

Appendix B

Emission Calculations Spreadsheets

Appendix B. Tug Emissions Calculations

Based on Puget Sound methodology

Emissions (g/year)=kW*Activity (hours/year)*load factor*Emission Factor (g/kW-hr)*fuel correction factor

Avg Tug HP	86
kW=HP/1.341	64.13124534
Activity (90 days, 10 hours day)	900
load factor for tugs	0.31
fuel correction factor	1
grams to pounds	0.002204623

Emission Factor			grams/year	grams/day	pounds/day
ROG	0.27		4831.006711	53.68	0.12
NOx	11		196818.7919	2186.88	4.82
CO	2		35785.2349	397.61	0.88
PM	0.9		16103.3557	178.93	0.39
CO2	690		12345906.04	137176.73	302.42

Source: Starcrest Consulting Group, 2007. Puget Sound Maritime Air Emissions Inventory. Prepared April 2007.

Finding PM 10 and PM2.5

Offroad Equipment	PM2.5 fraction of total PM	0.92	0.36
	PM10 fraction of total PM	1	0.39

Source: SCAQMD Final Methodology to Calculate Particulate Matter (PM)2.5 and PM2.5 Significance Thresholds. October 2006.

Appendix C

USFWS Special-Status Species List



United States Department of the Interior
FISH AND WILDLIFE SERVICE

Sacramento Fish and Wildlife Office
2800 Cottage Way, Room W-2605
Sacramento, California 95825



August 25, 2010

Document Number: 100825030324

Harry Oakes
ICF International
630 K Street, Suite 400
Sacramento, CA 95814

Subject: Species List for Suisun Marsh Habitat Management, Preservation, and Restoration Plan

Dear: Interested party

We are sending this official species list in response to your August 25, 2010 request for information about endangered and threatened species. The list covers the California counties and/or U.S. Geological Survey 7½ minute quad or quads you requested.

Our database was developed primarily to assist Federal agencies that are consulting with us. Therefore, our lists include all of the sensitive species that have been found in a certain area *and also ones that may be affected by projects in the area*. For example, a fish may be on the list for a quad if it lives somewhere downstream from that quad. Birds are included even if they only migrate through an area. In other words, we include all of the species we want people to consider when they do something that affects the environment.

Please read Important Information About Your Species List (below). It explains how we made the list and describes your responsibilities under the Endangered Species Act.

Our database is constantly updated as species are proposed, listed and delisted. If you address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be November 23, 2010.

Please contact us if your project may affect endangered or threatened species or if you have any questions about the attached list or your responsibilities under the Endangered Species Act. A list of Endangered Species Program contacts can be found at www.fws.gov/sacramento/es/branches.htm.

Endangered Species Division



U.S. Fish & Wildlife Service
Sacramento Fish & Wildlife Office

**Federal Endangered and Threatened Species that Occur in
or may be Affected by Projects in the Counties and/or
U.S.G.S. 7 1/2 Minute Quads you requested**

Document Number: 100825030324

Database Last Updated: April 29, 2010

Quad Lists

BIRDS LANDING (481A)

Listed Species

Invertebrates

Branchinecta conservatio

Conservancy fairy shrimp (E)

Branchinecta lynchi

vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus

valley elderberry longhorn beetle (T)

Elaphrus viridis

Critical habitat, delta green ground beetle (X)

delta green ground beetle (T)

Lepidurus packardii

vernal pool tadpole shrimp (E)

Fish

Hypomesus transpacificus

Critical habitat, delta smelt (X)

delta smelt (T)

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Critical habitat, CA tiger salamander, central population (X)

Rana draytonii

California red-legged frog (T)

Reptiles

Thamnophis gigas

giant garter snake (T)

Birds

Rallus longirostris obsoletus

California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni

California least tern (E)

Mammals

Reithrodontomys raviventris

salt marsh harvest mouse (E)

Plants

Sidalcea keckii

Keck's checker-mallow (=checkerbloom) (E)

DENVERTON (481B)

Listed Species

Invertebrates

Branchinecta conservatio

Conservancy fairy shrimp (E)

Critical habitat, Conservancy fairy shrimp (X)

Branchinecta lynchi

Critical habitat, vernal pool fairy shrimp (X)

vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus

valley elderberry longhorn beetle (T)

Elaphrus viridis

Critical habitat, delta green ground beetle (X)

delta green ground beetle (T)

Lepidurus packardii

Critical habitat, vernal pool tadpole shrimp (X)

vernal pool tadpole shrimp (E)

Fish

Acipenser medirostris

green sturgeon (T) (NMFS)

Hypomesus transpacificus

Critical habitat, delta smelt (X)

delta smelt (T)

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Rana draytonii

California red-legged frog (T)

Reptiles

Thamnophis gigas

giant garter snake (T)

Birds

Rallus longirostris obsoletus

California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni

California least tern (E)

Mammals

Reithrodontomys raviventris

salt marsh harvest mouse (E)

Plants

Cirsium hydrophilum var. *hydrophilum*

Suisun thistle (E)

Cordylanthus mollis ssp. *mollis*

soft bird's-beak (E)

Lasthenia conjugens

Contra Costa goldfields (E)

Critical habitat, Contra Costa goldfields (X)

Proposed Species

Plants

Cirsium hydrophilum var. *hydrophilum*

Critical habitat, Suisun thistle (PX)

Cordylanthus mollis ssp. *mollis*

Critical habitat, soft bird's-beak (PX)

HONKER BAY (481C)

Listed Species

Invertebrates

Branchinecta lynchi

vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus

valley elderberry longhorn beetle (T)

Elaphrus viridis

delta green ground beetle (T)

Fish

Acipenser medirostris

green sturgeon (T) (NMFS)

Hypomesus transpacificus

Critical habitat, delta smelt (X)

delta smelt (T)

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)

Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense
California tiger salamander, central population (T)

Rana draytonii
California red-legged frog (T)

Reptiles

Masticophis lateralis euryxanthus
Alameda whipsnake [=striped racer] (T)

Thamnophis gigas
giant garter snake (T)

Birds

Rallus longirostris obsoletus
California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni
California least tern (E)

Mammals

Reithrodontomys raviventris
salt marsh harvest mouse (E)

Plants

Cordylanthus mollis ssp. mollis
soft bird's-beak (E)

Oenothera deltoides ssp. howellii
Antioch Dunes evening-primrose (E)

Proposed Species

Amphibians

Rana draytonii
Critical habitat, California red-legged frog (PX)

ANTIOCH NORTH (481D)

Listed Species

Invertebrates

Apodemia mormo langei
Lange's metalmark butterfly (E)

Branchinecta lynchi
vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus
valley elderberry longhorn beetle (T)

Elaphrus viridis
delta green ground beetle (T)

Lepidurus packardi
vernal pool tadpole shrimp (E)

Fish

Acipenser medirostris

green sturgeon (T) (NMFS)

Hypomesus transpacificus

Critical habitat, delta smelt (X)

delta smelt (T)

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)

Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

Critical Habitat, Central Valley spring-run chinook (X) (NMFS)

Critical habitat, winter-run chinook salmon (X) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Rana draytonii

California red-legged frog (T)

Reptiles

Thamnophis gigas

giant garter snake (T)

Birds

Rallus longirostris obsoletus

California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni

California least tern (E)

Mammals

Reithrodontomys raviventris

salt marsh harvest mouse (E)

Vulpes macrotis mutica

San Joaquin kit fox (E)

Plants

Cordylanthus mollis ssp. mollis

soft bird's-beak (E)

Erysimum capitatum ssp. angustatum

Contra Costa wallflower (E)

Critical Habitat, Contra Costa wallflower (X)

Lasthenia conjugens

Contra Costa goldfields (E)

Neostapfia colusana

Colusa grass (T)

Oenothera deltoides ssp. howellii

Antioch Dunes evening-primrose (E)

Critical habitat, Antioch Dunes evening-primrose (X)

Sidalcea keckii

Keck's checker-mallow (=checkerbloom) (E)

FAIRFIELD SOUTH (482A)

Listed Species

Invertebrates

Branchinecta conservatio

Conservancy fairy shrimp (E)

Branchinecta lynchi

Critical habitat, vernal pool fairy shrimp (X)

vernal pool fairy shrimp (T)

Desmocerus californicus dimorphus

valley elderberry longhorn beetle (T)

Elaphrus viridis

delta green ground beetle (T)

Lepidurus packardii

Critical habitat, vernal pool tadpole shrimp (X)

Speyeria callippe callippe

callippe silverspot butterfly (E)

Syncaris pacifica

California freshwater shrimp (E)

Fish

Acipenser medirostris

green sturgeon (T) (NMFS)

Hypomesus transpacificus

Critical habitat, delta smelt (X)

delta smelt (T)

Oncorhynchus mykiss

Central Valley steelhead (T) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)

Critical habitat, winter-run chinook salmon (X) (NMFS)

winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Rana draytonii

California red-legged frog (T)

Critical habitat, California red-legged frog (X)

Reptiles

Thamnophis gigas

giant garter snake (T)

Birds

Pelecanus occidentalis californicus

California brown pelican (E)

Rallus longirostris obsoletus

Central Valley steelhead (T) (NMFS)
Critical habitat, Central Valley steelhead (X) (NMFS)

Oncorhynchus tshawytscha

Central Valley spring-run chinook salmon (T) (NMFS)
Critical habitat, winter-run chinook salmon (X) (NMFS)
winter-run chinook salmon, Sacramento River (E) (NMFS)

Amphibians

Ambystoma californiense

California tiger salamander, central population (T)

Rana draytonii

California red-legged frog (T)
Critical habitat, California red-legged frog (X)

Reptiles

Masticophis lateralis euryxanthus

Alameda whipsnake [=striped racer] (T)

Thamnophis gigas

giant garter snake (T)

Birds

Rallus longirostris obsoletus

California clapper rail (E)

Sternula antillarum (=Sterna, =albifrons) browni

California least tern (E)

Mammals

Reithrodontomys raviventris

salt marsh harvest mouse (E)

Plants

Cordylanthus mollis ssp. mollis

soft bird's-beak (E)

Proposed Species

Amphibians

Rana draytonii

Critical habitat, California red-legged frog (PX)

County Lists

No county species lists requested.

Key:

(E) *Endangered* - Listed as being in danger of extinction.

(T) *Threatened* - Listed as likely to become endangered within the foreseeable future.

(P) *Proposed* - Officially proposed in the Federal Register for listing as endangered or threatened.

(NMFS) Species under the Jurisdiction of the National Oceanic & Atmospheric Administration Fisheries Service. Consult with them directly about these species.

Critical Habitat - Area essential to the conservation of a species.

(PX) *Proposed Critical Habitat* - The species is already listed. Critical habitat is being proposed for it.

(C) *Candidate* - Candidate to become a proposed species.

(V) Vacated by a court order. Not currently in effect. Being reviewed by the Service.

(X) *Critical Habitat* designated for this species

Important Information About Your Species List

How We Make Species Lists

We store information about endangered and threatened species lists by U.S. Geological Survey 7½ minute quads. The United States is divided into these quads, which are about the size of San Francisco.

The animals on your species list are ones that occur within, **or may be affected by** projects within, the quads covered by the list.

- Fish and other aquatic species appear on your list if they are in the same watershed as your quad or if water use in your quad might affect them.
- Amphibians will be on the list for a quad or county if pesticides applied in that area may be carried to their habitat by air currents.
- Birds are shown regardless of whether they are resident or migratory. Relevant birds on the county list should be considered regardless of whether they appear on a quad list.

Plants

Any plants on your list are ones that have actually been observed in the area covered by the list. Plants may exist in an area without ever having been detected there. You can find out what's in the surrounding quads through the California Native Plant Society's online [Inventory of Rare and Endangered Plants](#).

Surveying

Some of the species on your list may not be affected by your project. A trained biologist and/or botanist, familiar with the habitat requirements of the species on your list, should determine whether they or habitats suitable for them may be affected by your project. We recommend that your surveys include any proposed and candidate species on your list. See our [Protocol](#) and [Recovery Permits](#) pages.

For plant surveys, we recommend using the [Guidelines for Conducting and Reporting Botanical Inventories](#). The results of your surveys should be published in any environmental documents prepared for your project.

Your Responsibilities Under the Endangered Species Act

All animals identified as listed above are fully protected under the Endangered Species Act of 1973, as amended. Section 9 of the Act and its implementing regulations prohibit the take of a federally listed wildlife species. Take is defined by the Act as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any such animal.

Take may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or shelter (50 CFR §17.3).

Take incidental to an otherwise lawful activity may be authorized by one of two procedures:

- If a Federal agency is involved with the permitting, funding, or carrying out of a project that may result in take, then that agency must engage in a formal [consultation](#) with the Service.

During formal consultation, the Federal agency, the applicant and the Service work together to

avoid or minimize the impact on listed species and their habitat. Such consultation would result in a biological opinion by the Service addressing the anticipated effect of the project on listed and proposed species. The opinion may authorize a limited level of incidental take.

- If no Federal agency is involved with the project, and federally listed species may be taken as part of the project, then you, the applicant, should apply for an incidental take permit. The Service may issue such a permit if you submit a satisfactory conservation plan for the species that would be affected by your project.

Should your survey determine that federally listed or proposed species occur in the area and are likely to be affected by the project, we recommend that you work with this office and the California Department of Fish and Game to develop a plan that minimizes the project's direct and indirect impacts to listed species and compensates for project-related loss of habitat. You should include the plan in any environmental documents you file.

Critical Habitat

When a species is listed as endangered or threatened, areas of habitat considered essential to its conservation may be designated as critical habitat. These areas may require special management considerations or protection. They provide needed space for growth and normal behavior; food, water, air, light, other nutritional or physiological requirements; cover or shelter; and sites for breeding, reproduction, rearing of offspring, germination or seed dispersal.

Although critical habitat may be designated on private or State lands, activities on these lands are not restricted unless there is Federal involvement in the activities or direct harm to listed wildlife.

If any species has proposed or designated critical habitat within a quad, there will be a separate line for this on the species list. Boundary descriptions of the critical habitat may be found in the Federal Register. The information is also reprinted in the Code of Federal Regulations (50 CFR 17.95). See our [Map Room](#) page.

Candidate Species

We recommend that you address impacts to candidate species. We put plants and animals on our candidate list when we have enough scientific information to eventually propose them for listing as threatened or endangered. By considering these species early in your planning process you may be able to avoid the problems that could develop if one of these candidates was listed before the end of your project.

Species of Concern

The Sacramento Fish & Wildlife Office no longer maintains a list of species of concern. However, various other agencies and organizations maintain lists of at-risk species. These lists provide essential information for land management planning and conservation efforts. [More info](#)

Wetlands

If your project will impact wetlands, riparian habitat, or other jurisdictional waters as defined by section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, you will need to obtain a permit from the U.S. Army Corps of Engineers. Impacts to wetland habitats require site specific mitigation and monitoring. For questions regarding wetlands, please contact Mark Littlefield of this office at (916) 414-6580.

Updates

Our database is constantly updated as species are proposed, listed and delisted. If you






















address proposed and candidate species in your planning, this should not be a problem. However, we recommend that you get an updated list every 90 days. That would be November 23, 2010.

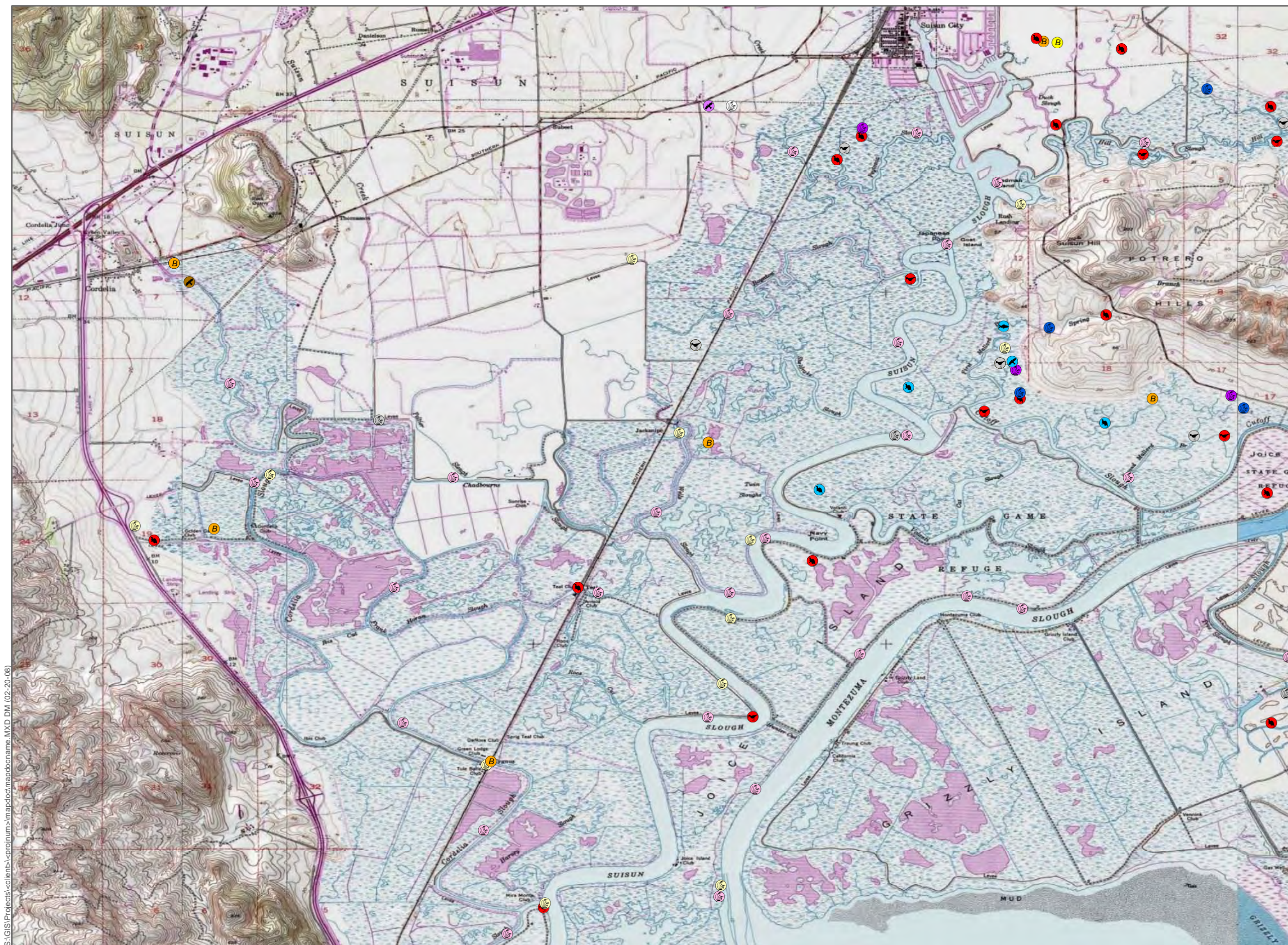
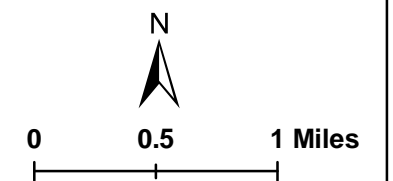
Appendix D

**California Natural Diversity Database
Occurrences of Special-Status Plant and Wildlife
Species in Suisun Marsh**

Appendix G
 CNDDB Occurrences of
 Special-Status Plant and Wildlife
 Species in Suisun Marsh
 Region 1

Legend






















-  alkali milk-vetch
-  burrowing owl
-  California black rail
-  California clapper rail
-  California least tern
-  Delta mudwort
-  Delta tule pea
-  Mason's lilaepsis
-  northern harrier
-  Sacramento splittail
-  salt-marsh harvest mouse
-  saltmarsh common yellowthroat
-  short-eared owl
-  soft bird's-beak
-  Suisun Marsh aster
-  Suisun shrew
-  Suisun song sparrow
-  Suisun thistle
-  Swainson's hawk
-  tricolored blackbird
-  western pond turtle

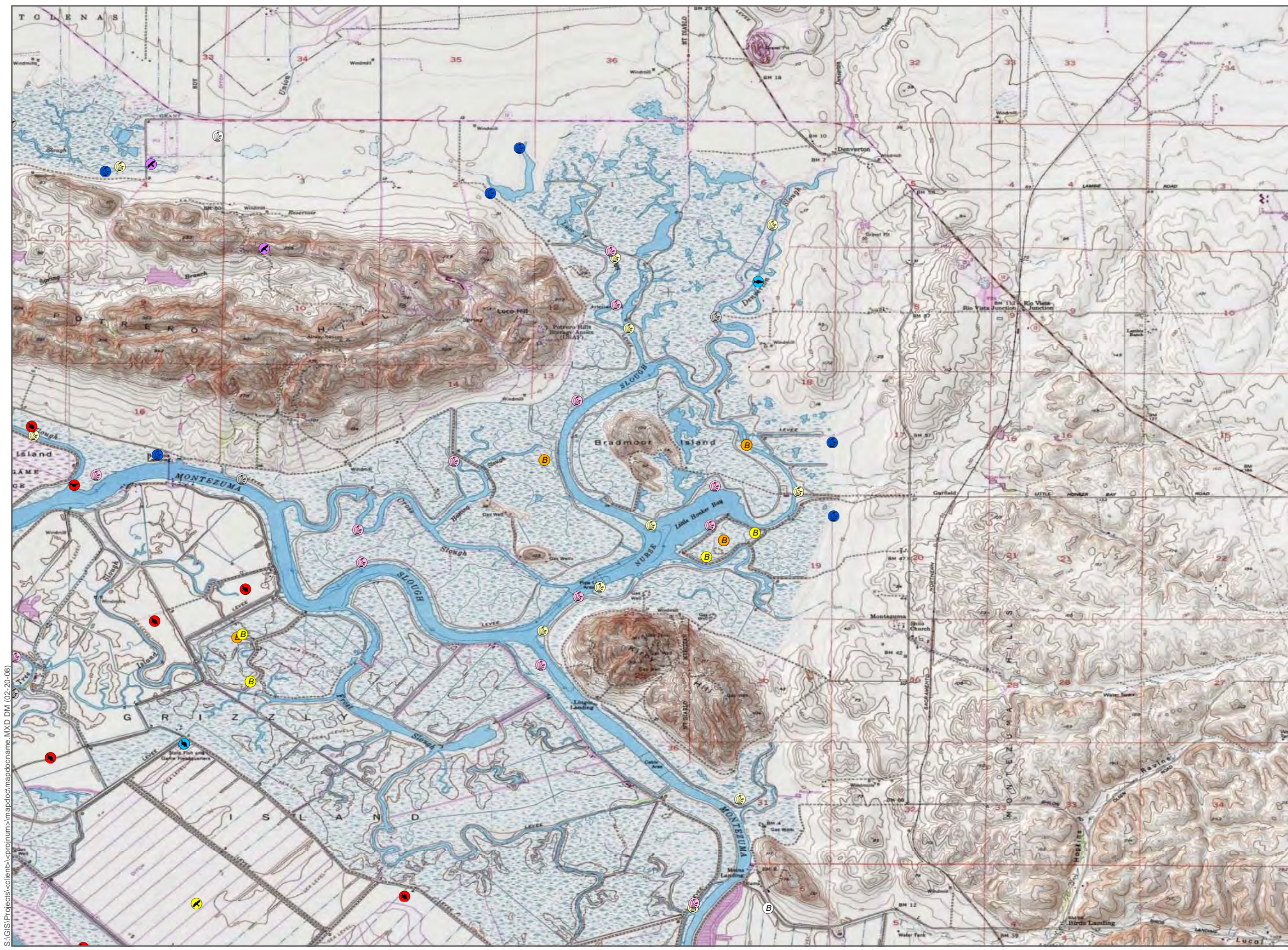
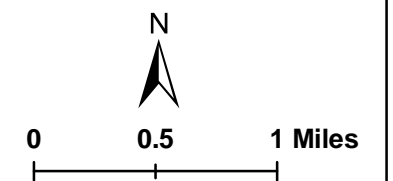


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Appendix G
 CNDDB Occurrences of
 Special-Status Plant and Wildlife
 Species in Suisun Marsh
 Region 2

Legend






















-  alkali milk-vetch
-  burrowing owl
-  California black rail
-  California clapper rail
-  California least tern
-  Delta mudwort
-  Delta tule pea
-  Mason's lilaepsis
-  northern harrier
-  Sacramento splittail
-  salt-marsh harvest mouse
-  saltmarsh common yellowthroat
-  short-eared owl
-  soft bird's-beak
-  Suisun Marsh aster
-  Suisun shrew
-  Suisun song sparrow
-  Suisun thistle
-  Swainson's hawk
-  tricolored blackbird
-  western pond turtle

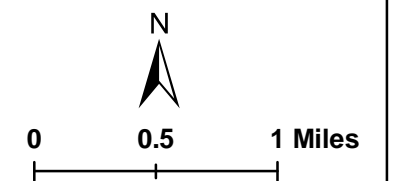


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Appendix G
 CNDDDB Occurrences of
 Special-Status Plant and Wildlife
 Species in Suisun Marsh
 Region 3

Legend






















-  alkali milk-vetch
-  burrowing owl
-  California black rail
-  California clapper rail
-  California least tern
-  Delta mudwort
-  Delta tule pea
-  Mason's lilaepsis
-  northern harrier
-  Sacramento splittail
-  salt-marsh harvest mouse
-  saltmarsh common yellowthroat
-  short-eared owl
-  soft bird's-beak
-  Suisun Marsh aster
-  Suisun shrew
-  Suisun song sparrow
-  Suisun thistle
-  Swainson's hawk
-  tricolored blackbird
-  western pond turtle

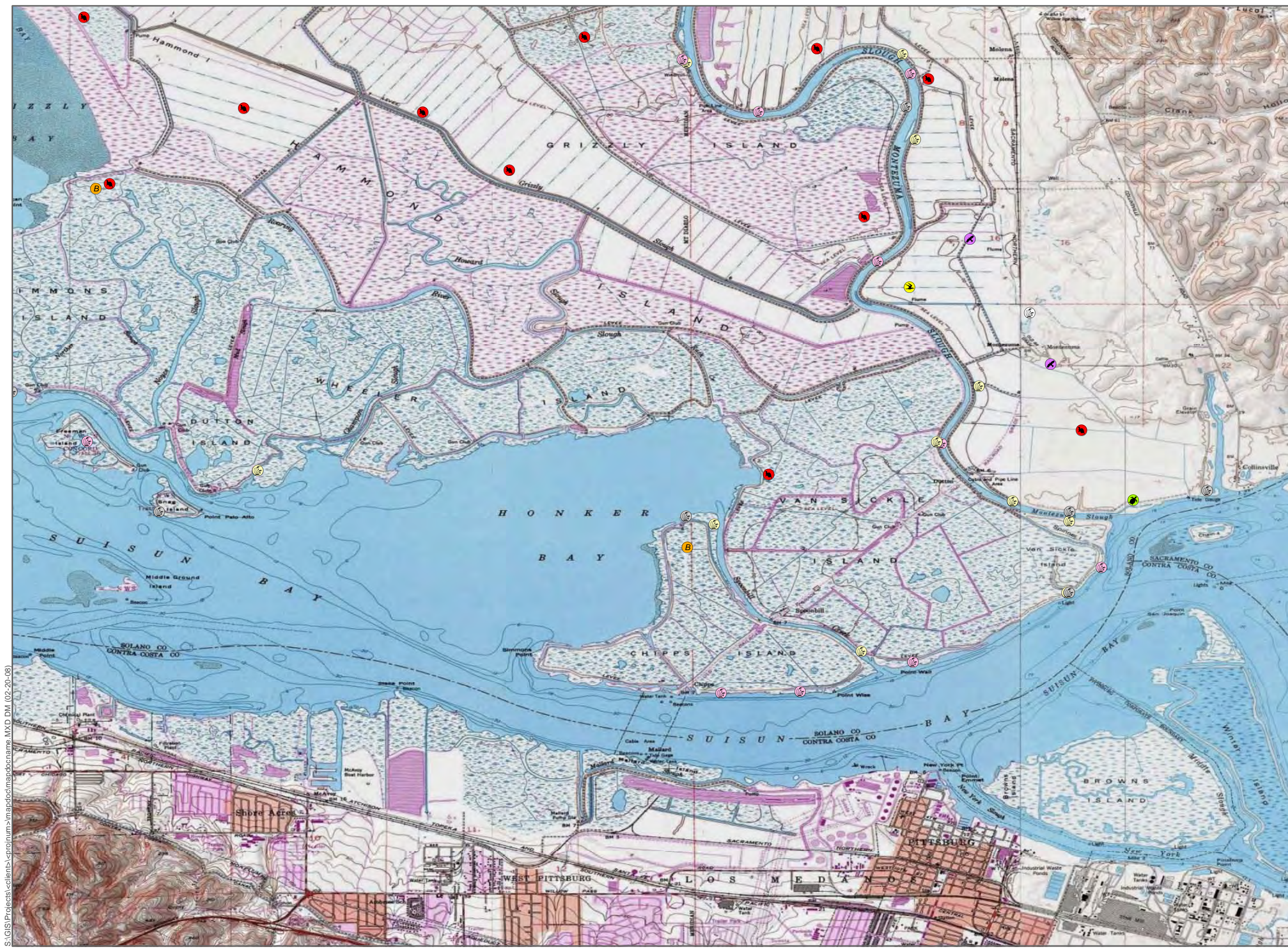
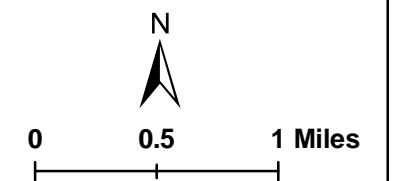


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Appendix G
 CNDDB Occurrences of
 Special-Status Plant and Wildlife
 Species in Suisun Marsh
 Region 4

Legend

-  alkali milk-vetch
-  burrowing owl
-  California black rail
-  California clapper rail
-  California least tern
-  Delta mudwort
-  Delta tule pea
-  Mason's lilaepsis
-  northern harrier
-  Sacramento splittail
-  salt-marsh harvest mouse
-  saltmarsh common yellowthroat
-  short-eared owl
-  soft bird's-beak
-  Suisun Marsh aster
-  Suisun shrew
-  Suisun song sparrow
-  Suisun thistle
-  Swainson's hawk
-  tricolored blackbird
-  western pond turtle



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