Ramsar Information Sheet

Published on 12 November 2018

United States of America

Elkhorn Slough

Designation date	25 June 2018
Site number	2345
Coordinates	36°50'15"N 121°45'01"W
Area	724,00 ha

Color codes

Fields back-shaded in light blue relate to data and information required only for RIS updates.

Note that some fields concerning aspects of Part 3, the Ecological Character Description of the RIS (tinted in purple), are not expected to be completed as part of a standard RIS, but are included for completeness so as to provide the requested consistency between the RIS and the format of a 'full' Ecological Character Description, as adopted in Resolution X.15 (2008). If a Contracting Party does have information available that is relevant to these fields (for example from a national format Ecological Character Description) it may, if it wishes to, include information in these additional fields.

1 - Summary

Summary

Elkhorn Slough is a spectacular wetland on the central California coast, hosting a rich diversity of plants and animals and beloved by the local community. This small estuary has been the subject of intensive study over the past decade, and restoration projects are informed by sound science. Subtidal eelgrass beds harbor valuable fish nurseries, intertidal salt marshes sequester carbon, and intertidal mudflats nourish migratory shorebirds with invertebrates such as worms and clams. These distinctive estuarine communities are among the rarest and most threatened habitat type in California as this state has lost approximately 91% of its wetlands in the last 100 years. Elkhorn Slough has been designated as a Globally Important Bird Area by the National Audubon Society and a Western Hemisphere Shorebird Reserve and provides habitat for more than 340 species of birds, with >20,000 waterbirds counted on annual surveys of the estuary over the past decade. The estuary harbors over 100 fish and 500 invertebrate species, as well as providing key habitat for marine mammals. Elkhorn Slough also provides diverse recreational, educational, and research opportunities for people, illustrated by the thousands of kayakers and birdwatchers exploring Elkhorn Slough every year.

2 - Data & location

2.1 - Formal data

2.1.1 - Name and address of the compiler of this RIS

Compiler 1

Name	Kerstin Wasson
Institution/agency	Elkhorn Slough National Estuarine Research Reserve
Postal address	1700 Elkhorn Road Royal Oaks, CA 95076 USA
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2.1.2 - Period of collection of data and information used to compile the RIS

From year	2003
To year	2016

2.1.3 - Name of the Ramsar Site

Official name (in English, French or Spanish)	Elkhorn Slough

2.2 - Site location

2.2.1 - Defining the Site boundaries

b) Digital map/image
<1 file(s) uploaded>

Former maps	0

Boundaries description

Elkhorn Slough is a small estuary, winding about 10 km inland from the ocean. The Ramsar boundaries encompass all habitat below Mean Higher High Water (approximately 1.8 m NAVD88 in 2016) that are owned by the California Department of Fish and Wildlife and the Elkhorn Slough Foundation. As shown on the provided map, these boundaries encompass the majority of the wetlands of the Elkhorn Slough estuary. Only a few small areas of private property occur along the estuary and are not included within the Ramsar boundaries.
Near the mouth of the estuary lies the small coastal town of Moss Landing, with a busy harbor that is home to fishing and research boats that work in the ocean offshore, as well as serving as the gateway for kayakers to enter Elkhorn Slough. Carneros Creek is a perennial stream that flows into the head of the estuary, entering near the northern limit of the proposed Ramsar boundaries. A railroad line runs through the estuary (see map), transporting passengers travelling between San Jose to the north and Los Angeles to the south.

2.2.2 - General location

a) In which large administrative region does the site lie?	Monterey County, California
b) What is the nearest town or population centre?	Moss Landing, California

2.2.3 - For wetlands on national boundaries only

a) Does the wetland extend onto the territory of one or more other countries?	Yes ○ No ◉
b) Is the site adjacent to another designated Ramsar Site on the territory of another Contracting Party?	Yes ○ No ◉

2.2.4 - Area of the Site

Official area, in hectares (ha):	724
Area, in hectares (ha) as calculated from GIS boundaries	723.89

2.2.5 - Biogeography

Biogeographic regions

Regionalisation scheme(s)	Biogeographic region
Marine Ecoregions of the World (MEOW)	Temperate Northern Pacific realm
Marine Ecoregions of the World (MEOW)	Cold Temperate Northeast Pacific province
Marine Ecoregions of the World (MEOW)	Northern California ecoregion (#58)

Other biogeographic regionalisation scheme

N/A

3 - Why is the Site important?

3.1 - Ramsar Criteria and their justification

☑ Criterion 1: Representative, rare or unique natural or near-natural wetland types

Hydrological services provided	California has lost approximately 91% of its wetlands in the last 100 years. The remaining wetlands are rare, natural or near-natural tidal wetlands with a number of hydrologic functions including; shoreline protection of upland habitat from erosional storm events and prevailing wind wave energy, sedimentation through this reduction of wave energy and buffering of current flows which maintains the relative elevation of the marsh and shoreline position in the face of sea-level rise, and water quality improvement through tidal marshes unique ability to trap and metabolize nutrients (Nelson and Zaveleta 2012) and pollutants.
Other ecosystem services provided	Elkhorn Slough provides numerous other ecosystem services including carbon sequestration in salt marshes (documented from cores collected for Watson et al. 2010 from our marshes as 201 ± 47.0 g C m-2 y-1), increased biodiversity, and socio-economic benefits such as, ecotourism (Kildow and Pendleton 2010), waterfowl hunting and support of offshore fisheries through nursery habitat for flatfish (Brown 2006).
Other reasons	Estuaries are rare on the topographically rugged California coast. Elkhorn Slough is the largest estuary on the central California coast, and as such provides important representation of all types of estuarine habitat. It harbors the largest tract of salt marsh in the state of California after San Francisco Bay.

☑ Criterion 2 : Rare species and threatened ecological communities

☑ Criterion 3 : Biological diversity

Justification	The Elkhorn Slough estuary supports salt marsh, eelgrass and oyster communities; all of the biogenic habitats comprised of these foundational species are very rare in California, and have been badly degraded by human activities. Thus their representation at Elkhorn Slough is regionally important. Elkhorn Slough hosts more than 500 invertebrate, 100 fish, and 300 bird species (Caffrey et al. 2002).

☑ Criterion 4 : Support during critical life cycle stage or in adverse conditions

☑ Criterion 5 : >20,000 waterbirds

Overall waterbird numbers	40,000
Start year	2003
Source of data:	Connors, 2003

☑ Criterion 6 : >1% waterbird population

☑ Criterion 7 : Significant and representative fish

Justification

Elkhorn Slough hosts a very rich assemblage of indigenous marine and estuarine fish species (Yoklavich et al. 1991, Hughes et al. 2015). About 100 species of fish in 43 different families have been documented in Elkhorn Slough (Caffrey et al. 2002) with the majority of these being indigenous. As the only large estuary in the region, the suite of fish species is globally important as a representation of local diversity.

The following are particularly significant and representative fish for Elkhorn Slough: Elasmobranchs, including leopard sharks (Triakis semifasciata) and bat rays (Myliobatis californica): sharks and rays are seasonally abundant in the estuary, foraging on clams and worms and leaving distinctive crater-like feeding pits in the mudflats, visible at low tide; they use the estuary as an excellent nursery due to warmer temperatures than offshore hastening growth, and ample food

- Gobies (most abundant is arrow goby, Clevelandia ios): these are the most common fish of the estuary, found in every mudflat; Elkhorn Slough provides ideal habitat for them

- Bay pipefish (Syngnathus leptorhynchus): these seahorse relatives are year-round residents that are most abundant in the eelgrass beds of Pacific estuaries, a very limited habitat type; Elkhorn Slough is a rare site in this region that harbors many

☑ Criterion 8 : Fish spawning grounds, etc.

Justification

As in other estuarine systems, many fish species spawn in Elkhorn Slough or use it as a nursery. A number of factors contribute to this including: an abundant food supply, protection from predation, a thermal refuge and calm waters. An example is the commercially valuable English sole (Parophrys vetulus). A high proportion of the adults of this species caught offshore in the Monterey Bay spent their juvenile period in Elkhorn Slough (Brown 2006), and dissolved oxygen concentrations within Elkhorn Slough correlate with offshore catch of English sole the following year (Hughes et al. 2015). Elkhorn Slough is designated as Essential Fish Habitat and a Habitat Area of Particular
Concern for various fish species life stages managed under the Coastal Pelagic and Pacific Groundfish Fisheries Management Plans of the National Marine Fisheries Service.

☑ Criterion 9 : >1% non-avian animal population

3.2 - Plant species whose presence relates to the international importance of the site

Scientific name	Common name	Criterion 2	Criterion 3	Criterion 4	IUCN Red List	CITES Appendix I	Other status	Justification
Sarcocornia pacifica	Pickleweed mats	☑	☐	☐		☐	Ranked by California Department of Fish and Wildlife, 2010	California State Rank 3 - Moderate risk of extinction
Zostera marina	Eelgrass	☐	☑	☐	LC	☐		IUCN Least Concern status, but populations in decline in developed regions of North American

3.3 - Animal species whose presence relates to the international importance of the site

Phylum	Scientific name	Common name	Species qualifies under criterion				Species contributes under criterion				Pop. Size	Period of pop. Est.	% occurrence 1)	IUCN Red List	CITES Appendix I	CMS Appendix I	Other Status	Justification
			2	4	6	9	3	5	7	8								
Birds																		
CHORDATA / AVES	*Calidris minutilla*	Least Sandpiper	☐	☐	☐	☐	☑	☑	☐	☐	70000		10	LC	☐	☐		
CHORDATA / AVES	*Charadrius nivosus nivosus*	Western Snowy Plover	☑	☑	☑	☐	☐	☐	☐	☐	30000		2.2		☐	☐	Threatened under ESA	Elkhorn Slough supports a significant proportion of protected nests of this threatened subspecies in a region where this ground nesting bird has been severely impacted by humans.
CHORDATA / AVES	*Limosa fedoa*	Marbled Godwit	☐	☐	☐	☐	☑	☑	☐	☐	50000		7.5	LC	☐	☐		
Fish, Mollusc and Crustacea																		
CHORDATA / ACTINOPTERYGII	*Clevelandia ios*	Arrow goby; Arrow goby; Arrow goby	☐	☐	☐	☐	☐	☐	☑	☐					☐	☐		
CHORDATA / ELASMOBRANCHII	*Myliobatis californica*	Bat eagle ray	☐	☐	☐	☐	☐	☐	☑	☐					☐	☐		
CHORDATA / ACTINOPTERYGII	*Parophrys vetulus*	English sole	☐	☑	☐	☐	☐	☐	☐	☑					☐	☐		Elkhorn Slough has been documented as a key nursery for this commercially valuable species (Brown 2006)
CHORDATA / ACTINOPTERYGII	*Syngnathus leptorhynchus*	Pipefish; Bay pipefish; Bay pipefish; Bay pipefish	☐	☐	☐	☐	☐	☐	☑	☐				LC	☐	☐		
CHORDATA / ELASMOBRANCHII	*Triakis semifasciata*	Leopard shark; Leopard shark	☐	☐	☐	☐	☐	☐	☑	☐				LC	☐	☐		
Others																		
CHORDATA / MAMMALIA	*Enhydra lutris nereis*	Southern Sea Otter	☑	☑	☐	☑	☐	☐	☐	☐	100	2003-2015	3.3		☑	☐		Elkhorn Slough supports the highest documented density of mother-pup pairs of this threatened subspecies. Female otters appear to have reduced energy requirement in the slough as opposed to the open sea.

1) Percentage of the total biogeographic population at the site

3.4 - Ecological communities whose presence relates to the international importance of the site

Name of ecological community	Community qualifies under Criterion 2?	Description	Justification
Salt Marsh	☑	Intertidal vegetation of estuary, dominated by Sarcocornia pacifica but with representation by various other marsh species	Salt marshes are extremely rare in California; this is the third largest after San Francisco Bay and Humboldt Bay.
Eelgrass	☐	Seagrass beds comprised of Zostera marina	Seagrass beds have declined globally and in California; the bed at Elkhorn is unusual in that it is expanding, with sea otters improving functioning through a trophic cascade (Hughes et al. 2013)
Oyster beds	☐	Olympia oyster, Ostrea lurida	Native oysters have declined all along the West Coast. Elkhorn Slough harbors the only native oysters between San Francisco Bay and Mugu Lagoon, a distance of >500 km (Wasson 2010).

4 - What is the Site like? (Ecological character description)

4.1 - Ecological character

Elkhorn Slough is a seasonal estuary and a tidal embayment. During rains, freshwater falls and flows into the slough from the surrounding hills and mixes with salt water carried by tides from Monterey Bay and the Pacific Ocean. These aquatic and terrestrial environments form a complex ecological community that performs many natural and vital functions. This community:

• Traps sediments eroded from the surrounding hills and farms.

• Affords protection from flooding. The slough channels run-off into the bay after heavy storms. The salt marsh acts as a buffer for storm surge.

• Provides habitat and nursery for fish. Over eighty species of fish are known to use the slough waters at some time during their life cycle. Some key commercial fisheries species such as English sole use the Reserve's waters as nursery.

• Serves as a way station for tired and hungry birds. Over 300 species of birds have been recorded in and around the slough including resident and migratory birds.

• Supports habitat (home) for numerous plants and animals - some of which are rare or endangered species.

• Provides many opportunities for recreation and wildlife viewing.

4.2 - What wetland type(s) are in the site?

Marine or coastal wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
A: Permanent shallow marine waters	Elkhorn Slough	2	245	Representative
G: Intertidal mud, sand or salt flats	Elkhorn Slough	3	150	Representative
H: Intertidal marshes	Elkhorn Slough	1	269	Representative

Inland wetlands

Wetland types (code and name)	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1
Saline, brackish or alkaline water > Marshes & pools >> Ss: Seasonal/ intermittent saline/ brackish/ alkaline marshes/ pools	Moss Landing Wildlife Area	1	60	Representative

4.3 - Biological components

4.3.1 - Plant species

Other noteworthy plant species

Scientific name	Common name	Position in range / endemism / other
Frankenia salina	Alkali heath	California estuaries
Jaumea carnosa	Fleshy jaumea	NE Pacific estuaries
Limonium californicum	California sea lavendar	California-Oregon estuaries

Invasive alien plant species

Scientific name	Common name	Impacts
Carpobrotus edulis	Iceplant	Potentially
Conium maculatum	Poison Hemlock	Potentially

4.3.2 - Animal species

Other noteworthy animal species

Phylum	Scientific name	Common name	Pop. size	Period of pop. est.	%occurrence	Position in range /endemism/other
CHORDATA/AVES	*Branta bernicla*	American Brant				Endemic
CHORDATA/AVES	*Circus cyaneus*	Northern Harrier				Endemic
CHORDATA/AVES	*Pelecanus erythrorhynchos*	American White Pelican				Endemic
CHORDATA/AVES	*Pelecanus occidentalis californicus*	California Brown Pelican				Endemic

Invasive alien animal species

Phylum	Scientific name	Common name	Impacts
MOLLUSCA/GASTROPODA	*Batillaria attramentaria*	Japanese false cerith	Potentially
ARTHROPODA/MALACOSTRACA	*Carcinus maenas*	green shore crab;shore crab;common shore crab;green crab;European shore-crab	Potentially
ANNELIDA/POLYCHAETA	*Ficopomatus enigmaticus*	Australian tube worm	Potentially

4.4 - Physical components

4.4.1 - Climate

Climatic region	Subregion
C: Moist Mid-Latitude climate with mild winters	Csb: Mediterranean (Mild with dry, warm summer)

Elkhorn Slough's climate type is not predicted to change but climate scientists expect accelerated sea level rise to impact coastal areas, including estuaries and coastal aquifers. Tidal marshes will need to accrete sediment to keep pace with rising sea level, or be afforded room to migrate inland in order to persist.

4.4.2 - Geomorphic setting

a) Minimum elevation above sea level (in metres): 0

a) Maximum elevation above sea level (in metres): 1

- Entire river basin ☐
- Upper part of river basin ☐
- Middle part of river basin ☐
- Lower part of river basin ☐
- More than one river basin ☐
- Not in river basin ☐
- Coastal ☑

Please name the river basin or basins. If the site lies in a sub-basin, please also name the larger river basin. For a coastal/marine site, please name the sea or ocean.

Pacific Ocean

4.4.3 - Soil

- Mineral ☑
- Organic ☑
- No available information ☐

Are soil types subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification)? Yes ◉ No ○

Please provide further information on the soil (optional)

Riverine sediment sources were historically important, but due to river diversion are less important now than marine and organic sources. Sediment erosion from adjacent farms has been a problem in the past decades, but management measures are decreasing this problem. However, sea level rise and storm intensity projections may lead to increased upland erosion and sedimentation in the estuary.

4.4.4 - Water regime

Water permanence

Presence?
Usually permanent water present

Source of water that maintains character of the site

Presence?	Predominant water source
Water inputs from surface water	☐
Marine water	☑

Water destination

Presence?
Marine

Stability of water regime

Presence?
Water levels fluctuating (including tidal)

4.4.5 - Sediment regime

- Significant erosion of sediments occurs on the site ☑

Significant accretion or deposition of sediments occurs on the site ☑
Significant transportation of sediments occurs on or through the site ☑
Sediment regime is highly variable, either seasonally or inter-annually ☑
Sediment regime unknown ☐

Please provide further information on sediment (optional):

Sediment processes are very dynamic. Erosion (e.g. salt marsh banks are retreating) due to strong tidal currents. Deposition occurs regularly on salt marsh surfaces, about 3 mm/yr. Episodic deposition occurs on mudflats and in eelgrass beds. Transport of sediment occurs due to tidal currents and freshwater inputs. There is high variability in sediment processes driven by variation in tides and weather.

4.4.6 - Water pH

Acid (pH<5.5) ☐
Circumneutral (pH: 5.5-7.4) ☐
Alkaline (pH>7.4) ☑
Unknown ☐

Please provide further information on pH (optional):

Average pH is about 8.0, though there is daily and seasonal variation.

4.4.7 - Water salinity

Fresh (<0.5 g/l) ☐
Mixohaline (brackish)/Mixosaline (0.5-30 g/l) ☐
Euhaline/Eusaline (30-40 g/l) ☑
Hyperhaline/Hypersaline (>40 g/l) ☐
Unknown ☐

Please provide further information on salinity (optional):

Average salinity is about 32 ppt, though there is seasonal and annual variation, and some of the peripheral wetlands with restricted exchange have higher and lower averages.

4.4.8 - Dissolved or suspended nutrients in water

Eutrophic ☐
Mesotrophic ☐
Oligotrophic ☐
Dystrophic ☐
Unknown ☑

4.4.9 - Features of the surrounding area which may affect the Site

Please describe whether, and if so how, the landscape and ecological characteristics in the area surrounding the Ramsar Site differ from the site itself: i) broadly similar ○ ii) significantly different ◉

Surrounding area has greater urbanisation or development ☐
Surrounding area has higher human population density ☐
Surrounding area has more intensive agricultural use ☑
Surrounding area has significantly different land cover or habitat types ☑

Please describe other ways in which the surrounding area is different:

The Ramsar site is below Mean Higher High Water, and thus consists of wetland habitat. The surrounding upland areas are very different, consisting both of protected open space (grasslands, oak woodlands, etc.) and human land uses such as agriculture, a power plant, residences, etc.

4.5 - Ecosystem services

4.5.1 - Ecosystem services/benefits

Provisioning Services

Ecosystem service	Examples	Importance/Extent/Significance
Food for humans	Sustenance for humans (e.g., fish, molluscs, grains)	High

Regulating Services

Ecosystem service	Examples	Importance/Extent/Significance
Pollution control and detoxification	Water purification/waste treatment or dilution	High
Climate regulation	Regulation of greenhouse gases, temperature, precipitation and other climactic processes	High

Cultural Services

Ecosystem service	Examples	Importance/Extent/Significance
Recreation and tourism	Nature observation and nature-based tourism	High
Scientific and educational	Educational activities and opportunities	High

Supporting Services

Ecosystem service	Examples	Importance/Extent/Significance
Biodiversity	Supports a variety of all life forms including plants, animals and microorganizms, the genes they contain, and the ecosystems of which they form a part	High

Within the site: 10000s

Outside the site: 100000s

Have studies or assessments been made of the economic valuation of ecosystem services provided by this Ramsar Site? Yes ◉ No ○ Unknown ○

Where economic studies or assessments of economic valuation have been undertaken at the site, it would be helpful to provide information on where the results of such studies may be located (e.g. website links, citation of published literature):

Kildow and Pendleton (2010) studied the environmental economics of the Slough but did not undertake a valuation study. We are certain that the value of the proposed Ramsar wetland would be in the millions of dollars per year, if you include the recreational businesses it sustains (kayak shops, boat tours, restaurants), the commercial fisheries it supports offshore (flatfish, crabs), and the other ecosystem services it provides (shoreline protection from storm and tsunami surges, uptake of nutrients, carbon sequestration, etc.).

4.5.2 - Social and cultural values

i) the site provides a model of wetland wise use, demonstrating the application of traditional knowledge and methods of management and use that maintain the ecological character of the wetland ☐

ii) the site has exceptional cultural traditions or records of former civilizations that have influenced the ecological character of the wetland ☐

iii) the ecological character of the wetland depends on its interaction with local communities or indigenous peoples ☑

Description if applicable

Elkhorn Slough is visited by tens of thousands of people each year, from all around the USA and beyond, and is a unique site where sea otters can be observed interacting with wetland habitats. This use depends on conservation of the prey items and vegetation types used by sea otters in the estuary.

iv) relevant non-material values such as sacred sites are present and their existence is strongly linked with the maintenance of the ecological character of the wetland ☐

4.6 - Ecological processes

(ECD) Notable aspects concerning migration: Elkhorn Slough hosts a large number of wintering and migrating shorebirds, up to 5-6% (>30,000) of shorebirds counted in the Pacific Flyway Project (Page et al. 1992)

5 - How is the Site managed? (Conservation and management)

5.1 - Land tenure and responsibilities (Managers)

5.1.1 - Land tenure/ownership

Public ownership

Category	Within the Ramsar Site	In the surrounding area
Provincial/region/state government	☑	☑

Private ownership

Category	Within the Ramsar Site	In the surrounding area
Foundation/non-governmental organization/trust	☑	☑

Provide further information on the land tenure / ownership regime (optional):

The landowners of the Ramsar site are the California Department of Fish and Wildlife and the Elkhorn Slough Foundation. The Elkhorn Slough Foundation is the largest private landowner in the surrounding watershed; the California Department of Fish and Wildlife also owns adjacent uplands. Other protected lands in the watershed include the Packard Ranch and Manzanita County Park. Besides conservation, agriculture is a dominant land use in the watershed.

5.1.2 - Management authority

Please list the local office / offices of any agency or organization responsible for managing the site:	For the lands owned by the California Department of Fish and Wildlife: Elkhorn Slough Reserve For the lands owned by the Elkhorn Slough Foundation: Elkhorn Slough Foundation
Provide the name and title of the person or people with responsibility for the wetland:	California Department of Fish and Wildlife: Dave Feliz, Elkhorn Slough Reserve Manager; Elkhorn Slough Foundation: Mark Silberstein, Executive Director
Postal address:	Elkhorn Slough Reserve, 1700 Elkhorn Road, Royal Oaks, CA 95076 Elkhorn Slough Foundation, PO Box 267, Moss Landing, CA 95039 marksilberstein@elkhornslough.org - the e-mail field below does not allow for multiple entries.
E-mail address:	dave.feliz@wildlife.ca.gov

5.2 - Ecological character threats and responses (Management)

5.2.1 - Factors (actual or likely) adversely affecting the Site's ecological character

Water regulation

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Canalisation and river regulation	High impact	High impact	☑	☑
Water abstraction	High impact	High impact	☑	☑

Agriculture and aquaculture

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Annual and perennial non-timber crops	High impact	High impact	☑	☑

Energy production and mining

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Unspecified	Low impact	Low impact	☐	☑

Transportation and service corridors

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Roads and railroads	Medium impact	High impact	☐	☑

Biological resource use

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Fishing and harvesting aquatic resources	Low impact	Low impact	☐	☑

Human intrusions and disturbance

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Recreational and tourism activities	Low impact	Low impact	☐	☑

Natural system modifications

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Dams and water management/use	High impact	High impact	☑	☑

Invasive and other problematic species and genes

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Invasive non-native/ alien species	Medium impact	High impact	☑	☑

Climate change and severe weather

Factors adversely affecting site	Actual threat	Potential threat	Within the site	In the surrounding area
Storms and flooding	Low impact	High impact	☑	☑

Please describe any other threats (optional):

Unspecified threat in energy production & mining is a natural gas power plant.

5.2.2 - Legal conservation status

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
NMFS Essential Fish Habitat	N/A	http://www.habitat.noaa.gov/protection/efh/habitatmapper.html	partly
NOAA National Estuarine Research Reserve	Elkhorn Slough National Estuarine Research Reserve	http://elkhornslough.org/	partly
State Marine Conservation Area	N/A	https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Network/Central-California	whole
State Marine Reserve	Elkhorn Slough State Marine Reserve	https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Network/Central-California	partly

Non-statutory designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site
Important Bird Area	N/A	http://www.audubon.org/important-bird-areas	whole

5.2.3 - IUCN protected areas categories (2008)

Ia Strict Nature Reserve ☐

Ib Wilderness Area: protected area managed mainly for wilderness protection ☑

II National Park: protected area managed mainly for ecosystem protection and recreation ☐

III Natural Monument: protected area managed mainly for conservation of specific natural features ☐

IV Habitat/Species Management Area: protected area managed mainly for conservation through management intervention ☐

V Protected Landscape/Seascape: protected area managed mainly for landscape/seascape conservation and recreation ☐

VI Managed Resource Protected Area: protected area managed mainly for the sustainable use of natural ecosystems ☐

5.2.4 - Key conservation measures

Legal protection

Measures	Status
Legal protection	Implemented

Habitat

Measures	Status
Habitat manipulation/enhancement	Implemented

Species

Measures	Status
Threatened/rare species management programmes	Implemented

Other:

Full conservation reports provided in additional materials tab.

5.2.5 - Management planning

Is there a site-specific management plan for the site? Yes

Has a management effectiveness assessment been undertaken for the site? Yes ○ No ◉

If the site is a formal transboundary site as indicated in section Data and location > Site location, are there shared management planning processes with another Contracting Party? Yes ○ No ◉

Please indicate if a Ramsar centre, other educational or visitor facility, or an educational or visitor programme is associated with the site:

The Elkhorn Slough Reserve has a Visitor Center open to the public Wednesday-Sunday from 9 am to 5 pm, with exhibits on the estuary and trails. The Reserve hosts school classes in an education lab and provides training for their teachers.

URL of site-related webpage (if relevant): ant): www.elkhornslough.org

5.2.6 - Planning for restoration

Is there a site-specific restoration plan? Yes, there is a plan

5.2.7 - Monitoring implemented or proposed

Monitoring	Status
Water quality	Implemented

Nutrients Weather Habitat Change (GIS) Biological Indicators (algal cover in megaplots on mudflat, marsh health and communities in transects, mudflat communities in permanent transects, crabs in traps, oyster recruitment on tiles, waterbirds including migratory shorebirds, breeding birds in heronry). There are have extensive long-term monitoring programs described at http://www.elkhornslough.org/research/, including a State of the Estuary Report providing a brief summary that is updated every 2 years.

6 - Additional material

6.1 - Additional reports and documents

6.1.1 - Bibliographical references

See attachment offline version for full bibliographical references.

6.1.2 - Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)
<no file available>

ii. a detailed Ecological Character Description (ECD) (in a national format)
<no file available>

iii. a description of the site in a national or regional wetland inventory
<no file available>

iv. relevant Article 3.2 reports
<no file available>

v. site management plan
<1 file(s) uploaded>

vi. other published literature
<2 file(s) uploaded>

6.1.3 - Photograph(s) of the Site

Please provide at least one photograph of the site:

Turns (*Elkhorn Slough Reserve, 19-05-2009*)

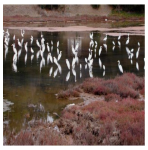
Overhead Photo (*Elkhorn Slough Foundation, 28-12-2011*)

Otter (*Elkhorn Slough Reserve, 02-05-2012*)

Shore Birds (*Elkhorn Slough Reserve, 31-12-2000*)

Oyster Restoration Reef (*Elkhorn Slough Reserve, 01-12-2013*)

Eel Grass Bed (*Elkhorn Slough Reserve, 01-12-2013*)



Great Egrit (*Elkhorn Slough Reserve, 11-10-2007*)

6.1.4 - Designation letter and related data

Designation letter
<1 file(s) uploaded>

Date of Designation: 2018-06-25