ELKHORN SLOUGH NATIONAL ESTUARINE RESEARCH RESERVE

1700 Elkhorn Road • Watsonville, CA 95076 • (831) 728-2822

Cover letter: Ramsar nomination of Elkhorn Slough

17 October 2016

Mr. Daniel M. Ashe
U.S. Fish and Wildlife Service
1849 C Street NW, Room 3358
Washington, D.C. 20240

Dear Mr. Ashe,

It is an honor to nominate Elkhorn Slough as a Ramsar site. 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. We have brought together over 100 stakeholders into an ecosystem-based management project to jointly shape a vision and strategies for conservation and management of the estuary.

We have completed the application and include endorsements from the two landowners (California Depart of Fish and Wildlife for the wetlands of the Elkhorn Slough Reserve and Moss Landing Wildlife Area, and the Elkhorn Slough Foundation for its wetlands). We also provide letters of support from our Congressperson, Sam Farr, as well as from three organizations with a strong investment in the estuary: the Monterey Bay National Marine Sanctuary, The Nature Conservancy, and Point Blue. We are confident you will find this application to be compelling, and look forward to Elkhorn Slough becoming part of this prestigious international network of wetlands.

In the application, we detail how Elkhorn Slough meets all nine of the criteria for a Ramsar site, and provide extensive information in the site. To summarize briefly:

Criterion 1: Representative, rare or unique natural or near-natural wetland types. Elkhorn Slough is the largest estuary along hundreds of miles of central California coast, and hosts the largest salt marsh in California south of San Francisco Bay, as well as extensive mudflats and eelgrass beds.

Criterion 2: Rare species and threatened ecological communities. Elkhorn Slough is critical for two threatened species (southern sea otters, snowy plovers) and three threatened communities (salt marsh, eelgrass beds, oyster beds).

Criterion 3: Biological diversity. Elkhorn Slough hosts more than 500 invertebrate, 100 fish, and 300 bird species.

Criterion 4: Support during critical life cycle stage or in adverse conditions. Elkhorn Slough is a critical stopover for migratory waterbirds on the Pacific Flyway, supports the highest density of threatened southern sea otter pups, hosts a significant portion of nests of threatened Western snowy plovers, and serves as a key nursery for English Sole, a commercially valuable species.

Criterion 5: >20,000 waterbirds. Our fall monitoring surveys routinely record >20,000 waterbirds in Elkhorn Slough.

Criterion 6: >1% waterbird population. Elkhorn Slough typically hosts >2% of the nests of threatened Western snowy plovers, and 5-6% of the total migratory shorebirds counted on the Pacific Flyway.

Criterion 7: Significant and representative fish. Elkhorn Slough has 100 fish species in 43 families, and as the only large estuary in the region, provides critical fish habitat.

Criterion 8: Fish spawning grounds. 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. Recent studies have shown that English Sole that spent their juvenile period in Elkhorn Slough contribute disproportionately to the offshore catch of adults in Monterey Bay.

Criterion 9: >1% non-avian population. Elkhorn Slough provides very important foraging, resting, and nursery areas for southern sea otter, and about 3% of the population is typically found within the estuary.

We hope you agree that these are very convincing reasons to nominate Elkhorn Slough as a Ramsar wetland. We look forward to hearing from you.

Cordially,

Kerstin Wasson

Research Coordinator, Elkhorn Slough Reserve
Associate Adjunct Professor, University of California, Santa Cruz

Country

Site name

Offline RIS Word form

The purpose of this form is to help in collecting data on a Ramsar Site for the completion of an online Ramsar Information Sheet (RIS) at https://rsis.ramsar.org. It can be circulated between the National Focal Point, RIS compilers and other national data collectors. However, it is not accepted by the Ramsar Secretariat for submission of a Site update or new Site designation. The data collected through this form must be transferred to the online form by the National Focal Point or an authorized online RIS compiler.

All fields marked with an asterisk (*) are required.

For more information on how to use this form, please refer to the document
How to use the offline RIS Word form.

Created by RSIS v1.3 on 03 November 2015

Summary

1.1 Summary description

Please provide a short descriptive text summarising the key characteristics and internationally important aspects of the site. You may prefer to complete the four following sections before returning to draft this summary.

Summary *(This field is limited to 2500 characters)*

One of the most spectacular and unique ecosystems linking the coast and ocean in central California is Elkhorn Slough, the third largest estuarine system in the state of California. Subtidal eelgrass beds harbor 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.

Data & location

2.1 Formal data

2.1.1 Name and address of the compiler of this RIS

Name* *(This field is mandatory)*

Kerstin Wasson

Institution/agency* *(This field is mandatory)*

Elkhorn Slough National Estuarine Research Reserve

Postal address *(This field is limited to 254 characters)*

1700 Elkhorn Road
Royal Oaks, CA 95076
USA

E-mail* *(The online RIS only accepts valid e-mail addresses, e.g. example@mail.com) (This field is mandatory)*

Kerstin.Wasson@gmail.com

Phone* *(The online RIS only accepts valid phone numbers, e.g. +1 41 123 45 67) (This field is mandatory)*

831 728 2822

Fax *(The online RIS only accepts valid phone numbers, e.g. +1 41 123 45 67)*

2.1.2 Period of collection of data and information used to compile the RIS

From year *(The online RIS only accepts numeric values)*

2003

To year *(The online RIS only accepts numeric values)*

2016

2.1.3 Name of the Ramsar Site

Official name (in English, French or Spanish)* *(This field is mandatory)*

Elkhorn Slough

Unofficial name (optional)

2.2 Site location

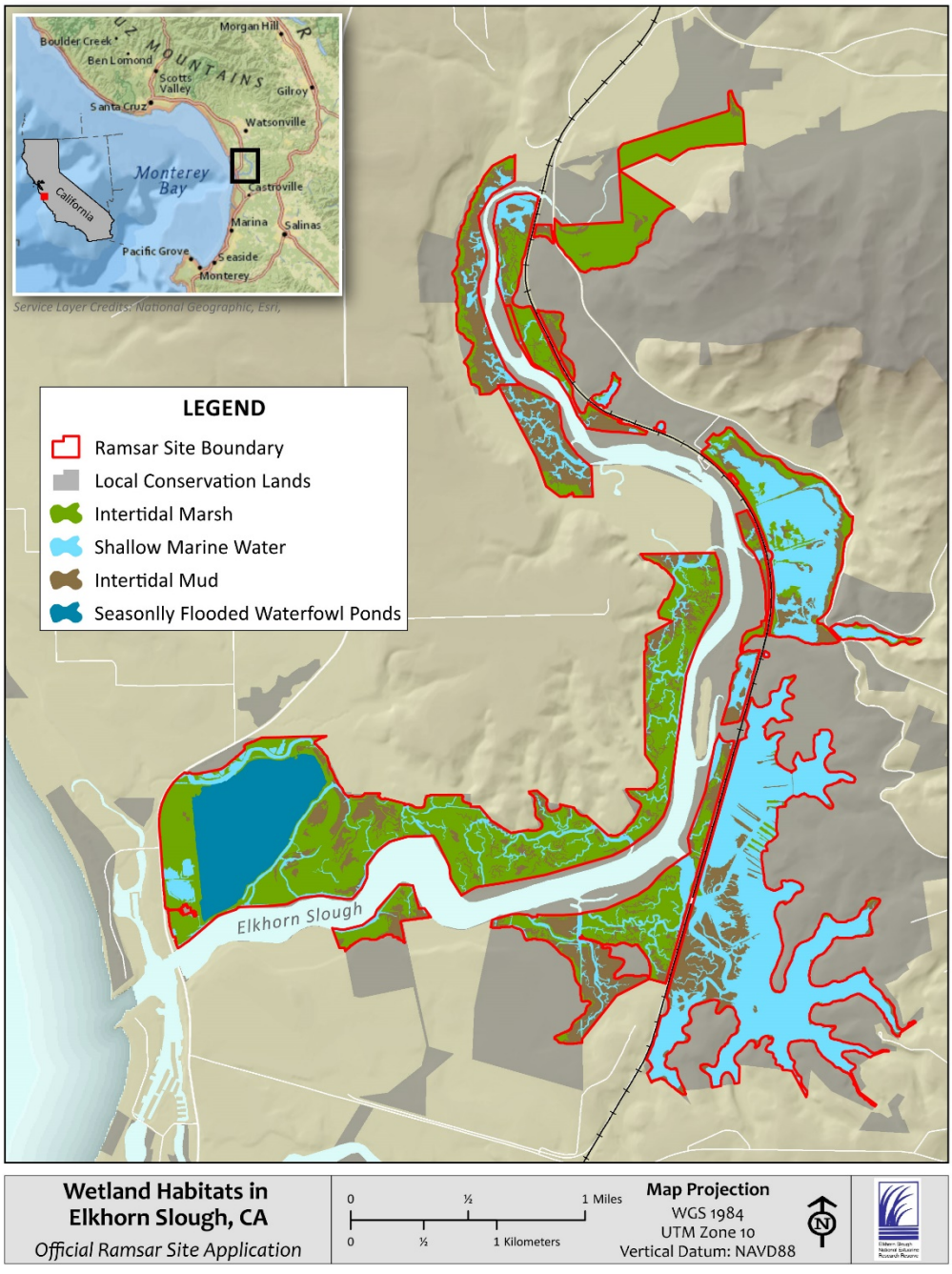
2.2.1 Defining the Site boundaries

The site boundaries must be clearly delineated on both: a) a GIS shapefile and b) a digital map/image:

-> To define the site boundaries please complete field 2.2.1 a1), 2.2.1 a2) and 2.2.1 b) via the online form.

Boundaries description (optional) *(This field is limited to 2500 characters)*

Habitat below Mean Higher High Water (approximately 1.8 m NAVD88 in 2016) owned by the California Department of Fish and Wildlife and the Elkhorn Slough Foundation



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 / [x] No

b) Is the site adjacent to another designated Ramsar Site on the territory of another Contracting Party?
[ ] Yes / [x] No

c) Is the site part of a formal transboundary designation with another Contracting Party?
[ ] Yes / [x] No

d) Transboundary Ramsar Site name:

2.2.4 Area of the Site

If you have not established an official area by other means, you can copy the area calculated from the GIS boundaries into the 'official area' box.

Official area, in hectares (ha): *(The online RIS only accepts numeric values)*

724

Area, in hectares (ha) as calculated from GIS boundaries

724

2.2.5 Biogeography

Please provide the biogeographic region(s) encompassing the site and the biogeographic regionalization scheme applied:

Biogeographic regions

Regionalisation scheme(s)[1]	Biogeographic region
Marine Ecoregions of the World	Temperate Northern Pacific realm, Cold Temperate Northeast Pacific province, Northern California ecoregion (#58)

Other biogeographic regionalisation scheme *(This field is limited to 2500 characters)*

[1] Marine Ecoregions of the World (MEOW) | Udvardy's Biogeographical Provinces | Bailey's Ecoregions | WWF Terrestrial Ecoregions | EU biogeographic regionalization | Freshwater Ecoregions of the World (FEOW) | Other scheme (provide name below)

Why is the Site important?

3.1 Ramsar Criteria and their justification

Tick the box against each criterion applied to the designation of the Ramsar Site. All criteria which apply should be ticked. Please explain why you selected a criterion by filling in the relevant fields on this page, on the three other pages of this section 'Criteria & justification' and on the 'Wetland types' page of the section 'What is the site like?'.

[X] Criterion 1: Representative, rare or unique natural or near-natural wetland types

To justify this Criterion, please select at least one wetland type as representative, rare or unique in the section What is the site like? > Wetland types and provide further details in at least one of the three boxes below.

Hydrological services provided *(This field is limited to 3000 characters)*

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 *(This field is limited to 3000 characters)*

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 *(This field is limited to 3000 characters)*

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.

[X] Criterion 2 : Rare species and threatened ecological communities

To justify this Criterion, please give details below on:
- relevant plant species in the section Criteria & justification> Plant species (3.2)
- relevant animal species in the section Criteria & justification> Animal species (3.3)
- relevant ecological communities in the section Criteria & justification> Ecological communities (3.4)

- Southern sea otter (*Enhydra lutris nereis*): About 100 sea otters are found within the Elkhorn Slough estuary at any given time. Salt marshes in the estuary harbor the highest density of mother-pup pairs in the range of the species, and Elkhorn Slough is considered important for the recovery of the species (T. Tinker, USGS, pers. com.).
- Western snowy plover (*Charadrius alexandrinus nivosus*): Salt ponds in Elkhorn Slough wetlands provide important nesting habitat for this species; the majority of nests in central California occur in Elkhorn Slough (Page and Stenzel 1981).
- Elkhorn Slough harbors three threatened ecological communities:
    - Salt marshes: Over 90% of coastal wetlands have been lost in California, and Elkhorn Slough has second largest salt marsh after San Francisco Bay

- Eelgrass beds: eelgrass has declined in California, but is expanding in Elkhorn Slough, supported by a trophic cascade generated by sea otters
- Oyster beds: Olympia oysters have declined along West Coast, but are found at Elkhorn Slough, the only spot in a >500 km stretch of coastline between San Francisco Bay and Mugu Lagooon

[X] **Criterion 3 : Biological diversity**

To justify this Criterion, please give details in the box below. If you want to name any specific species, please give details on:
- relevant plant species in the section Criteria & justification> Plant species (3.2)
- relevant animal species in the section Criteria & justification> Animal species (3.3)

Justification *(This field is limited to 3000 characters)*

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).

[X] **Criterion 4 : Support during critical life cycle stage or in adverse conditions**

To justify this Criterion, please give details below on:
- relevant plant species in the section Criteria & justification> Plant species (3.2)
- relevant animal species in the section Criteria & justification> Animal species (3.3)
and explain the life cycle stage or nature of adverse conditions in the accompanying 'justification' box.

This criterion applies to many resident species at Elkhorn Slough. Here are just a few examples, which also are reiterated under other criteria:

- Elkhorn Slough has been designated a Globally Important Bird Area because it is a critical stopover for migratory waterbirds birds on the Pacific Flyway
- Southern sea otter (*Enhydra lutris nereis*): 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.
- Western snowy plovers (*Charadrius alexandrinus nivosus*): 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.
- English sole (*Pleuronectes vetulus*): Elkhorn Slough has been documented as a key nursery for this commercially valuable species (Brown 2006)

[X] **Criterion 5 : >20,000 waterbirds**

To justify this Criterion, please give details below on:- the total number of waterbirds and the period of data collection - relevant waterbird species, and if possible their population size, in the section Criteria & justification> Animal species (3.3)

Overall waterbird numbers* *(This field is mandatory)*

Regular monitoring by staff of the Elkhorn Slough Reserve documents >20,000 waterbirds in the estuary during fall surveys; indeed, sometimes there are nearly 40,000 shorebirds alone, plus thousands more other waterbirds, including waterfowl (e.g. widgeons, teals, buffleheads), waders, and Brown Pelicans (Wasson et al. 2015; Fork 2014). More than 50 species are commonly observed during these surveys. Earlier research also documented such high numbers (Connors 2003).

Start year* *(This field is mandatory)*

2003

End year* *(This field is mandatory)*

2015

Source of data:

[X] **Criterion 6 : >1% waterbird population**

To justify this Criterion, please give details on relevant waterbird species and their population size in the section Criteria & justification> Animal species (3.3)

Elkhorn Slough wetlands regularly support 2.2% of the population (50 nests of 2260 birds on the Pacific coast) of western snowy plovers (*Charadrius alexandrinus nivosus*), a species federally listed in the US as threatened. Overall, 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)

X[ ] **Criterion 7 : Significant and representative fish**

To justify this Criterion, please give information in the box below and details of relevant fish species in the section Criteria & justification> Animal species (3.3)

Justification *(This field is limited to 3000 characters)*

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.

[X] **Criterion 8 : Fish spawning grounds, etc.**

To justify this Criterion, please give information in the box below. Completion of details on relevant fish species in the section Criteria & justification> Animal species (3.3) is optional.

Justification *(This field is limited to 3000 characters)*

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 (*Pleuronectes 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.

[X] Criterion 9 : >1% non-avian population

To justify this Criterion, please give details on relevant non-avian species and their population size in the section Criteria & justification> Animal species (3.3)

Elkhorn Slough provides very important foraging, resting, and nursery areas for southern sea otter (*Enhydra lutris nereis*), a species listed as federally threatened. The population size of southern sea otters is about 3000 animals; of these, more than 100 are typically found within Elkhorn Slough (thus representing >3% of the population) (Hughes et al. 2013).

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[2]	CITES Appendix I	Other status	Justification
Sarcocornia pacifica alliance	Pickleweed mats	California State Rank 3 - Moderate risk of extinction	[ ]	[ ]		[ ]		Ranked by California Department of Fish and Wildlife, 2010
Zostera marina	Eelgrass				LC			IUCN Least Concern status, but populations in decline in developed regions of North American

Optional text box to provide further information on plant species of international importance:

(This field is limited to 2500 characters)

[2] | LC | NT | VU | EN | CR | EW | EX

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[3]	Period of pop. Est.[3]	% occurrence[3]	IUCN Red List[4]	CITES Appendix I	CMS Appendix I	Other Status	Justification
			2	4	6	9	3	5	7	8								
Chordata	*Enhydra lutris nereis*	Southern Sea Otter	[x]	[x]	[ ]	[ ]	[x]	[ ]	[ ]	[ ]	3000	2016		EN	[ ]	[ ]	Endangered (ESA)	
Chordata	*Charadrius alexandrinus nivosus*	Western snowy plover	x	x	x		x	x			2260	Mar-Sept 2015	2.2	NT			Threatened (ESA)	
Chordata	*Limosa fedoa*	Marbled Godwit					x	x			50,000*		7.5	LC				*Estimated Pacific Flyway population
Chordata	*Calidris minutilla*	Least																

[3] These fields are only compulsory to justify criteria 6 & 9

[4] | LC | NT | VU | EN | CR | EW | EX

		Sandpiper					x	x			70,000*		10	LC			
Chordata	*Pleuronectes vetulus*	English sole		x			x			x							

Optional text box to provide further information on animal species of international importance:

(This field is limited to 2500 characters)

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	Yes - California State Rank 3 - Moderate risk of extinction	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	X	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	X	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)

What is the Site like?

4.1 Ecological character

Please summarize the ecological components, processes and services which are critical to determining the ecological character of the site. Please also summarize any natural variability in the ecological character of the site, and any known past or current

(This field is limited to 2500 characters)

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?

Please list all wetland types which occur on the site, and for each of them: - rank the four most abundant types by area from 1 (greatest extent) to 4 (least extent) in the third column, - if the information exists, provide the area (in ha) in the fourth column - if this wetland type is used for justifying the application of Criterion 1, indicate if it is representative, rare or unique in the last column - you can give the local name of the wetland type if different from the Ramsar classification system in the second column

Marine or coastal wetlands

Wetland types (code and name)[5]	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1[6]
H A G	Elkhorn Slough Elkhorn Slough Elkhorn Slough	1 2 3	269 245 150	

Inland wetlands

Wetland types (code and name)[7]	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1[6]

Human-made wetlands

Wetland types (code and name)[8]	Local name	Ranking of extent (1: greatest - 4: least)	Area (ha) of wetland type	Justification of Criterion 1[6]
Ss	Moss Landing Wildlife Area	1	60	

What non-wetland habitats are within the site?

Other non-wetland habitat

Other non-wetland habitats within the site	Area (ha) if known

[5] A: Permanent shallow marine waters | B: Marine subtidal aquatic beds (Underwater vegetation) | C: Coral reefs | D: Rocky marine shores | E: Sand, shingle or pebble shores | G: Intertidal mud, sand or salt flats | Ga: Bivalve (shell-fish) reefs | H: Intertidal marshes | I: Intertidal forested wetlands | J: Coastal brackish / saline lagoons | F: Estuarine waters | Zk(a): Karst and other subterranean hydrological systems | K: Coastal freshwater lagoons

[6] | Representative | Rare | Unique

[7] M: Permanent rivers/ streams/ creeks | L: Permanent inland deltas | Y: Permanent Freshwater springs; oases | N: Seasonal/ intermittent/ irregular rivers/ streams/ creeks | O: Permanent freshwater lakes | Tp: Permanent freshwater marshes/ pools | P: Seasonal/ intermittent freshwater lakes | Ts: Seasonal/ intermittent freshwater marshes/ pools on inorganic soils | Tp: Permanent freshwater marshes/ pools | W: Shrub-dominated wetlands | Xf: Freshwater, tree-dominated wetlands | Ts: Seasonal/ intermittent freshwater marshes/ pools on inorganic soils | U: Permanent Non-forested peatlands | Xp: Permanent Forested peatlands | Va: Montane wetlands | Vt: Tundra wetlands | Q: Permanent saline/ brackish/ alkaline lakes | R: Seasonal/ intermittent saline/ brackish/ alkaline lakes and flats | Sp: Permanent saline/ brackish/ alkaline marshes/ pools | Ss: Seasonal/ intermittent saline/ brackish/ alkaline marshes/ pools | Zg: Geothermal wetlands | Zk(b): Karst and other subterranean hydrological systems

[8] 1: Aquaculture ponds | 2: Ponds | 3: Irrigated land | 4: Seasonally flooded agricultural land | 5: Salt exploitation sites | 6: Water storage areas/Reservoirs | 7: Excavations | 8: Wastewater treatment areas | 9: Canals and drainage channels or ditches | Zk(c): Man-made subterranean hydrological systems

Habitat connectivity (ECD)

4.3 Biological components

4.3.1 Plant species

Other noteworthy plant species

Scientific name	Common name (optional)	Position in range / endemism / other (optional)

Invasive alien plant species

Scientific name	Common name	Impacts[9]	Changes at RIS update[10]

4.3.2 Animal species

Other noteworthy animal species

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

[9] No impacts | Potentially | Actually (minor impacts) | Actually (major impacts)
[10] No change | increase | decrease | unknown

Invasive alien animal species

Phylum	Scientific name	Common name	Impacts[9]	Changes at RIS update[10]
Arthropoda	Carcinus maenas	European Green Crab	Unknown for Elkhorn Slough; has affected benthic invertebrate communities in other estuaries. Currently in decline, apparently due to Sea otter consumption.	
Mollusca	Batillaria attramentaria	Asian mud snail	Unknown for Elkhorn Slough; likely to affect foods webs through benthic diatom consumption. Currently in decline.	
Annelida	Ficopomatus enigmaticus	Australian tube worm	Unknown for Elkhorn Slough; may compete for hard substrates with native oysters	
See Wasson et al. 2001 and 2005 for list of all invasive invertebrates of Elkhorn Slough. Most of these came in with oyster culture or boating. No new invasions have been documented in the past decade.				

4.4 Physical components

4.4.1 Climate

Please indicate the prevailing climate type(s) by selecting below the climatic region(s) and subregion(s), using the Köppen-Gieger Climate Classification System.

Climatic region[11]	Subregion[12]
C: Moist Mid-Latitude climate with mild winters	Csb: Mediterranean (Mild with dry, warm summer)

If changing climatic conditions are affecting the site, please indicate the nature of these changes:
(This field is limited to 1000 characters)

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) *(The online RIS only accepts numeric values)*

0

a) Maximum elevation above sea level (in metres) *(The online RIS only accepts numeric values)*

0.85

b) Position in landscape/river basin:

[ ] 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
[X] 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. *(This field is limited to 1000 characters)*

Pacific Ocean

4.4.3 Soil

[11] A. Tropical humid climate | B. Dry climate | C. Moist Mid-Latitude climate with mild winters | D. Moist Mid-Latitude climate with cold winters | E. Polar climate with extremely cold winters and summers | H. Highland

[12] Af: Tropical wet (No dry season) | Am: Tropical monsoonal (Short dry season; heavy monsoonal rains in other months) | Aw: Tropical savanna (Winter dry season) | BWh: Subtropical desert (Low-latitude desert) | BSh: Subtropical steppe (Low-latitude dry) | BWk: Mid-latitude desert (Mid-latitude desert) | BSk: Mid-latitude steppe (Mid-latitude dry) | Csa: Mediterranean (Mild with dry, hot summer) | Csb: Mediterranean (Mild with dry, warm summer) | Cfa: Humid subtropical (Mild with no dry season, hot summer) | Cwa: Humid subtropical (Mild with dry winter, hot summer) | Cfb: Marine west coast (Mild with no dry season, warm summer) | Cfc: Marine west coast (Mild with no dry season, cool summer) | Dfa: Humid continental (Humid with severe winter, no dry season, hot summer) | Dfb: Humid continental (Humid with severe winter, no dry season, warm summer) | Dwa: Humid continental (Humid with severe, dry winter, hot summer) | Dwb: Humid continental (Humid with severe, dry winter, warm summer) | Dfc: Subarctic (Severe winter, no dry season, cool summer) | Dfd: Subarctic (Severe, very cold winter, no dry season, cool summer) | Dwc: Subarctic (Severe, dry winter, cool summer) | Dwd: Subarctic (Severe, very cold and dry winter, cool summer) | ET: Tundra (Polar tundra, no true summer) | EF: Ice Cap (Perennial ice) | H: Highland (-)

[X] Mineral
[X] Organic
[ ] No available information

Are soil types subject to change as a result of changing hydrological conditions (e.g., increased salinity or acidification)?

[X] Yes / [ ] No

Please provide further information on the soil (optional) *(This field is limited to 1000 characters)*

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?[13]	Changes at RIS update[10]
Permanent	

Source of water that maintains character of the site

Presence?[14]	Predominant water source	Changes at RIS update[10]
Tidal Freshwater from surface run-off, streams, groundwater and agricultural run-off contributes to water, but much smaller percentage of volume than tidal	[X]	

Water destination

Presence?[15]	Changes at RIS

[13] Usually permanent water present | Usually seasonal, ephemeral or intermittent water present | Unknown

[14] Water inputs from rainfall | Water inputs from surface water | Water inputs from groundwater | Marine water | Unknown

	update[10]
Marine	

Stability of water regime

Presence?[16]	Changes at RIS update[10]
Fluctuating (tidal)	

Please add any comments on the water regime and its determinants (if relevant). Use this box to explain sites with complex hydrology: *(This field is limited to 1000 characters)*

Connectivity of surface waters and of groundwater (ECD)

Stratification and mixing regime (ECD)

4.4.5 Sediment regime

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

Please provide further information on sediment (optional): *(This field is limited to 1000 characters)*

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.

Water turbidity and colour (ECD)

Light - reaching wetland (ECD)

Water temperature (ECD)

4.4.6 Water pH

[ ] Acid (pH<5.5)
[ ] Circumneutral (pH: 5.5-7.4)
[x] Alkaline (pH>7.4)
[ ] Unknown

Please provide further information on pH (optional): *(This field is limited to 1000 characters)*

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

[15] Feeds groundwater | To downstream catchment | Marine | Unknown
[16] Water levels largely stable | Water levels fluctuating (including tidal) | Unknown

4.4.7 Water salinity

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

Please provide further information on salinity (optional): *(This field is limited to 1000 characters)*

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.

Dissolved gases in water (ECD)

4.4.8 Dissolved or suspended nutrients in water

[x] Eutrophic
[x] Mesotrophic
[ ] Oligotrophic
[ ] Dystrophic
[ ] Unknown

Please provide further information on dissolved or suspended nutrients (optional): *(This field is limited to 1000 characters)*

The estuary receives high nutrient loads from the surround agricultural areas. We conducted an eutrophication assessment (Hughes et al. 2010) and concluded that conditions range from moderately eutrophic (in strongly flushed areas) to highly eutrophic (in more stagnant peripheral areas).

Dissolved organic carbon (ECD)

Redox potential of water and sediments (ECD)

Water conductivity (ECD)

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 / [x] ii) significantly different

If the surrounding area differs from the Ramsar Site, please indicate how: (Please tick all categories that apply)

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

Please describe other ways in which the surrounding area is different: *(This field is limited to 1000 characters)*

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

Please select below all relevant ecosystem services/benefits currently provided by the site and indicate their relative importance in the right-hand column.

Provisioning Services

Ecosystem service[17]	Examples[18]	Importance/Extent/Significance[19]
Food for humans	Commercially valuable flatfish such as English Sole	High: Brown (2006) demonstrated that Elkhorn Slough is nursery for flatfish in Monterey Bay; Hughes et al (2015) showed offshore catch is linked to Slough conditions

Regulating Services

Ecosystem service[20]	Examples[21]	Importance/Extent/Significance[19]
1) Pollution control 2) Climate regulation	1) Slough marshes take up nutrients 2) Slough marshes sequester carbon	1) High: This is important role in nutrient loaded estuary, demonstrated by Nelson and Zavleta (2012) 2) High: consistent levels of carbon sequestration documented (average 200 g C/m2) in cores taken by Watson et al. (2010)

[17] Food for humans | Fresh water | Wetland non-food products | Biochemical products | Genetic materials

[18] Sustenance for humans (e.g., fish, molluscs, grains) | Drinking water for humans and/or livestock | Water for irrigated agriculture | Water for industry | Water for energy production (hydro-electricity) | Timber | Fuel wood/fibre | Peat | Livestock fodder | Reeds and fibre | Other | Extraction of material from biota | Medicinal products | Genes for tolerance to certain conditions (e.g., salinity) | Genes for resistance to plant pathogens | Ornamental species (live and dead)

[19] not relevant for site | Low | Medium | High

[20] Maintenance of hydrological regimes | Erosion protection | Pollution control and detoxification | Climate regulation | Biological control of pests and disease | Hazard reduction

[21] Groundwater recharge and discharge | Storage and delivery of water as part of water supply systems for agriculture and industry | Soil, sediment and nutrient retention | Water purification/waste treatment or dilution | Local climate regulation/buffering of change | Regulation of greenhouse gases, temperature, precipitation and other climactic processes | Support of predators of agricultural pests (e.g., birds feeding on locusts) | Flood control, flood storage | Coastal shoreline and river bank stabilization and storm protection

Cultural Services

Ecosystem service[22]	Examples[23]	Importance/Extent/Significance[19]
1) Recreation and tourism 2) Scientific and educational	1) Birdwatching and kayaking to observe sea otters 2) Many research projects; visitor center at Elkhorn Slough Reserve	1) High: value of Slough for wildlife viewing has been well-documented (Kildow and Pendleton 2010) 2) Researchers from regional universities (Moss Landing Marine Laboratories, University of California, Stanford University, California State University Monterey Bay) conduct projects in estuary; 45,000 visitors per year come to Elkhorn Slough Reserve, including 5,000 students

Supporting Services

Ecosystem service[24]	Examples[25]	Importance/Extent/Significance[19]
Biodiversity	Over 500 species of invertebrates, 100 species of fish, 300 species of birds	High: species lists provided in Caffrey et al. (2002).

[22] Recreation and tourism | Spiritual and inspirational | Scientific and educational

[23] Recreational hunting and fishing | Water sports and activities | Picnics, outings, touring | Nature observation and nature-based tourism | Inspiration | Cultural heritage (historical and archaeological) | Contemporary cultural significance, including for arts and creative inspiration, and including existence values | Spiritual and religious values | Aesthetic and sense of place values | Educational activities and opportunities | Important knowledge systems, importance for research (scientific reference area or site) | Long-term monitoring site | Major scientific study site | Type location for a taxon

[24] Biodiversity | Soil formation | Nutrient cycling | Pollination

[25] 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 | Sediment retention | Accumulation of organic matter | Storage, recycling, processing and acquisition of nutrients | Carbon storage/sequestration | Support for pollinators

Other ecosystem service(s) not included above: *(This field is limited to 1000 characters)*

Please make a rough estimate of the approximate number of people who directly benefit from the ecological services provided by this site (estimate at least in orders of magnitude: 10s, 100s, 1000s, 10 000s etc.):

Within the site:

10,000s per year

Outside the site:

100,000s per year

Have studies or assessments been made of the economic valuation of ecosystem services provided by this Ramsar Site?

[X] 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): *(This field is limited to 2500 characters)*

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

Is the site considered internationally important for holding, in addition to relevant ecological values, examples of significant cultural values, whether material or non-material, linked to its origin, conservation and/or ecological functioning? If so, please describe this importance under one or more of the four following categories. You should not list here any values derived from non-sustainable exploitation or which result in detrimental ecological changes.

[ ] 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

Description if applicable *(This field is limited to 2500 characters)*

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

Description if applicable *(This field is limited to 2500 characters)*

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

Description if applicable *(This field is limited to 2500 characters)*

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

Description if applicable *(This field is limited to 2500 characters)*

4.6 Ecological processes

This section is not intended for completion as part of a standard RIS, but is included for completeness as part of the agreed format of a 'full' Ecological Character Description (ECD) outlined by Resolution X.15

Primary production (ECD)

Nutrient cycling (ECD)

Carbon cycling (ECD)

Animal reproductive productivity (ECD)

Vegetational productivity, pollination, regeneration processes, succession, role of fire, etc. (ECD)

Notable species interactions, including grazing, predation, competition, diseases and pathogens (ECD)

Notable aspects concerning animal and plant dispersal (ECD)

Notable aspects concerning migration (ECD)

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)

Pressures and trends concerning any of the above, and/or concerning ecosystem integrity (ECD)

How is the Site managed?

5.1 Land tenure and responsibilities (Managers)

5.1.1 Land tenure/ownership

Please specify if this category applies to the Ramsar Site, to the surrounding area or to both, by ticking the relevant option(s).

Public ownership

Category[26]	Within the Ramsar Site	In the surrounding area
State (California Department of Fish and Wildlife)	[x]	[x]

Private ownership

Category[27]	Within the Ramsar Site	In the surrounding area
Land trust (Elkhorn Slough Foundation)	[x]	[x]

Other

Category[28]	Within the Ramsar Site	In the surrounding area
	[ ]	[ ]

Provide further information on the land tenure / ownership regime (optional): *(This field is limited to 1000 characters)*

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: *(This field is limited to 1000 characters)*

For the lands owned by the California Department of Fish and Wildlife: Elkhorn Slough

[26] Public land (unspecified) | National/Federal government | Provincial/region/state government | Local authority, municipality, (sub)district, etc. | Other public ownership
[27] Cooperative/collective (e.g., farmers cooperative) | Commercial (company) | Foundation/non-governmental organization/trust | Religious body/organization | Other types of private/individual owner(s)
[28] Unspecified mixed ownership | No information available | Commoners/customary rights

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: *(This field is limited to 254 characters)*

Elkhorn Slough Reserve, 1700 Elkhorn Road, Royal Oaks, CA 95076
Elkhorn Slough Foundation, PO Box 267, Moss Landing, CA 95039

E-mail address: *(The online RIS only accepts valid e-mail addresses, e.g. example@mail.com)*

dave.feliz@wildlife.ca.gov, marksilberstein@elkhornslough.org

5.2 Ecological character threats and responses (Management)

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

Please specify if this category applies to the Ramsar Site, to the surrounding area or to both, by ticking the relevant option(s).

Human settlements (non agricultural)

Factors adversely affecting site[29]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
			[ ]		[ ]	

Water regulation

Factors adversely affecting site[31]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
River diversion, groundwater use, diking	High	High	[x]		[x]	

Agriculture and aquaculture

Factors adversely affecting site[32]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
Pollution (nutrients, pesticides); wetland reclamation; freshwater use	High	High	[x]		[x]	

Energy production and mining

Factors adversely affecting site[33]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
Natural gas power plant	Low	Low	[ ]		[x]	

Transportation and service corridors

[29] Housing and urban areas | Commercial and industrial areas | Tourism and recreation areas | Unspecified development
[30] Low impact | Medium impact | High impact | unknown impact |
[31] Drainage | Water abstraction | Dredging | Salinisation | Water releases | Canalisation and river regulation
[32] Annual and perennial non-timber crops | Wood and pulp plantations | Livestock farming and ranching | Marine and freshwater aquaculture | Non specified
[33] Oil and gas drilling | Mining and quarrying | Renewable energy | Unspecified

Factors adversely affecting site[34]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
Public roads and railroad built in tidal wetlands	Med	High	[ ]		[ ]	

Biological resource use

Factors adversely affecting site[35]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
Fishing, clamming, hunting	Low	Low	[ ]		[x]	

Human intrusions and disturbance

Factors adversely affecting site[36]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
Kayaking, boating	Low	Low	[ ]		[x]	

Natural system modifications

Factors adversely affecting site[37]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
Diking and restriction of tidal exchange	High	High	[x]		[x]	

Invasive and other problematic species and genes

Factors adversely affecting site[38]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
Invasive invertebrates and high marsh	Medium	High	[x]		[x]	

[34] Roads and railroads | Utility and service lines (e.g., pipelines) | Shipping lanes | Aircraft flight paths | Unspecified

[35] Hunting and collecting terrestrial animals | Gathering terrestrial plants | Logging and wood harvesting | Fishing and harvesting aquatic resources | Unspecified

[36] Recreational and tourism activities | (Para)military activities | Unspecified/others

[37] Fire and fire suppression | Dams and water management/use | Vegetation clearance/ land conversion | Unspecified/others

[38] Invasive non-native/ alien species | Problematic native species | Introduced genetic material | Unspecified

plants See Wasson et al 2001, 2005, and 2010 for details.						

Pollution

Factors adversely affecting site[39]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
			[ ]		[ ]	

Geological events

Factors adversely affecting site[40]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
Earthquakes	Low	Unknown	[x]	Unknown	[x]	Unknown

Climate change and severe weather

Factors adversely affecting site[41]	Actual threat[30]	Potential threat[30]	Within the site	Changes[10]	In the surrounding area	Changes[10]
Sea level rise; droughts and floods	Low	High	[x]		[x]	

Please describe any other threats (optional): *(This field is limited to 2500 characters)*

5.2.2 Legal conservation status

Please list any other relevant conservation status, at global, regional or national level and specify the boundary relationships with the Ramsar Site:

Global legal designations

Designation type[42]	Name of area	Online information url	Overlap with Rams

[39] Household sewage, urban waste water | Industrial and military effluents | Agricultural and forestry effluents | Garbage and solid waste | Air-borne pollutants | Excess heat, sound, light | Unspecified
[40] Volcanoes | Earthquakes/tsunamis | Avalanches/landslides | Unspecified
[41] Habitat shifting and alteration | Droughts | Temperature extremes | Storms and flooding | Unspecified
[42] World Heritage site | UNESCO Biosphere Reserve | Other global designation

			ar Site[43]
US National NOAA	Elkhorn Slough National Estuarine Research Reserve	http://elkhornslough.org/	partly
US National NOAA NMFS	Essential Fish Habitat	http://www.habitat.noaa.gov/protection/efh/habitatmapper.html	partly
US State	State Marine Reserve	https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Network/Central-California	partly
US State	State Marine Conservation Area	https://www.wildlife.ca.gov/Conservation/Marine/MPAs/Network/Central-California	whole
Audubon Society	Globally Important Bird Area	http://netapp.audubon.org/iba	whole

Regional (international) legal designations

Designation type[44]	Name of area	Online information url	Overlap with Ramsar Site[43]

National legal designations

Designation type	Name of area	Online information url	Overlap with Ramsar Site[43]

Non-statutory designations

[43] whole | partly
[44] EU Natura 2000 | Other international designation

Designation type[45]	Name of area	Online information url	Overlap with Ramsar Site[43]
Western Hemisphere Shorebird Network; Audubon Globally Important Bird Area	Elkhorn Slough	http://www.whsrn.org/ http://netapp.audubon.org/iba	Partly

5.2.3 IUCN protected areas categories (2008)

[ ] Ia Strict Nature Reserve
[x] 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[46]	Status[47]
State Ecological Reserve, State Marine Reserve, State Conservation area	implemented

Habitat

Measures[48]	Status[47]
Listed under various local,	Implemented

[45] Important Bird Area | Important Plant Area | Other non-statutory designation
[46] Legal protection
[47] Proposed | Partially implemented | Implemented
[48] Catchment management initiatives/controls | Improvement of water quality | Habitat manipulation/enhancement | Hydrology management/restoration | Re-vegetation | Soil management | Land conversion controls | Faunal corridors/passage

regional and national management plans	

Species

Measures[49]	Status[47]
Listed under various local, regional and national management plans	Implemented

Human Activities

Measures[50]	Status[47]

Other: *(This field is limited to 2500 characters)*

5.2.5 Management planning

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

[51]Yes, both Elkhorn Slough Foundation and Elkhorn Slough Reserve have management plans that include the site area

Is the management plan/planning implemented?

[x] Yes / [ ] No

The management plan covers

[52]All of Ramsar site

Is the management plan currently subject to review and update?

[x] Yes / [ ] No

Has a management effectiveness assessment been undertaken for the site?

[ ] Yes / [x] No

[49] Threatened/rare species management programmes | Reintroductions | Control of invasive alien plants | Control of invasive alien animals

[50] Management of water abstraction/takes | Regulation/management of wastes | Livestock management/exclusion (excluding fisheries) | Fisheries management/regulation | Harvest controls/poaching enforcement | Regulation/management of recreational activities | Communication, education, and participation and awareness activities | Research

[51] No | Yes | In preparation

[52] All of Ramsar Site | Part of Ramsar Site

Please give link to site-specific plan or other relevant management plan if this is available via the Internet or upload it in section 'Additional material': *(This field is limited to 500 characters)*

The Tidal Wetland Project Strategic Plan is the most relevant management planning document for the Ramsar site. It can be downloaded from http://www.elkhornslough.org/tidalwetland/strategic_plan.htm

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: *(This field is limited to 1000 characters)*

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):

www.elkhornslough.org

5.2.6 Planning for restoration

Is there a site-specific restoration plan?

[53]The Elkhorn Slough Tidal Wetland Project Strategic Plan outlines restoration and conservation priorities. Parts of it have been implemented thus far.

Has the plan been implemented?

[x] Yes / [x] No

The restoration plan covers:

[54]All of the Ramsar site

Is the plan currently being reviewed and updated?

[ ] Yes / [ ] No

Where the restoration is being undertaken to mitigate or respond to a threat or threats identified in this RIS, please indicate it / them: *(This field is limited to 1000 characters)*

We are currently in final planning stages for a marsh restoration project through sediment addition which addresses a threat from wetland reclamation (the marsh had subsided to elevations to low to sustain marsh).

We are conducting oyster restoration to reverse historic declines.

5.2.7 Monitoring implemented or proposed

Monitoring[55]	Status[56]
Water Quality	Implemented

[53] Please select a value | No need identified | No; the site has already been restored | No; but restoration is needed | No; but a plan is being prepared | Yes; there is a plan

[54] All of Ramsar Site | Part of Ramsar Site

[55] Water regime monitoring | Water quality | Soil quality | Plant community | Plant species | Animal community | Animal species (please specify) | Birds

[56] | Implemented | Proposed

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)	(all)

Please indicate other monitoring activities:

(This field is limited to 2500 characters)

We 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.

Additional material

6.1 Additional reports and documents

6.1.1 Bibliographical references

(This field is limited to 2500 characters)

Brown J. A. 2006. Using the chemical composition of otoliths to evaluate the nursery role of estuaries for English sole *Pleuronectes vetulus* populations. *Marine Ecology Progress Series* 306:269-281.

Caffrey J. M., Brown M., Tyler W.B., Silberstein M., editors. 2002. Changes in a California estuary: A profile of Elkhorn Slough. Elkhorn Slough Foundation, Moss Landing.

Connors S. 2003. Shorebird distribution in a changing environment: patterns at Elkhorn Slough. Master of Science Thesis. San Jose State University.

Fork S. 2014. Shorebirds, waterfowl, and waders of Elkhorn Slough - quarterly surveys of migrants and residents (2003-2014). Technical Report Series 2014:2.

Gee, A. K., Wasson, K., Shaw, S. L., Haskins, J. 2010. Signatures of restoration and management changes in the water quality of a central California estuary. *Coasts and Estuaries* 33:1004-124.

Hughes B. B., Levey M. D., Fountain, M. C., Carlisle A. B., Chavez F. P., Gleason M. G. 2015. Climate mediates hypoxic stress on fish diversity and nursery function at the land–sea interface. *Proceedings of the National Academy of Sciences*, *112*(26), 8025-8030.

Hughes B. B., Levey M.D., Brown J.A., Fountain M.C., Carlisle A. B., Litvin S.Y., Greene C. M. Heady W. M., Gleason M.G. 2014. Nursery functions of US West Coast estuaries: the state of knowledge for juveniles of focal invertebrate and fish species. The Nature Conservancy, Arlington, V.A.

Hughes B.B, Eby R., Van Dyke E., Tinker M.T., Marks C.I., Johnson K.S., Wasson K. 2013. Recovery of a top predator mediates negative eutrophic effects on seagrass. *Proceedings of the National Academy of Sciences* 110:15313-15318.

Hughes, B.B., Haskins, J.C., Wasson, K., Watson, E.B. 2011. Identifying factors that influence expression of eutrophication in a central California estuary. *Marine Ecology Progress Series* 439:19-30.

Kildow, J., Pendleton, L. 2010. Elkhorn Slough restoration policy and economics report. http://www.elkhornslough.org/tidalwetland/downloads/Kildow_and_Pendleton_Elkhorn_Slough_Restoration_Policy_and_Economics_report_2010.pdf

Nelson JL, Zavaleta ES. 2012. Salt marsh as a coastal filter for the oceans: changes in function

with experimental increases in nitrogen loading and sea-level rise. PloS one 7(8):e38558.

Ritter, A.F., Wasson, K., Lonhart, S.I., Preisler, R.K., Woolfolk, A., Griffith, K.A., Connors, S., Heiman, K. 2008. Ecological signatures of anthropogenically altered tidal exchange in estuarine ecosystems. *Estuaries and Coasts* 31(3):554-571.

Page, G.W. and Stenzel, L.E. 1981. The breeding status of the Snowy Plover in California. Western Birds 12:1-40.

Page, G.W., Shuford, W.D., Kjelmyr, J.E., Stenzel, L.E. 1992. Shorebird numbers in wetlands of the Pacific flyway: A summary of counts from April 1988 to January 1992. Report, Point Reyes Bird Observatory, Stinson Beach, Calif.

Tidal Wetland Program, 2007. Elkhorn Slough Tidal Wetland Strategic Plan, March 2007. Elkhorn Slough National Estuarine Research Reserve, Watsonville, CA. http://www.elkhornslough.org/tidalwetland/strategic_plan.htm

Van Dyke, E. and K. Wasson. 2005. Historical Ecology of a Central California Estuary: 150 Years of Habitat Change. *Estuaries* 28(2):173-189.

Wasson, K., Zabin, C.J., Bedinger, L., Diaz, M.C., Pearse, J.S. 2001. Biological invasions of estuaries without international shipping: the importance of intraregional transport. *Biological Conservation* 102:143-153.

Wasson, K., Fenn, K., Pearse, J. 2005. Habitat differences in marine invasions of central California. *Biological Invasions* 7:935-948.

Wasson, K. 2010. Informing Olympia oyster restoration: evaluation of factors that limit populations in a California estuary. *Wetlands* 30:449-459.

Wasson K, Watson EB, Van Dyke E, Hayes G, Aiello I. 2012. A novel approach combining rapid paleoecological assessments with geospatial modeling and visualization to help coastal managers design salt marsh conservation strategies in the face of environmental change. *Elkhorn Slough Technical Report* 2012:1. http://library.elkhornslough.org/research/bibliography/Marsh_Sustainbility_Elkhorn_Slough_Technical_Report_2012.pdf

Wasson K., Eby R., Endris C., Fork S., Haskins J., Hughes B., Jeppesen R., Van Dyke E., Watson E. 2015. Elkhorn Slough, California State of the Estuary Report: A report on temporal trends in estuarine indicators monitored by the Elkhorn Slough National Estuarine Research Reserve. Available at http://www.elkhornslough.org/research/PDF/State_of_Estuary_2015.pdf

Wasson, K., Woolfolk, A. 2011. Salt marsh-upland ecotones in central California:

vulnerability to invasions and anthropogenic stressors. *Wetlands* 31:1-14.

Watson, E. B., Wasson, K., Pasternack, G. B., Woolfolk, A., Van Dyke, E., Gray, A. B., Pakenham, A., Wheatcroft, R. A. 2011. Applications from paleoecology to environmental management and restoration in a dynamic coastal environment. *Restoration Ecology* 19:765-775

Yoklavich M. M., Cailliet G.M., Barry J.P., Ambrose D.A., Antrim B.S.. 1991. Temporal and spatial patterns in abundance and diversity of fish assemblages in Elkhorn Slough, California. *Estuaries* 14:465-480.

(This bibliography of references cited in the application exceeds the 2500 character limit and can be provided as a separate appendix if desired.)

6.1.2 Additional reports and documents

i. taxonomic lists of plant and animal species occurring in the site (see section 4.3)
-UPLOAD via online form-

ii. a detailed Ecological Character Description (ECD) (in a national format)
-UPLOAD via online form-

iii. a description of the site in a national or regional wetland inventory
-UPLOAD via online form-

iv. relevant Article 3.2 reports
-UPLOAD via online form-

v. site management plan
-UPLOAD via online form-

vi. other published literature
-UPLOAD via online form-

Please note that any documents uploaded here will be made publicly available.

6.1.3 Photograph(s) of the Site

Please provide at least one photograph of the site:

File	Copyright holder	Date on which the picture was taken	Caption
Aerial overview	Elkhorn Slough Foundation	12/28/2011	Aerial image of Elkhorn Slough channel and marshes
Otter	Elkhorn Slough Reserve	5/2/2012	Sea otter resting on salt marsh at Elkhorn Slough Reserve
Terns	Elkhorn Slough Reserve	5/19/2009	Caspian Terns breeding on the Elkhorn Slough

			Reserve
Egrets	Elkhorn Slough Reserve	10/11/2007	Great Egrets forage on the Elkhorn Slough Reserve
Shorebirds	Elkhorn Slough Reserve	12/31/2000	Shorebirds feed on mudflats at Elkhorn Slough
People in mudflat	Elkhorn Slough Reserve	12/1/2013	Monitoring oyster restoration reefs at Elkhorn Slough Reserve

[x] I certify that I am the photographer, the valid holder of rights over the photograph(s), or an authorized representative of the organization which is the valid holder of rights over the photograph(s), and I hereby assign an irrevocable, perpetual and royalty-free right to use, reproduce, edit, display, transmit, prepare derivative works of, modify, publish, affix logos to, and otherwise make use of the submitted photograph(s) in any way, to the Ramsar Convention Secretariat, its affiliates and partners, for non-commercial purposes in conjunction with the mission of the Ramsar Convention. This use includes, but is not limited to, internal and external publication and materials, presentation on the websites of the Ramsar Convention or any affiliated body, and any and all other communication channels with copyright attributed to the holder in all published forms. The full accuracy of all data submitted rests with the submitter, or organization submitting the photograph(s). In submitting, I hereby agree to the aforementioned terms, personally or on behalf of the organization of which I am an authorized official, certifying that the Ramsar Convention Secretariat, its affiliates and partners are explicitly held harmless for any and all costs, expenses, or damages arising from use of the submitted photograph(s) and any additional information provided.

6.1.4 Designation letter and related data

Designation letter*

-UPLOAD via online form-

Date of Designation

Number of certificates wished *(The online RIS only accepts numeric values)*

SAM FARR
20TH DISTRICT, CALIFORNIA

COMMITTEE ON APPROPRIATIONS
SUBCOMMITTEES:
AGRICULTURE, RURAL DEVELOPMENT, FOOD AND DRUG ADMINISTRATION, AND RELATED AGENCIES
MILITARY CONSTRUCTION, VETERANS' AFFAIRS, AND RELATED AGENCIES
CO-CHAIR, CONGRESSIONAL ORGANIC CAUCUS
CO-CHAIR, CONGRESSIONAL TRAVEL AND TOURISM CAUCUS
CO-CHAIR, HOUSE OCEANS CAUCUS

Congress of the United States
House of Representatives
Washington, DC 20515–0520

1126 LONGWORTH HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–0520
(202) 225–2861

100 WEST ALISAL
SALINAS, CA 93901
(831) 424–2229

701 OCEAN STREET
ROOM 318
SANTA CRUZ, CA 95060
(831) 429–1976

www.farr.house.gov

October 17, 2016

Mr. Daniel M. Ashe, Director
U.S. Fish and Wildlife Service
1849 C Street, NW
Washington, DC 20240

Dear Director Ashe:

I am writing to lend my strong support for the designation of the Elkhorn Slough as a Ramsar wetlands site pursuant to the terms of the 1971 Ramsar Convention on Wetlands. As you may know, the Elkhorn Slough is one of the largest remaining coastal estuaries on the California Coast and an integral part of the Monterey Bay ecosystem. I have no doubt that this site stands out as an excellent candidate for addition to the list of 37 existing Ramsar designated wetlands in the U.S.

As you may know, Elkhorn Slough is an exceptional ecosystem on the Central California Coast that provides a key linkage between the Monterey Bay and the surrounding uplands. It harbors California's largest tract of tidal salt marsh outside the San Francisco Bay. It also boasts an amazing level of biological diversity as the home to over 135 aquatic bird species, 550 marine invertebrate species, and over 100 fish species. Over 200 migratory bird species use the slough as a resting place during their travels. The Slough is also critical habitat for substantial populations of several marine mammal species, including California sea otters, sea lions, and harbor seals.

Additionally, the Slough is also a model of wetlands management and conservation. In 1980, the State of California and the National Oceanic and Atmospheric Administration partnered to establish Elkhorn Slough as a National Estuarine Research Reserve. Moreover, the widely respected non-profit Elkhorn Slough Foundation has worked over the course of many years to support the Slough's protection the surrounding communities into those efforts.

I recognize that the Ramsar designation comes without any legal, fiscal or management obligations. But I believe the status will help further elevate the significance of Elkhorn Slough and further assist in the long standing conservation and restoration of the Slough. Thank you for your time and attention to this matter.

Sincerely,

Sam Farr
Member of Congress

SF/aa

State of California – The Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Central Region
1234 East Shaw Avenue
Fresno, California 93710
www.wildlife.ca.gov

EDMUND G. BROWN, Jr., Governor
CHARLTON H. BONHAM, Director

October 10, 2016

Mr. Daniel M. Ashe
U.S. Fish and Wildlife Service
1849 C Street NW, Room 3358
Washington, D.C. 20240

Dear Mr. Ashe:

The California Department of Fish and Wildlife (Department) supports the nomination of the Elkhorn Slough as a designated Ramsar wetland site. The diversity of habitats and wildlife in the Elkhorn Slough is unparalleled, representing a unique transition from upland habitats to the Pacific Ocean and the deep waters of the Monterey Canyon.

The Department manages both the 872 acre Moss Landing Wildlife Area and the 1,700 acre Elkhorn Slough Ecological Reserve in the Elkhorn Slough estuary. The Reserve is also designated as a National Estuarine Research Reserve (NERR), as a result of a partnership with the National Oceanic Atmospheric Administration. Through a combination of federal and State funds, we manage the Reserve in cooperation with the Elkhorn Slough Foundation. It is one of 28 NERRs around the United States.

Our Department has also designed the Elkhorn Slough as a Marine Protected Area to further conserve the diverse natural resources of the area.

This nomination is well founded, considering the biological richness of the area. Elkhorn Slough contains the largest concentration of southern sea otters within its range. Their recolonization of the estuarine environment happened relatively recently and the Reserve is actively involved in describing their natural history in estuaries. Additionally, large numbers of harbor seals and California sea lions utilize the area. Over 300 species of birds have been observed in the area, including the endangered Western snowy plover.

Considerable time, effort and funding is continuously being invested in scientific investigations and subsequent management of the Elkhorn Slough area. It is one of the few remaining estuaries on the California coast. Research at the Elkhorn Slough Reserve is engaged in long term system monitoring of water quality, as well as the estuary's response to rising sea levels. Marsh restoration efforts underway in the Slough include tracking the project's ability to sequester carbon in the Elkhorn benthic environment.

The Elkhorn Slough Reserve receives over 40,000 visitors per year. Many of these visitors are students, engaged in the Reserve's education programs. Our visitor center

provides access to five miles of trails on the shore of the Slough, exhibits about the Elkhorn Slough and a forum to present natural history information to the public.

The Department is committed to the conservation of the Elkhorn Slough on many fronts. We heartily endorse this nomination as a Ramsar site to further these actions. For further information, please contact the Reserve Manager Dave Feliz at (831) 728-2822.

Thank you,

Julie A. Vance
Regional Manager

ec: California Department of Fish and Wildlife
T. Palmisano, D. Feliz, R4 lands file

Mailing Address
P.O. Box 267
Moss Landing
California 95039

Tel: (831) 728-5939
Fax: (831) 728-7031

www.elkhornslough.org

August 23, 2016

Mr. Daniel M. Ashe
U.S. Fish and Wildlife Service
1849 C Street NW, Room 3358
Washington, D.C. 20240

Dear Mr. Ashe:

I am writing to enthusiastically endorse the nomination of Elkhorn Slough, California, as a Ramsar Wetland Site. Elkhorn Slough, on the central coast of Monterey Bay, is an extraordinary environment and harbors one of the largest tracts of tidal wetlands remaining in the state.

The slough is renown for the abundance and diversity of wildlife found here and most recently, has been acknowledged as having the densest concentration of southern Sea Otters on the coast of California.

The conservation importance of Elkhorn Slough is reinforced by the designations it already holds within the watershed:

- National Estuarine Research Reserve
- State Ecological Reserve
- State Beach & Park
- National Marine Sanctuary
- Globally Important Bird Area
- Western Hemisphere Shorebird Reserve
- California Marine Protected Area
- Nature Conservancy Legacy Site

To these designations, we add the long history of dynamic research undertaken here, from the very first published studies of a California Estuary in the 1930s to the recent ground-breaking research on sea otters published in the Proceedings of the National Academy of Sciences.

We believe that Elkhorn Slough meets the criteria outlined for a Ramsar site. The international recognition that this designation brings will elevate the work done here, leverage further conservation and, we humbly believe, burnish the reputation of the Ramsar Convention.

As the landowner of the largest acreage in the Elkhorn watershed, the Elkhorn Slough Foundation Board of Directors agrees to uphold the goals of the Convention and to further the conservation and long-term stewardship of these wetland resources.

It is our pleasure and honor to endorse this nomination.

We are happy to answer any questions you might have regarding this application and we look forward to joining this remarkable network of wetland sites.

Sincere Regards,

Mark Silberstein
Executive Director

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
Monterey Bay National Marine Sanctuary
99 Pacific Street, Bldg 455a
Monterey, CA 93940

July 22, 2016

Mr. Daniel M. Ashe
U.S. Fish and Wildlife Service
1849 C Street NW, Room 3358
Washington, D.C. 20240

Dear Daniel,

Monterey Bay National Marine Sanctuary (MBNMS) is pleased to support the nomination proposal for Elkhorn Slough designation as a Ramsar wetland site. There are multiple reasons why Elkhorn Slough merits designation as a Ramsar site, including:

- Estuaries are rare along the California coastline, and Elkhorn Slough is one of the least developed, most intact examples of this important wetland habitat type in the region;
- Over 20,000 migratory shorebirds use it as a stopover during migration, and the largest number of threatened Snowy Plover nests in central California are found there;
- About 100 threatened southern sea otters regularly are found in Elkhorn Slough, and the estuarine wetlands host the greatest density of mother-pup pairs in the range of the subspecies, due to ample food resources and shallow, protected habitats;
- Elkhorn Slough has the third most extensive salt marsh habitat in the state of California, and researchers have recently documented the high carbon sequestration rates of Slough marshes;
- The estuary has eelgrass beds that are rapidly expanding, unlike many others in the region, which are degrading;
- The estuary is considered a regional gem by the local community, beloved among birdwatchers and naturalists, and prized by the over 100 volunteers that work at the Elkhorn Slough Reserve and Foundation;
- Tens of thousands of visitors from all over the world come to Elkhorn Slough for its spectacular bird and otter watching opportunities and scenic kayaking alongside seagrass, marshes and tidal creeks; and
- Elkhorn Slough is an integral part of Monterey Bay National Marine Sanctuary, a key nursery habitat for multiple species that links wetlands to the open ocean.

Our mission is to understand and protect the coastal ecosystem and cultural resources found within sanctuaries. National Marine Sanctuaries were established for the purpose of resource protection, research, education and public use. The natural resources within west coast sanctuaries include extensive kelp forests, one of North America's largest underwater canyons and extensive rocky shores along hundreds of miles of coastline from the Olympic Peninsula to southern California. It is home to one of the most diverse marine ecosystems in the world, including 37 species of marine mammals, over 180 species of sea and shore birds, >500 species of fishes, and numerous invertebrates and algae. This remarkably productive marine environment is fringed by spectacular

coastal scenery, including sandy beaches, rocky cliffs, rolling hills and steep mountains.

There are a variety of potential resource threats and opportunities within the sanctuary due to the sensitivity of habitats and species in the region, the long stretch of adjacent populated coastline, and the multiple uses of the marine environment. Sanctuary research and monitoring programs evaluate the status and health of marine species, habitats and ecosystems, provide critical information to resource managers, and coordinate activities with the array of world-class research institutions in the region. Resource protection programs use a variety of means to reduce or prevent detrimental human impacts, including collaborative planning efforts, regulations and permits, emergency response activities, enforcement and education. Key among these is partnering with local researchers to conduct both long-term monitoring and mechanistic studies to better understand local and regional patterns and processes.

In addition to our efforts, Elkhorn Slough has a long history of conservation investment by a variety of state and federal agencies and local and national non-profits. The Elkhorn Slough Reserve is operated in partnership with the National Oceanic and Atmospheric Administration, as one of 28 National Estuarine Research Reserves across the country. In recognition of its importance as a migratory stopover, Elkhorn Slough has been included in the Western Hemisphere Shorebird Network and is designated an Audubon Globally Important Bird Area. These kinds of partnerships ensure that this new Ramsar site will be wisely managed to protect biodiversity and provide public access and educational and research opportunities in perpetuity.

On behalf of Monterey Bay National Marine Sanctuary, I fully and enthusiastically support submission of this nomination.

Sincerely,

Paul Michel

Paul Michel
SUPERINTENDENT

Point Blue Conservation Science

Conservation science for a healthy planet
3820 Cypress Drive, #11 Petaluma, CA 94954
T 707.781.2555 | F 707.765.1685
pointblue.org

September 21, 2016

Mr. Daniel M. Ashe
U.S. Fish and Wildlife Service
1849 C Street NW, Room 3358
Washington, D.C. 20240

Dear Mr. Ashe,

I am writing to express my strong support for designation of the Elkhorn Slough estuary as a Ramsar wetland site. Point Blue Conservation Science (Point Blue) is a non-profit whose mission is to conserve birds, other wildlife, and their habitat through research and outreach. Our scientists work through diverse partnerships to reduce the negative impacts of changes in climate, land-use and the ocean on wildlife and people while fostering adaptation to a changing world.

Founded as Point Reyes Bird Observatory in 1965, Point Blue has been studying the use of Pacific Coast wetlands by waterbirds for over 40 years and one of our highest goals is to conserve and enhance key wetland habitats in California, because they support such rich and diverse natural communities, sequester carbon to combat climate change, filter water to improve water quality, and reduce the impacts of flooding. Unfortunately, over 90% of wetlands in California have been lost and degradation of remaining wetlands continues to be a significant threat. While small in size relative to other land use or habitat types, these vital wetlands provide a disproportionately important suite of ecosystem functions and services.

Point Blue biologists have worked for over 30 years studying the local Monterey Bay population of Federally Threatened Western Snowy Plovers and have been involved with ongoing monitoring of shorebird use of the Elkhorn Slough estuary. Point Blue has partnered with the US Fish & Wildlife Service, California Department of Parks & Recreation, and the California Department of Fish & Wildlife, as well as several NGOs and local landowners, to protect and enhance critically important snowy plover habitat in and around the slough, often meeting or exceeding regional Recovery goals for the species. The 872 acre Moss Landing Wildlife Area, designated a State Ecological Reserve by the California Department of Fish and Wildlife, is a vitally important component of the Elkhorn Slough watershed and has consistently been one of the

three most important sites on Monterey Bay for breeding Snowy Plovers, supporting over 1% of the range wide breeding population of the species.

The mudflats of Elkhorn Slough provide extremely valuable feeding and roosting opportunities for a large diversity of shorebirds throughout the year. The National Audubon Society recognizes this slough as a Globally Important Bird Area and the Western Hemisphere Shorebird Reserve Network designated it a Site of Regional Importance, supporting over 20,000 shorebirds during migration. The slough and its environs are highly valued by birdwatchers and naturalists, attracting visitors from all over the world.

Elkhorn Slough also represents a vitally important resource for university-level research (California State University Monterey Bay, San Jose State University and Moss Landing Marine Laboratories, University of California at Santa Cruz, and Hartnell College) and, through the active, on-going coordination of the Elkhorn Slough National Estuarine Research Reserve and the Elkhorn Slough Foundation, is a vital link to a rare habitat for many elementary and high school students every year.

Recognition as a Ramsar site will benefit Elkhorn Slough by promoting further conservation and resource management activities throughout the watershed. This will bolster current efforts undertaken by a diverse array of stakeholders to study and preserve this vital wetland.

Sincerely,

Ellie Cohen

President and CEO

Point Blue Conservation Science

The Nature Conservancy
Protecting nature. Preserving life.™

CA Coastal & Marine Program
99 Pacific Street, Suite 200G
Monterey, CA 93940

tel [831] 333-2046
fax [831] 333-1736

nature.org
nature.org/california

Mr. Daniel M. Ashe
U.S. Fish and Wildlife Service
1849 C Street NW, Room 3358
Washington, D.C. 20240

July 25, 2016

Dear Mr. Ashe,

The Nature Conservancy strongly supports the nomination of Elkhorn Slough, on California's central coast, as a Ramsar site worthy of the recognition and status as a globally significant wetland area. This designation would bring international recognition and help to advance international partnerships to better support the conservation and management of this important wetland area.

There are few other estuaries in California that have received as much conservation focus and investment from federal, state, private, and non-profit partners as Elkhorn Slough. Early on, The Nature Conservancy identified Elkhorn Slough as a high priority for conservation. And since the 1970s, we have invested in the long-term protection of the lands and waters of Elkhorn Slough through acquisition of many acres of wetland and adjacent upland habitat (that we have since transferred to the Elkhorn Slough Foundation) and in partnerships to do scientific research and outreach at this site. Similarly, the California Department of Fish and Wildlife owns two separate parts of the estuary, the Moss Landing Wildlife Area and Elkhorn Slough Reserve, both of which are also included in Marine Protected Areas established under California's Marine Life Protection Act. In addition, the Elkhorn Slough Reserve is operated in partnership with the National Oceanic and Atmospheric Administration, as one of 28 National Estuarine Research Reserves across the country, and is also part of NOAA's Monterey Bay National Marine Sanctuary.

Estuaries with the habitat quality that are able to deliver a broad range of ecosystem services are rare along the topographically rugged California coastline. Elkhorn Slough is one of the least developed, most intact examples of this important wetland habitat type in the region. Elkhorn Slough has the third most extensive salt marsh habitat in the state of California, and researchers have recently documented the high carbon sequestration rates of Slough marshes. The eelgrass beds in the estuary are rapidly expanding, unlike many others in the region which are degraded. There are over 20,000 migratory shorebirds that use it as a stopover during migration, and in recognition of its importance as a migratory stopover, Elkhorn Slough has been included in the Western Hemisphere Shorebird Network and is designated an Audubon Globally Important Bird Area. Additionally, about 100 threatened southern sea otters are regularly found in Elkhorn Slough, including the greatest density of mother-pup pairs in the range of the subspecies, due to ample food resources and shallow, protected habitats. Over 500 species of invertebrates have

been documented in Elkhorn Slough, providing the basis of foodwebs for fish, birds and marine mammals. About 100 fish species are found in Elkhorn Slough, and it serves as key nursery habitat for commercially valuable flatfish and crab species as well as important pupping habitat for leopard sharks. Further, Elkhorn Slough is the only site harboring native oysters along hundreds of kilometers of coastline (between Mugu Lagoon in southern California and San Francisco Bay), and is one of only a few estuaries in California with active native oyster restoration programs.

Elkhorn Slough serves as a hub of estuarine science in the region, with students and faculty from Moss Landing Marine Laboratories, Stanford University, California State University Monterey Bay and University of California among others. In addition to its incredible natural diversity and importance as a site for research and conservation, the estuary is also prized by the local community, beloved among birdwatchers and naturalists. Tens of thousands of visitors from all over the world come to Elkhorn Slough for its spectacular bird and otter watching opportunities and scenic kayaking alongside seagrass, marshes and tidal creeks. There are also many educational opportunities including teacher training and class fieldtrips as well as a visitor center and hiking trails provided by the Elkhorn Slough Reserve, serving thousands of school children each year, as well as thousands of other visitors.

The Nature Conservancy and the other organizations in the region are committed to continued conservation of the natural resources in these important estuarine and wetland habitats to ensure that they will be wisely managed to protect biodiversity and provide public access and educational and research opportunities in perpetuity. We urge you to take action to provide Elkhorn Slough with a Ramsar designation to support those efforts.

Sincerely,

Mary K Gleason

Dr. Mary Gleason
Lead Scientist, California Oceans Program
The Nature Conservancy