

Species of Concern within the Salish Sea nearly double between 2002 and 2013

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Abstract

Species of concern are native species, sub-species or ecologically significant units that warrant special attention to ensure their conservation. The number of species of concern within an ecosystem can be used as a crude measure of ecosystem health. Within the Salish Sea, four jurisdictions assess which species require special initiatives to ensure protection and survival of the population: the Province of British Columbia, the State of Washington, the Canadian Federal Government, and the United States Federal Government. Also known as marine species at risk, the number of species of concern in the Salish Sea is used by the US Environmental Protection Agency and Environment Canada as a transboundary ecosystem indicator. As of November 15, 2013, there were 119 species at risk in the Salish Sea, almost twice the number of species at risk when the indicator was first established in 2002. While some of this increase represents an increase in the number of fish, bird and mammal species known to use the Salish Sea, most additions represent new listings due to concern about declines in populations. In terms of species richness, currently 35% of mammal species, 32% of bird species, 17% of fish species, 100% of reptile species, and less than 1% of macro invertebrate species are listed by one or more jurisdiction. The high proportion of species of concern is suggestive of ecosystem decay and we recommend that it is time to consider the Salish Sea an ecosystem of concern.

Introduction

Species of concern are native species, sub-species or ecologically significant units that warrant special attention to ensure their conservation. Also known as marine species at risk, the number of species of concern in the Salish Sea is used by the United States Environmental Protection Agency and Environment Canada as a transboundary ecosystem indicator (<http://www2.epa.gov/salish-sea/marine-species-risk>). Within ecosystems like the Salish Sea that span international boundaries and include multiple jurisdictions, an ecosystem-based list of species of concern serves many functions. It acts as a crude indicator of ecosystem health, permits cross checking of species of concern between jurisdictions, suggests where more research is needed to assess species status or causes of decline, and highlights where transboundary approaches could benefit species recovery (Gaydos and Gilardi, 2003). Four jurisdictions within the bi-national, 16,925 square kilometer Salish Sea (Gaydos et al., 2008) have processes for assessing and listing species that require special initiatives to ensure protection and survival of the population. These include the Province of British Columbia, the State of Washington, the Canadian Federal Government, and the United States Federal Government. This work reviews invertebrates, fishes, reptiles, birds and mammals that use the Salish Sea marine ecosystem and are listed as species of concern by one or more jurisdiction. Also it compares listings between jurisdictions and between current findings and prior lists developed in 2002, 2004, 2006, 2008 and 2011 (Gaydos and Gilardi, 2003; Brown and Gaydos, 2005; Brown and Gaydos, 2007; Gaydos and Brown, 2009; and Gaydos and Brown, 2011).

Methods

Species that use the Salish Sea marine ecosystem and were listed by one or more jurisdiction were included. Listed fish, bird, and mammal species were included if they occurred on published lists of birds, mammals (Gaydos and Pearson, 2011) and fishes (Pietsch and Orr, In Press) dependent upon the Salish Sea. Listed reptiles were included if the listing agency identified the Salish Sea as critical habitat for the species. Invertebrates were included if listing data indicated their distribution included the Salish Sea. Listing status as of November 15, 2013 was used. Specifically, the processes for listing and listing classifications within each jurisdiction are as follows:

British Columbia

In the Province of British Columbia, species are assigned a risk of extinction. Species are placed on Red, Blue or Yellow lists. Red-listed species are those that have been legally designated as Endangered or Threatened under the provincial Wildlife Act, are extirpated, or are candidates for such designation. Blue-listed species are those not immediately threatened, but are of concern because of characteristics that make them particularly sensitive to human activities or natural events. Yellow-listed species are all species not included on the Red or Blue lists. For the purpose of this study, Red and Blue-listed species were considered species of concern. When British Columbia ranks species, each species is assigned a global rank (applies across its range), a national rank (for each nation within its range, such as Canada), and a sub-national rank (for each province). In British Columbia, the Conservation

Data Centre within the Ministry of Sustainable Resource Management assigns the provincial rank. These provincial ranks are updated annually (<http://www.env.gov.bc.ca/atrisk/toolintro.html>). Within the marine ecosystem, British Columbia currently only assesses mammals, birds, reptiles and freshwater fishes that also use marine habitat. Important to this study, conspicuously absent are marine fishes and marine invertebrates. All credible sources of information concerning species distribution, abundance, trends, and threats are considered in provincially ranking species in British Columbia.

Washington State

In Washington State, the Washington Fish and Wildlife Commission (Commission) lists species of concern under the provisions of Washington Administrative Code (WAC) 232-12-297 (Endangered, Threatened, and Sensitive Wildlife Species Classification). Listing occurs in much the same stepwise procedure as occurs at the U.S. federal level. Species can be listed as either endangered (seriously threatened with extinction throughout all or a significant portion of its range within the state), threatened (likely to become an endangered species within the foreseeable future throughout a significant portion of its range within the state) or sensitive (vulnerable or declining and likely to become endangered or threatened in a significant portion of its range within the state). Listing can be initiated in one of three ways: (1) the Washington Department of Fish and Wildlife (WDFW) initiates a species status review; (2) the WDFW receives a petition from a citizen (at which point the agency has 60 days to either initiate the classification process or deny the petition, based on the best available scientific data); or (3) the Commission requests the WDFW to review a species of concern. Listings are based solely on the biological status of the species in the wild, as indicated by the preponderance of scientific data available. When the listing process is initiated, the WDFW publishes a public notice in the Washington State Register and calls for scientific information relevant to the species' status. Then WDFW prepares a draft species status report, which reviews relevant information on the status of the species in Washington, addresses factors affecting its status, and makes a preliminary listing recommendation. The public and the scientific community is given 90 days to review and comment on the draft status report and listing recommendation, and the WDFW can hold one or more public meetings during the public review period. At the close of the public comment period, WDFW addresses comments, completes the final status report and listing recommendation and submits them to the Commission. The final species status report, agency classification recommendation, and State Environmental Policy Act (SEPA) documents are made available to the public at least 30 days prior to the Commission meeting. Once a species is listed, WDFW writes and implements a recovery plan for threatened or endangered species, or a management plan for sensitive species. A review of the species' status is conducted by the WDFW at least once every five years. The WDFW maintains a list of Candidate species, which are those species that will be reviewed for possible listing as endangered, threatened, or sensitive. Important to this study, marine invertebrates and fishes can only receive candidate status in Washington State as (WAC) 232-12-297 does not permit State listing of marine invertebrates and fishes. Species listed as candidates, sensitive, threatened or endangered are included in this study (<http://wdfw.wa.gov/conservation/endangered/>).

Canada

In Canada, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) creates a federal assessment of species at risk using an international ranking system adapted from the World Conservation Union in Switzerland. COSEWIC is composed of government and non-government members, members from academic institutions, and one member with expertise in Aboriginal traditional knowledge. Species designations are made using a formal status report review process. Experts are commissioned to write status reports on the biology, population status, range, and possible threats facing the species or subspecies in question using the best available scientific, community, and Aboriginal traditional knowledge. COSEWIC meets at least once annually to consider new and updated status reports and to make status determinations. If deemed necessary and appropriate, emergency listing can be made ahead of COSEWIC's regular general meeting and decisions made are later ratified based upon a full report. As listed by COSEWIC, risk categories for species include extinct (a species that no longer exists), extirpated (no longer exists in the wild in Canada, but exists elsewhere), endangered (facing imminent extinction or extirpation), threatened (likely to become endangered if limiting factors are not reversed), special concern (characteristics make species particularly sensitive to human activities or natural events), not at risk, or data deficient (insufficient information to support status designation). Species that are suspected of being at some risk of extinction or extirpation, but have not yet been reviewed by COSEWIC are placed on a Candidate List and as time and resources permit, COSEWIC commission's status reports for these species so that an assessment can be undertaken. Currently, species listed by COSEWIC as "endangered," "threatened," or "special concern" do not receive legal recognition from the federal government. Under the Canadian federal Species at Risk Act (SARA), the federal Cabinet ultimately decides whether COSEWIC designated species should get legal protection under SARA. These decisions

are made after consultations with affected stakeholders and other groups. In this study, species listed under COSEWIC (http://www.cosewic.gc.ca/eng/sct5/index_e.cfm) or SARA (<http://www.sararegistry.gc.ca/sarredirect/>) as Candidates, Special Concern, Threatened, or Endangered are included as species of concern and are identified accordingly.

United States

In the United States, the U.S. Fish and Wildlife Service (USFWS, Department of the Interior) and the National Oceanic and Atmospheric Administration (NOAA-Fisheries, Department of Commerce) (hereinafter referred to as “the Agencies”) share responsibility for identifying species of concern under the provisions of the Federal Endangered Species Act (ESA), enacted in 1973. A species is listed either as endangered (a species that is in danger of extinction throughout all of or a significant portion of its range) or threatened (one that is likely to become endangered in the foreseeable future) when it is determined to be negatively impacted by any or all of the following factors: 1) current or imminent destruction or degradation of its habitat or range; 2) over-extraction for any purpose or by any means; 3) population-level impacts of disease or predation; 4) existing regulatory mechanisms that are inadequate to protect the species; or 5) other natural or anthropogenic factors significantly impeding the species’ survival. The process for listing a species can be initiated by the Agencies or by a petition from the public. The Agencies initiate the process by publishing a “notice of review” that identifies a “candidate for listing” any species in the United States that it believes meets the definition of threatened or endangered, or for which its status in the wild warrants review and consideration under the ESA. If the Agencies receive a petition for listing a species from the public they have 90 days to review the petition and determine whether or not there is substantial information indicating that the listing may be warranted. At this point, the species is called a “Candidate for Listing,” and the Agencies then have one year to determine whether or not to propose listing for the species. During this review period, the Agencies seek biological information to help complete the status review. If the Agencies decide that a species warrants listing under the ESA, a proposed rule is published in the Federal Register for a 60-day public comment period. Information received is analyzed and considered, and within one year of a listing proposal, one of three possible actions is taken: 1) a species is listed as threatened or endangered because the best available scientific data supports the listing; 2) the proposal is withdrawn because the best available scientific data do not support the listing; or 3) the proposal review period is extended for an additional 6 months if there is substantial disagreement within the scientific community concerning the listing. In addition to being not listed, listed as threatened and listed as endangered, species also can be listed as a species of concern. These are species about which the Agencies have concerns regarding status and threats, but for which insufficient information is available to indicate a need to list the species under the ESA (Federal Register 9 (73): 19975-19979). The status of a listed species is reviewed at least every five years to determine if federal protection is still warranted. This project lists candidate species, species of concern and those listed as threatened or endangered (<http://www.fws.gov/endangered/> and <http://www.nmfs.noaa.gov/pr/species/esa/>).

Results

As of November 15, 2013, 119 native species, sub-species or ecologically significant units that depend on the Salish Sea marine ecosystem were listed by one or more jurisdiction as species of concern (Table 1). These included two invertebrates (Table 2), 44 fishes (Table 3), two reptiles (Table 4), 55 birds (Table 5), and 16 mammals (Table 6). Of the 119 species listed, the Province of British Columbia listed 58% of them, Washington State listed 44%, the Canadian Federal Government identified 61%, and the U.S. Federal Government identified 22% (Table 7).

Listing and de-listing of species of concern is an active process but is variable by jurisdiction. Between 2011 and 2013, species’ status was changed 45 times. Overall, the Canadian Federal Government was most active, accounting for 30 status alterations (combined between COSEWIC and SARA). The US Federal Government followed with 12 status alterations, while the governments of British Columbia and Washington had the least activity with 3 and 0 changes, respectively.

Between 2011 and 2013, 5 new species were added to the list due to a recent listing by one or more jurisdiction. These include 3 fish (American shad, *Alosa sapidissima*, COSEWIC Candidate; North Pacific Spiny Dogfish, *Squalus suckleyi*, COSEWIC Special Concern; and Pacific Ocean Perch, *Sebastes alutus*, COSEWIC Candidate; see Table 3), 1 bird (Buff-breasted Sandpiper, *Tryngites subruficollis*, COSEWIC Special Concern; see Table 5) and 1 mammal (Baird’s Beaked Whale, *Berardius bairdii*, COSEWIC Candidate; see Table 6). Additionally, 10 new species were added because of our expanded understanding of species using the ecosystem, including 8 fishes and 2 birds.

During that same time period, 9 species were removed from the list. This included one invertebrate (Newcomb's littorine snail, *Algamorda subrotundata*, U.S. Species of Concern to not listed; table 2), 4 fishes (Chinook Salmon, no specific DPS or ESU, *Oncorhynchus tshawytscha*, COSEWIC Candidate to not listed; Coho Salmon, no specific DPS or ESU, *O. kisutch*, COSEWIC Candidate to not listed; Sockeye Salmon, Fraser River Drainage, *O. nerka*, COSEWIC Candidate to not listed, and Surf Smelt, *Hypomesus pretiosus*, COSEWIC Candidate to not listed; table 3); and 4 birds (Aleutian Canada Goose, *Branta canadensis leucopareia*, US Species of Concern to not listed; Red Phalarope, *Phalaropus fulicarius*, COSEWIC Candidate to not listed; Greater Scaup, *Aythya marila*, COSEWIC Candidate to not listed; and Lesser Scaup, *A. affinis*, COSEWIC Candidate to not listed; Table 5).

Discussion

Since 2002, every jurisdiction has underestimated the total number of species of concern within the Salish Sea. Combining all listed species within the ecosystem is needed to portray a comprehensive view of the actual species of concern. Since 2002, the number of species of concern in the Salish Sea has nearly doubled from 60 to 119. In part, this is because of our ever-broadening understanding of which species use the Salish Sea, but also it is in recognition that more and more species have declined to the point where their conservation warrants special attention. This is disconcerting.

In terms of species richness, less than 1% of macro invertebrate species (2/3000; estimated unpublished), 100% of reptile species, 17% of fish species (44/253; Pietsch and Orr, in-press), 32% of bird species (55/172; Gaydos and Pearson, 2011), and 35% of mammal species (13/37; Gaydos and Pearson, 2011) are "of concern." The high proportion of species of concern is suggestive of ecosystem decay (Bierregard et al., 2001) and we suggest that it is time to consider the entire Salish Sea an ecosystem of concern. Increased funding and improved efforts to recover declining populations of species and recover this ecosystem are urgently needed to stop the insidious loss of species and ecosystem decay.

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Table 1: Species of concern in the Salish Sea in 2013 by jurisdiction

	British Columbia	Washington State	Canada	U.S.A.	Total
Invertebrates	2	2	2	2	2
Fishes	8	22	30	14	44
Reptiles	1	2	2	2	2
Birds	46	15	23	3	55
Mammals	12	11	16	5	16
Total	69	52	73	26	119

Table 2: Invertebrate Species of Concern in the Salish Sea

Common Name	Scientific Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
Abalone, Pinto (Northern)	<i>Haliotis kamtschatkana</i>	Invertebrate	Red List	Candidate	Endangered (COSEWIC); Threatened to Endangered (SARA)	Species of Concern
Newcomb's littorine snail	<i>Algamorda subrotundata</i> (also <i>A. newcombiana</i>)	Invertebrate				Species of Concern to Not Listed
Olympia oyster	<i>Ostrea conchaphila</i>	Invertebrate	Blue list	Candidate	Special Concern (COSEWIC and SARA)	

*Items in bold represent legal status changes made between January 1, 2011 and November 15, 2013.

Table 3: Fish Species of Concern in the Salish Sea

Common Name	Scientific Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
American shad	<i>Alosa sapidissima</i>	Fish			Not Listed to Candidate (COSEWIC)	
Basking Shark	<i>Cetorhinus maximus</i>	Fish			Endangered (COSEWIC); Not Listed to Endangered (SARA)	Species of Concern
Dogfish, North Pacific Spiny	<i>Squalus suckleyi</i>	Fish			Not Listed to Special Concern (COSEWIC)	
Eulachon	<i>Thaleichthys pacificus</i>	Fish	Blue List	Candidate	Not Listed to Endangered (Central Pacific Coast & Fraser River; COSEWIC)	Threatened (Southern)
Lamprey, River	<i>Lampetra ayresii</i>	Fish		Candidate		Species of Concern
Pacific cod	<i>Gadus macrocephalus</i>	Fish		Candidate (South & Central Puget Sound)	Not Listed to Candidate (COSEWIC)	Species of Concern
Pacific hake (Puget Sound / Georgia Basin)	<i>Merluccius productus</i>	Fish		Candidate		Species of Concern
Pacific herring	<i>Clupea pallasii</i>	Fish		Candidate		
Pacific Ocean Perch	<i>Sebastes alutus</i>	Fish			Not Listed to Candidate (COSEWIC)	
Pacific Sardine	<i>Sardinops sagax</i>	Fish			Special Concern (SARA)	
Rockfish, Black	<i>Sebastes melanops</i>	Fish		Candidate		
Rockfish, Bocaccio (Puget Sound / Georgia Basin)	<i>Sebastes paucispinis</i>	Fish		Candidate	Threatened (COSEWIC)	Endangered

Common Name	Scientific Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
Rockfish, Brown	<i>Sebastes auriculatus</i>	Fish		Candidate		
Rockfish, Canary (Puget Sound / Georgia Basin)	<i>Sebastes pinniger</i>	Fish		Candidate	Threatened (COSEWIC)	Threatened
Rockfish, China	<i>Sebastes nebulosus</i>	Fish		Candidate		
Rockfish, Copper	<i>Sebastes caurinus</i>	Fish		Candidate		
Rockfish, Darkblotched	<i>Sebastes crameri</i>	Fish			Special Concern (COSEWIC)	
Rockfish, Greenstriped (Puget Sound)	<i>Sebastes elongatus</i>	Fish		Candidate		
Rockfish, Quillback	<i>Sebastes maliger</i>	Fish		Candidate	Threatened (COSEWIC)	
Rockfish, Redstripe (Puget Sound)	<i>Sebastes proriger</i>	Fish		Candidate		
Rockfish, Rougheye Type I & II	<i>Previously known as only one species: Sebastes aleutianus</i>	Fish			Special Concern (COSEWIC and SARA)	
Rockfish, Tiger	<i>Sebastes nigrocinctus</i>	Fish		Candidate		
Rockfish, Widow	<i>Sebastes entomelas</i>	Fish		Candidate	Candidate (COSEWIC)	
Rockfish, Yelloweye (Puget Sound / Georgia Basin)	<i>Sebastes ruberrimus</i>	Fish		Candidate	Special Concern (COSEWIC); Not Listed to Special Concern (SARA)	Threatened
Rockfish, Yellowtail	<i>Sebastes flavidus</i>	Fish		Candidate	Candidate (COSEWIC)	
Salmon, Chinook (Puget Sound)	<i>Oncorhynchus tshawytscha</i>	Fish		Candidate		Threatened
Salmon, Chinook (no DPS or ESU)	<i>Oncorhynchus tshawytscha</i>	Fish			Candidate to Not Listed (COSEWIC)	

Common Name	Scientific Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
Salmon, Chum (No Specific DPS or ESU)	<i>Oncorhynchus keta</i>	Fish			Candidate (COSEWIC)	
Salmon, Chum (Summer-Run Hood Canal)	<i>Oncorhynchus keta</i>	Fish		Candidate		Threatened
Salmon, Coho (Interior Fraser River)	<i>Oncorhynchus kisutch</i>	Fish			Endangered (COSEWIC)	
Salmon, Coho (No Specific DPS or ESU)	<i>Oncorhynchus kisutch</i>	Fish			Candidate to Not Listed (COSEWIC)	
Salmon, Coho (Puget Sound/Strait of Georgia)	<i>Oncorhynchus kisutch</i>	Fish				Species of Concern
Salmon, Pink	<i>Oncorhynchus gorbuscha</i>	Fish			Candidate (COSEWIC)	
Salmon, Sockeye (Cutlus Lake)	<i>Oncorhynchus nerka</i>	Fish			Endangered (COSEWIC)	
Salmon, Sockeye (Fraser River Drainage)	<i>Oncorhynchus nerka</i>	Fish			Candidate to Not Listed (COSEWIC)	
Salmon, Sockeye (Sakinaw Lake)	<i>Oncorhynchus nerka</i>	Fish			Endangered (COSEWIC)	
Shark, Bluntnose Sixgill	<i>Hexanchus griseus</i>	Fish			Special Concern (COSEWIC and SARA)	
Shortspine Thornyhead	<i>Sebastolobus alascanus</i>	Fish			Candidate (COSEWIC)	
Sturgeon, Green	<i>Acipenser medirostris</i>	Fish	Red List		Special Concern (COSEWIC and SARA)	Threatened
Sturgeon, White (Lower Fraser River)	<i>Acipenser transmontanus</i>	Fish	Red List		Not a DU to Threatened (COSEWIC)	

Common Name	Scientific Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
Sturgeon, White (Middle Fraser River)	<i>Acipenser transmontanus</i>	Fish	Red List		Not a DU to Endangered (COSEWIC)	
Sturgeon, White (Upper Fraser River)	<i>Acipenser transmontanus</i>	Fish	Red List		Not a DU to Endangered (COSEWIC) Endangered (SARA)	
Surf Smelt	<i>Hypomesus pretiosus</i>	Fish			Candidate to Not Listed (COSEWIC)	
Trout, Bull	<i>Salvelinus confluentus</i>	Fish	Blue List	Candidate	Not Listed to Special Concern (South Coast BC Populations; COSEWIC)	Threatened
Trout, Cutthroat	<i>Oncorhynchus clarkii clarkii</i>	Fish	Blue List		Special Concern (COSEWIC)	
Trout, Steelhead (Puget Sound / Georgia Basin)	<i>Oncorhynchus mykiss</i>	Fish			Candidate (COSEWIC)	Threatened
Walleye pollock (S. Puget Sound)	<i>Theragra chalcogramma</i>	Fish		Candidate		

***Items in bold represent legal status changes made between January 1, 2011 and November 15, 2013.**

Table 4: Reptile Species of Concern in the Salish Sea

Common Name	Scientific Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
Green Sea Turtle	<i>Chelonia mydas</i>	Reptile		Threatened	Candidate (COSEWIC)	Threatened
Leatherback Sea Turtle	<i>Dermochelys coriacea</i>	Reptile	Red List	Endangered	Endangered (COSEWIC and SARA)	Endangered

Table 5: Avian Species of Concern in the Salish Sea

Common Name	Scientific Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
American Avocet	<i>Recurvirostra americana</i>	Avian	Red List to Blue List			
American Bittern	<i>Botaurus lentiginosus</i>	Avian	Blue List			Species of Concern to Not Listed
American Golden Plover	<i>Pluvialis dominica</i>	Avian	Blue List		Candidate to Not Listed (COSEWIC)	
American Kestrel	<i>Falco sparverius</i>	Avian			Candidate (COSEWIC)	
Ancient Murrelet	<i>Synthliboramphus antiquus</i>	Avian	Blue List		Special Concern (COSEWIC and SARA)	
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Avian		Sensitive		Species of Concern
Band-tailed Pigeon	<i>Patagioenas fasciata</i>	Avian	Blue List		Special Concern (COSEWIC); Not Listed to Special Concern (SARA)	
Belted Kingfisher	<i>Megaceryle alcyon</i>	Avian			Candidate (COSEWIC)	
Black-footed Albatross	<i>Phoebastria nigripes</i>	Avian	Blue List		Special Concern (COSEWIC and SARA)	
Brant	<i>Branta bernicla</i>	Avian	Blue List			

Common Name	Scientific Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
Cackling Goose	<i>Branta hutchinsii</i>	Avian	Blue List			
California Gull	<i>Larus californicus</i>	Avian	Blue List			
Canada Goose, Aleutian	<i>Branta canadensis leucopareia</i>	Avian				Species of Concern to Not Listed
Canada Goose, Dusky	<i>Branta canadensis occidentalis</i>	Avian	Red List			
Caspian Tern	<i>Hydroprogne caspia</i>	Avian	Blue List			
Cassin's Auklet	<i>Ptychoramphus aleuticus</i>	Avian	Blue List	Candidate	Candidate (COSEWIC)	Species of Concern to Not Listed
Common Murre	<i>Uria aalge</i>	Avian	Red List	Candidate		
Cormorant, Brandt's	<i>Phalacrocorax penicillatus</i>	Avian	Red List	Candidate		
Cormorant, Double-crested	<i>Phalacrocorax auritis</i>	Avian	Blue List			
Cormorant, Pelagic	<i>Phalacrocorax pelagicus pelagicus</i>	Avian	Red List			
Forster's Tern	<i>Sterna forsteri</i>	Avian	Red List		Data Deficient (COSEWIC)	
Great Blue Heron, Pacific	<i>Ardea herodias fannini</i>	Avian	Blue List		Special Concern (COSEWIC and SARA)	
Grebe, Clark's	<i>Aechmophorus clarkii</i>	Avian	Red list	Candidate		
Grebe, Horned	<i>Podiceps auritus</i>	Avian			Special Concern (COSEWIC)	
Grebe, Western	<i>Aechmophorus occidentalis</i>	Avian	Red List	Candidate	Candidate (COSEWIC)	
Green Heron	<i>Butorides virescens</i>	Avian	Blue List			
Gyr Falcon	<i>Falco rusticolus</i>	Avian	Blue List			
Hudsonian Godwit	<i>Limosa haemastica</i>	Avian	Red List		Not Listed to Candidate (COSEWIC)	
Killdeer	<i>Charadrius vociferus</i>	Avian			Candidate (COSEWIC)	

Common Name	Scientific Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
Long-Billed Curlew	<i>Numenius americanus</i>	Avian	Blue List		Special Concern (COSEWIC and SARA)	
Long-tailed Duck	<i>Clangula hyemalis</i>	Avian	Blue List			
Loon, Common	<i>Gavia immer</i>	Avian		Sensitive		
Loon, Yellow-billed	<i>Gavia adamsii</i>	Avian	Blue List		Not Listed to Candidate (COSEWIC)	Not Listed to Candidate
Marbled Murrelet	<i>Brachyramphus marmoratus marmoratus</i>	Avian	Blue List	Threatened	Threatened (COSEWIC and SARA)	Threatened
Northern Fulmar	<i>Fulmarus glacialis</i>	Avian	Red List			
Owl, Short-eared	<i>Asio flammeus</i>	Avian	Blue List		Special Concern (COSEWIC and SARA)	
Owl, Snowy	<i>Bubo scandiacus</i>	Avian	Blue List			
Pelican, American White	<i>Pelecanus erythrorhynchos</i>	Avian	Red List	Endangered		
Pelican, Brown	<i>Pelecanus occidentalis</i>	Avian		Endangered		Species of Concern to Not Listed
Peregrine Falcon, American	<i>Falco peregrinus anatum</i>	Avian	Red List	Sensitive	Special Concern (COSEWIC); Threatened to Special Concern (SARA)	Species of Concern to Not Listed
Peregrine Falcon, Peale's	<i>Falco peregrinus pealei</i>	Avian	Blue List	Sensitive	Special Concern (COSEWIC and SARA)	Species of Concern to Not Listed
Phalarope, Red	<i>Phalaropus fulicarius</i>	Avian			Candidate to Not Listed (COSEWIC)	
Phalarope, Red-necked	<i>Phalaropus lobatus</i>	Avian	Blue List		Candidate (COSEWIC)	
Puffin, Horned	<i>Fratercula corniculata</i>	Avian	Red List			

Common Name	Scientific Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
Puffin, Tufted	<i>Fatercula cirrhata</i>	Avian	Blue List	Candidate		Species of Concern to Not Listed
Purple Martin	<i>Progne subis</i>	Avian	Blue List	Candidate		Species of Concern to Not Listed
Red Knot	<i>Calidris canutus roselaari</i>	Avian	Red list		Threatened (COSEWIC and SARA)	
Rough-legged Hawk	<i>Buteo lagopus</i>	Avian	Blue List			
Sandhill Crane	<i>Grus canadensis</i>	Avian		Endangered		
Sandpiper, Buff-breasted	<i>Tryngites subruficollis</i>	Avian			Special Concern (COSEWIC)	
Scaup, Greater	<i>Aythya marila</i>	Avian			Candidate to Not Listed (COSEWIC)	
Scaup, Lesser	<i>Aythya affinis</i>	Avian			Candidate to Not Listed (COSEWIC)	
Shearwater, Buller's	<i>Puffinus bulleri</i>	Avian	Blue List			
Shearwater, Flesh-footed	<i>Puffinus carneipes</i>	Avian	Blue List			
Shearwater, Pink-footed	<i>Puffinus creatopus</i>	Avian	Blue List		Threatened (COSEWIC and SARA)	
Short-billed Dowitcher	<i>Limnodromus griseus</i>	Avian	Blue List			
Surf Scoter	<i>Melanitta perspicillata</i>	Avian	Blue List			
Tundra Swan	<i>Cygnus columbianus</i>	Avian	Blue List			
Wandering Tattler	<i>Tringa incana</i>	Avian	Blue List		Not Listed to Candidate (COSEWIC)	

*Items in bold represent legal status changes made between January 1, 2011 and November 15, 2013.

Table 6: Mammal Species of Concern in the Salish Sea

Common Name	Species Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
Baird's Beaked Whale	<i>Berardius bairdii</i>	Mammal			Not Listed to Candidate (COSEWIC)	
Cuvier's Beaked Whale	<i>Ziphius cavirostris</i>	Mammal			Candidate (COSEWIC)	
Fin Whale	<i>Balaenoptera physalus</i>	Mammal	Red List	Endangered	Threatened (COSEWIC and SARA)	Endangered
Gray Whale (E. North Pacific Stock)	<i>Eschrichtius robustus</i>	Mammal	Blue List	Sensitive	Special Concern (COSEWIC and SARA)	
Grizzly bear	<i>Ursus arctos</i>	Mammal	Blue List	Endangered	Special Concern (COSEWIC)	Threatened
Harbor Porpoise	<i>Phocoena phocoena</i>	Mammal	Blue List	Candidate	Special Concern (COSEWIC and SARA)	
Humpback Whale (N. Pacific)	<i>Megaptera novaeangliae</i>	Mammal	Blue List	Endangered	Threatened to Special Concern (COSEWIC); Threatened (SARA)	Endangered
Killer Whale (N. Residents)	<i>Orcinus orca</i>	Mammal	Blue List to Red List	Endangered	Threatened (COSEWIC and SARA)	
Killer Whale (Offshore)	<i>Orcinus orca</i>	Mammal	Blue List to Red	Endangered	Threatened (COSEWIC); Special Concern to Threatened (SARA)	
Killer Whale (S. Residents)	<i>Orcinus orca</i>	Mammal	Red List	Endangered	Endangered (COSEWIC and SARA)	Endangered

Common Name	Scientific Name	Taxonomic Classification	British Columbia	Washington State	Canada	U.S.A.
Killer Whale (Transients)	<i>Orcinus orca</i>	Mammal	Red List	Endangered	Threatened (COSEWIC and SARA)	
Northern Elephant Seal	<i>Mirounga angustirostris</i>	Mammal			Candidate (COSEWIC)	
Northern Fur Seal	<i>Callorhinus ursinus</i>	Mammal	Red List		Threatened (COSEWIC)	
Pacific White-sided Dolphin	<i>Lagenorhynchus obliquidens</i>	Mammal			Candidate (COSEWIC)	
Sea Otter, Northern	<i>Enhydra lutris kenyoni</i>	Mammal	Blue List	Endangered	Special Concern (COSEWIC and SARA)	Species of Concern
Steller Sea-lion (Eastern Population)	<i>Eumetopias jubatus</i>	Mammal	Blue List	Threatened	Special Concern (COSEWIC and SARA)	Threatened to Not Listed

* Items in bold represent legal status changes made between January 1, 2011 and November 15, 2013.

Table 7: Percentage of species of concern listed by jurisdiction over time

	British Columbia	Washington State	CANADA	U.S.A.	Total Species Listed
2002 (Gaydos and Gilardi, 2003)	47%	73%	28%	30%	60
2004 (Brown and Gaydos, 2005)	50%	73%	36%	31%	63
2006 (Brown and Gaydos, 2007)	49%	73%	40%	33%	63
2008 (Gaydos and Brown, 2009)	48%	70%	44%	42%	64
2011 (Gaydos and Brown, 2011)	55%	44%	56%	29%	113
2013 (Current Study)	58%	44%	61%	22%	119