 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_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: |
|---|---|
| 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. 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: | |
|---|---|---|
| Attributes | 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

**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: | |
|---|---|---|
| Attributes | 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 and is unique within each element and refers to a nationwide ESI species list maintained at RPI and 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
Gulls

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

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 lilaeopsis
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

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

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

#### 5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:

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
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)

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

Oncorhynchus tshawytscha (late fall)
Oncorhynchus tshawytscha (spring)
Oncorhynchus tshawytscha (winter)
Hypomesus transpacificus
Pleuronectes vetulus
Acipenser medirostris
Triakis semifasciata
Spirinchus thaleichthys
Clupea pallasi
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 packardi

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

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:**

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: | 5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION: |
|---|---|
| 0 | Not listed by NHP |
| 121996 | Date of NHP list |

**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 |

**5.1.2.4.1.1. ENUMERATED DOMAIN VALUE:**

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 |

| 5.1.2.4.1.1. ENUMERATED DOMAIN VALUE: | 5.1.2.4.1.2. ENUMERATED DOMAIN VALUE DEFINITION: |
|---|---|
| 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:**

ordered

**5.1.2.1. ATTRIBUTE LABEL:**

EL_SPE

**5.1.2.2. ATTRIBUTE DEFINITION:**

Concatenation of the first character of the ELEMENT and SPECIES_ID

**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

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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:

| 5.1.1.1. ENTITY TYPE LABEL: | 5.1.1.2. ENTITY TYPE DEFINITION: | |
|---|---|---|
| Attributes | 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.

| 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:**
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 at RPI and 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 | State endangered |
| E/E | Endangered on Federal and State lists |
| T | State 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 SPECIES_ID and links to BIORES, SPECIES, and SEASONAL databases

**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. 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 NDDB records were used in assisting resource experts during data development and review, however, all NDDB records were omitted from the final digital dataset. The CDFG Natural Heritage Division (telephone number: 916/445-6383) should be consulted for the most complete and up-to-date digital NDDB 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.

### 5.1.1. ENTITY TYPES:

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

**5.1.2. ATTRIBUTES:**

**5.1.2.1. ATTRIBUTE LABEL:**

ID

**5.1.2.2. ATTRIBUTE DEFINITION:**

A unique identifier that links to the POLY_LUT table. ID is a concatenation of atlas number (30), element number (4), and record number. ID values of zero are holes in polygons and do not contain information.

The following M_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 |

**5.1.2.3. ATTRIBUTE DEFINITION SOURCE:**

Research Planning, Inc.

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

Research Planning, Inc.

**5.1.2.5. ATTRIBUTE UNITS OF MEASUREMENT:**

nominal

## 6.0. DISTRIBUTION INFORMATION

**6.1. DISTRIBUTOR**

**6.1.1. CONTACT PERSON PRIMARY**

**6.1.1.1. CONTACT PERSON:**

John Kaperick

6.1.1.2. CONTACT ORGANIZATION:

NOAA

**6.1.4. CONTACT ADDRESS**

**6.1.4.1. ADDRESS TYPE:**

Physical Address

**6.1.4.2. ADDRESS:**

7600 Sand Point Way N.E., Bin C15700

**6.1.4.3. CITY:**

Seattle

**6.1.4.4. STATE OR PROVINCE:**

W A

**6.1.4.5. POSTAL CODE:**

98115-0070

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

**6.5. CUSTOM ORDER PROCESS**

Contact NOAA for distribution options (see 6.1.1.).

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## 7.0. METADATA REFERENCE INFORMATION

**7.1. METADATA DATE:**
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 HMRAD

7.4.3. CONTACT POSITION:
GIS Manager

**7.4.4. CONTACT ADDRESS**

**7.4.4.1. ADDRESS TYPE:**
Physical Address

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

**7.4.4.3. CITY:**
Seattle

**7.4.4.4. STATE OR PROVINCE:**
Washington

**7.4.4.5. POSTAL CODE:**
98115

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

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

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

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

**7.6. METADATA STANDARD VERSION:**
19940608

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