

Species of Concern within the Salish Sea: changes from 2002 to 2011

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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 and it illustrates where cross-jurisdiction work is needed to recover declining species. 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. As of January 1, 2011, one or more of these jurisdictions listed 113 species of concern. This is almost twice the 64 species identified on September 1, 2008 when this metric was last evaluated. This represents new listings and also reflects an increase in the number of birds and mammals known to use the Salish Sea for some part of their life history. Since 2008, 23 new additions were made to the list due to a recent listing by one or more jurisdiction and not because of an expanded understanding of species using the ecosystem. Newly listed species include 5 fish species and 18 bird species. The addition of 23 newly listed species represents the greatest jump in species of concern since this list was first established in 2002. This is good news in that it signifies that declining species are getting much needed attention through the listing process, but it also reinforces a downward trend in declining species in the region. In light of projected increased population growth, on-going habitat modifications and expected climate change, the number of species of concern for this ecosystem is likely to increase if listing efforts remain consistent for all four jurisdictions. Increased and improved bi-national efforts to recover declining populations of species and recover this ecosystem are urgently needed to stop the insidious loss of species and ecosystem decay.

Introduction

Species of concern are native species, sub-species or ecologically significant units that warrant special attention to ensure their conservation. Within ecosystems spanning international boundaries and 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 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 compiles a list of invertebrates, fishes, reptiles, birds and mammals that use the Salish Sea marine ecosystem and are listed as species of concern by more or more jurisdiction. Also it compares listings between jurisdictions and updates prior lists developed in 2002 (Gaydos and Gilardi, 2003), 2004 (Brown and Gaydos, 2005), 2006 (Brown and Gaydos, 2007), and 2008 (Gaydos and Brown, 2009).

Methods

Species that use the Salish Sea marine ecosystem and were listed by one or more jurisdiction were included. A recent published list was used to identify birds and mammals that depend on the Salish Sea (Gaydos and Pearson, 2011). Listed reptiles were included if the listing agency identified the Salish Sea as critical habitat for the species. Fish and invertebrates were included if available listing data, published data or professional opinion indicated their distribution included the Salish Sea. Listing status as of January 1, 2011 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 are 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, species of concern are listed by the Washington Fish and Wildlife Commission (Commission) 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 of "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/>) 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 as 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 January 1, 2011, 113 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 3 invertebrates (Table 2), 37 fishes (Table 3), two reptiles (Table 4), 56 birds (Table 5), and 15 mammals (Table 6). Of the 113 species listed by one or more jurisdiction, the Province of British Columbia listed 55% of them, Washington State listed 44%, the Canadian Federal Government identified 55%, and the U.S. Federal Government identified 29% (Table 7).

Between 2008 and 2011, 23 new species were added to the list due to a recent listing by one or more jurisdiction and not because of an expanded understanding of species using the ecosystem. These include 5 fish species (Pacific Sardine, *Sardinops sagax*, SARA Special Concern; Chum Salmon, *Oncorhynchus keta*, no specific DPS COSEWIC Candidate; Coho Salmon, *Oncorhynchus kisutch*, no specific DPS, COSEWIC Candidate; Pink Salmon, *Oncorhynchus gorbuscha*, no specific DPS, COSEWIC Candidate; and Surf Smelt, *Hypomesus pretiosus*, COSEWIC Candidate; see Table 3). Also included are 18 bird species (American Kestrel, *Megasceryle alcyon*, COSEWIC Candidate; Band-tailed Pigeon, *Patagioenas fasciata*, BC Blue list and COSEWIC Special Concern; Belted Kingfisher, *Megasceryle alcyon*, COSEWIC Special Concern; Brant, *Branta bernicla*, BC Blue list; Cackling Goose, *Branta hutchinsii*, BC Blue list; Clark's Grebe, *Aechmophorus clarkii*, BC Red list and WA Candidate; Horned Grebe, *Podiceps auritus*, COSEWIC Special Concern; Green Heron, *Bitprodes virescens*, BC Blue list;

Killdeer, *Charadrius vociferous*, COSEWIC Candidate; Long-tailed duck, *Clangula hyemalis*, BC Blue list; Yellow-billed loon, *Gavia adamsii*, BC Blue list; Red Phalarope, *Phalaropus fulicarius*, COSEWIC Candidate; Rough-legged Hawk, *Buteo lagopus*, BC Blue list; Greater and Lesser Scaup, *Aythya marila* and *A. affinis*; both COSEWIC Candidates; Buller's and Flesh-footed Shearwaters; *Puffinus bulleri* and *P. carneipes*, BC Blue list; and the Snowy Owl, *Bubo scandiacus*; BC Blue list; see Table 5).

Discussion

More species of concern were added between September 1, 2008 and January 1, 2011 than between 2002 and 2004 (Brown and Gaydos, 2005), 2004 and 2006 (Brown and Gaydos, 2007) and 2006 and 2008 (Gaydos and Brown, 2009). Of the 49 new species added to the list of species of concern, 53% (26/49) were added because of our improved understanding of which bird and mammal species use the Salish Sea marine ecosystem. The fact that 23 species were added because of a recent listing by one or more jurisdictions is good in that it signifies that the listing agencies are actively reviewing species for listing. It is bad in that it details an ever-increasing number of imperiled species.

To the best of our knowledge, this is the only ecosystem-based list of species of concern developed and tracked for the Salish Sea marine ecosystem. Combining all listed species within the ecosystem portrays a comprehensive view of the actual species of concern within the ecosystem. As in 2002, 2004, 2006 and 2008, each jurisdiction underestimated the total number of species of concern within the marine ecosystem. This is not surprising due to differences in species abundance and distribution within the ecosystem as well as jurisdictional differences in listing criteria but it does point to the merit of using a comprehensive list that includes listings from all jurisdictions to paint an accurate picture of what is happening ecosystem-wide.

A transboundary, multi-jurisdiction list of species of concern can be used as an indicator of ecosystem health. Using unpublished SeaDoc Society estimates on species richness for the ecosystem, less than 1% of invertebrates (3/3000), and 100% of reptiles using the Salish Sea are listed as species of concern. Pietsch, Orr and Palsson found that 247 fish species have been documented in the Salish Sea (unpublished data). We document 37 fish as species of concern, including 2 ecologically significant units of Chinook Salmon, 2 of Chum, 2 of Coho and 3 of Sockeye for a total of 32 distinct species of fish meaning 13% (32/247) of fish species in the ecosystem are listed as species of concern. Based on recently published data on birds and mammal species of the Salish Sea (Gaydos and Pearson, 2011), 33% of birds (56/172) that use the Salish Sea marine waters are listed by one or more jurisdiction as species of concern. Recognizing that 4 of the 15 mammals listed as species of concern include 4 distinct population segments of killer whales (Table 6), 32% (12/37) of the mammals using the Salish Sea are listed as species of concern. In our opinion, the high proportion of species of concern is suggestive of ecosystem decay (Bierregard et al., 2001) and we suggest that at some point we need to consider the entire Salish Sea as an ecosystem of concern. In light of projected increased population growth, on-going habitat modifications and expected climate change, the number of species of concern for this ecosystem is likely to increase if listing efforts remain consistent for all four jurisdictions. 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 2011 by jurisdiction

	BRITISH COLUMBIA	WASHINGTON STATE	CANADA	U.S.A.	TOTAL
INVERTEBRATES	2	2	2	2	3
FISHES	2	21	22	13	37
REPTILES	1	2	2	2	2
BIRDS	45	14	22	10	56
MAMMALS	12	11	15	6	15
TOTAL	62	50	63	33	113

Table 2: Invertebrate Species of Concern in the Salish Sea

SPECIES	BRITISH COLUMBIA	WASHINGTON STATE	CANADA	U.S.A.
Newcomb's littorine snail (<i>Algamorda newcombiana</i>)		Candidate to Not Listed		Species of Concern
Olympia oyster (<i>Ostrea conchaphila</i>)	Not listed to Blue List	Candidate	Special Concern (COSEWIC, SARA)	
Pinto (Northern) Abalone (<i>Haliotis kamtschatkana</i>)	Not listed to Red List	Candidate	Threatened (SARA); Threatened to Endangered (COSEWIC)	Species of Concern

*Items in bold represent legal status changes made between September 1, 2008 and January 1, 2011.

Table 3: Fish Species of Concern in the Salish Sea

SPECIES	BRITISH COLUMBIA	WASHINGTON STATE	CANADA	U.S.A.
Basking Shark (<i>Cetorhinus maximus</i>)			Endangered (COSEWIC)	
Eulachon (<i>Thaleichthys pacificus</i>)	Blue List	Candidate	Candidate (COSEWIC) to Not Listed	Candidate to Threatened
Pacific cod (<i>Gadus macrocephalus</i>), South & Central Puget Sound		Candidate		Not Listed to Species of Concern
Pacific hake (<i>Merluccius productus</i>), Puget Sound/Georgia Basin		Candidate		Species of Concern
Pacific herring (<i>Clupea pallasii</i>)		Candidate		
Pacific Sardine (<i>Sardinops sagax</i>)			Not Listed to Special Concern (SARA)	
Rockfish, Black (<i>Sebastes melanops</i>)		Candidate		
Rockfish, Bocaccio (<i>Sebastes paucispinis</i>), Puget Sound / Georgia Basin		Candidate	Threatened (COSEWIC)	Candidate to Endangered
Rockfish, Brown (<i>Sebastes auriculatus</i>)		Candidate		
Rockfish, Canary (<i>Sebastes pinniger</i>), Puget Sound / Georgia Basin		Candidate	Threatened (COSEWIC)	Candidate to Threatened
Rockfish, China (<i>Sebastes nebulosus</i>)		Candidate		
Rockfish, Copper (<i>Sebastes caurinus</i>)		Candidate		
Rockfish, Greenstriped (<i>Sebastes elongatus</i>)		Candidate		Candidate to Not Listed
Rockfish, Quillback (<i>Sebastes maliger</i>)		Candidate	Not Listed to Threatened (COSEWIC)	
Rockfish, Redstripe (<i>Sebastes proriger</i>)		Candidate		Candidate to Not Listed
Rockfish, Rougheye (Type I & II) (<i>Sebastes aleutianus</i>)			Special Concern (COSEWIC); Not listed to Special Concern (SARA)	
Rockfish, Tiger (<i>Sebastes nigrocinctus</i>)		Candidate		
Rockfish, Widow (<i>Sebastes entomelas</i>)		Candidate	Candidate (COSEWIC)	
Rockfish, Yelloweye (<i>Sebastes ruberrimus</i>), Puget Sound / Georgia Basin		Candidate	Not Listed to Special Concern (COSEWIC)	Candidate to Threatened

SPECIES	BRITISH COLUMBIA	WASHINGTON STATE	CANADA	U.S.A.
Rockfish, Yellowtail (<i>Sebastes flavidus</i>)		Candidate	Candidate (COSEWIC)	
Salmon, Chinook (<i>Oncorhynchus tshawytscha</i>), no DPS or ESU			Candidate (COSEWIC)	
Salmon, Chinook (<i>Oncorhynchus tshawytscha</i>), Puget Sound		Candidate		Threatened
Salmon, Chum (<i>Oncorhynchus keta</i>), no DPS or ESU			Not Listed to Candidate (COSEWIC)	
Salmon, Chum (<i>Oncorhynchus keta</i>), Summer Run Hood Canal		Candidate		Threatened
Salmon, Coho (<i>Oncorhynchus kisutch</i>), no DPS or ESU			Not Listed to Candidate (COSEWIC)	
Salmon, Coho (<i>Oncorhynchus kisutch</i>), Interior Fraser River			Endangered (COSEWIC)	
Salmon, Coho (<i>Oncorhynchus kisutch</i>), Puget Sound and Strait of Georgia				Species of Concern
Salmon, Pink (<i>Oncorhynchus gorbuscha</i>)			Not Listed to Candidate (COSEWIC)	
Salmon, Sockeye (<i>Oncorhynchus nerka</i>), Cultus Lake			Endangered (COSEWIC)	
Salmon, Sockeye (<i>Oncorhynchus nerka</i>), Fraser River Drainage			Candidate (COSEWIC)	
Salmon, Sockeye (<i>Oncorhynchus nerka</i>), Sakinaw Lake			Endangered (COSEWIC)	
Shark, Bluntnose Sixgill (<i>Hexanchus griseus</i>)			Special Concern (COSEWIC); Not listed to Special Concern (SARA)	
Shortspine Thornyhead (<i>Sebastolobus alascanus</i>)			Not Listed to Candidate (COSEWIC)	
Surf Smelt (<i>Hypomesus pretiosus</i>)			Not Listed to Candidate (COSEWIC)	
Trout, Bull (<i>Salvelinus confluentus</i>)	Blue List	Candidate		Threatened
Trout, Steelhead (<i>Oncorhynchus mykiss</i>), Puget Sound / Georgia Basin			Candidate (COSEWIC)	Threatened
Walleye Pollock (<i>Theragra chalcogramma</i>), S. Puget Sound		Candidate		

*Items in bold represent legal status changes made between September 1, 2008 and January 1, 2011.

Table 4: Reptile Species of Concern in the Salish Sea

Species	British Columbia	Washington State	Canada	U.S.A.
Sea Turtle, Green (<i>Chelonia midas</i>)		Threatened	Threatened (COSEWIC)	Threatened
Sea Turtle, Leatherback (<i>Dermochelys coriacea</i>)	Red List	Endangered	Endangered (COSEWIC, SARA)	Endangered

Table 5: Avian Species of Concern in the Salish Sea

SPECIES	BRITISH COLUMBIA	WASHINGTON STATE	CANADA	U.S.A.
American Avocet (<i>Recurvirostra americana</i>)	Red list			
American Bittern (<i>Botaurus lentiginosus</i>)	Blue List			Species of Concern
American Golden Plover (<i>Pluvialis dominica</i>)	Blue List		Not Listed to Candidate (COSEWIC)	
American Kestrel (<i>Megaceryle alcyon</i>)			Not Listed to Candidate (COSEWIC)	
Ancient Murrelet (<i>Synthliboramphus antiquus</i>)	Blue List		Special Concern (COSEWIC, SARA)	
Bald Eagle (<i>Haliaeetus leucocephalus</i>)		Sensitive		Species of Concern
Band-tailed Pigeon (<i>Patagioenas fasciata</i>)	Not Listed to Blue List		Not Listed to Special Concern (COSEWIC)	
Belted Kingfisher (<i>Megaceryle alcyon</i>)			Not Listed to Candidate (COSEWIC)	
Black-footed Albatross (<i>Phoebastria nigripes</i>)	Blue List		Special Concern (COSEWIC); Not Listed to Special Concern (SARA)	
Brant (<i>Branta bernicla</i>)	Not Listed to Blue List			
Cackling Goose (<i>Branta hutchinsii</i>)	Not Listed to Blue List			
California Gull (<i>Larus californicus</i>)	Blue List			

SPECIES	BRITISH COLUMBIA	WASHINGTON STATE	CANADA	U.S.A.
Canada Goose, Aleutian (<i>Branta canadensis leucopareia</i>)				Species of Concern
Caspian Tern (<i>Hydroprogne caspia</i>)	Blue List			
Cassin's Auklet (<i>Ptychoramphus aleuticus</i>)	Blue List	Candidate	Not listed to Candidate (COSEWIC)	Species of Concern
Common Murre (<i>Uria aalge</i>)	Red List	Candidate		
Cormorant, Brandt's (<i>Phalacrocorax penicillatus</i>)	Red List	Candidate		
Cormorant, Double-crested (<i>Phalacrocorax auritus</i>)	Blue List			
Cormorant, Pelagic (<i>Phalacrocorax pelagicus</i>)	Red List			
Forster's Tern (<i>Sterna forsteri</i>)	Red List		Data Deficient (COSEWIC)	
Great Blue Heron, Pacific (<i>Ardea herodias fannini</i>)	Blue List		Special Concern (COSEWIC, SARA)	
Grebe, Clark's (<i>Aechmophorus clarkii</i>)	Not Listed to Red List	Not Listed to Candidate		
Grebe, Horned (<i>Podiceps auritus</i>)			Not Listed to Special Concern (COSEWIC)	
Grebe, Western (<i>Aechmophorus occidentalis</i>)	Red List	Candidate	Not Listed to Candidate (COSEWIC)	
Green Heron (<i>Butorides virescens</i>)	Not Listed to Blue List			
Gyr Falcon (<i>Falco rusticolus</i>)	Blue List			
Hudsonian Godwit (<i>Limosa haemastica</i>)	Red List			
Killdeer (<i>Charadrius vociferus</i>)			Not Listed to Candidate (COSEWIC)	
Long-billed Curlew (<i>Numenius americanus</i>)	Blue List		Special Concern (COSEWIC, SARA)	
Long-tailed Duck (<i>Clangula hyemalis</i>)	Not Listed to Blue List			
Loon, Common (<i>Gavia immer</i>)		Sensitive		
Loon, Yellow-billed (<i>Gavia adamsii</i>)	Not Listed to Blue List			

SPECIES	BRITISH COLUMBIA	WASHINGTON STATE	CANADA	U.S.A.
Marbled Murrelet (<i>Brachyramphus marmoratus marmoratus</i>)	Red List to Blue List	Threatened	Threatened (COSEWIC, SARA)	Threatened
Northern Fulmar (<i>Fulmarus glacialis</i>)	Red List			
Owl, Short-eared (<i>Asio flammeus</i>)	Blue List		Special Concern (COSEWIC, SARA)	
Owl, Snowy (<i>Bubo scandiacus</i>)	Not Listed to Blue List			
Pelican, American White (<i>Pelecanus erythrorhynchos</i>)	Red List	Endangered		
Pelican, Brown (<i>Pelecanus occidentalis</i>)		Endangered		Endangered to Species of Concern
Peregrine Falcon, American (<i>Falco peregrinus anatum</i>)	Red List	Sensitive	Special Concern (COSEWIC); Threatened (SARA)	Species of Concern
Peregrine Falcon, Peale's (<i>Falco peregrinus pealei</i>)	Blue List	Sensitive	Special Concern (COSEWIC, SARA)	Species of Concern
Phalarope, Red (<i>Phalaropus fulicarius</i>)			Not Listed to Candidate (COSEWIC)	
Phalarope, Red-necked (<i>Phalaropus lobatus</i>)	Blue List		Not Listed to Candidate (COSEWIC)	
Puffin, Horned (<i>Fratercula corniculata</i>)	Red List			
Puffin, Tufted (<i>Fratercula cirrhata</i>)	Blue List	Candidate		Species of Concern
Purple Martin (<i>Progne subis</i>)	Blue List	Candidate		Species of Concern
Red Knot (<i>Calidris canutus roselaari</i>)	Not Listed to Red List		Threatened (COSEWIC); Not Listed to Threatened	
Rough-legged Hawk (<i>Buteo lagopus</i>)	Not Listed to Blue List			
Scaup, Greater (<i>Aythya marila</i>)			Not Listed to Candidate (COSEWIC)	
Scaup, Lesser (<i>Aythya affinis</i>)			Not Listed to Candidate (COSEWIC)	
Shearwater, Buller's (<i>Puffinus bulleri</i>)	Not Listed to Blue List			

SPECIES	BRITISH COLUMBIA	WASHINGTON STATE	CANADA	U.S.A.
Shearwater, Flesh-footed (<i>Puffinus carneipes</i>)	Not Listed to Blue List			
Shearwater, Pink-footed (<i>Puffinus creatopus</i>)	Blue List		Threatened (COSEWIC, SARA)	
Short-billed Dowitcher (<i>Limnodromus griseus</i>)	Blue List			
Surf Scoter (<i>Melanitta perspicillata</i>)	Blue List			
Tundra Swan (<i>Cygnus columbianus</i>)	Blue List			
Wandering Tattler (<i>Tringa incana</i>)	Blue List			

*Items in bold represent legal status changes made between September 1, 2008 and January 1, 2011.

Table 6: Mammal Species of Concern in the Salish Sea

SPECIES	BRITISH COLUMBIA	WASHINGTON STATE	CANADA	U.S.A.
Cuvier's Beaked Whale (<i>Ziphius cavirostris</i>)			Candidate	
Fin Whale (<i>Balaenoptera physalus</i>)	Red List	Endangered	Threatened (COSEWIC, SARA)	Endangered
Gray Whale (<i>Eschrichtius robustus</i>)	Blue List	Sensitive	Special Concern (COSEWIC, SARA)	
Grizzly Bear (<i>Ursus arctos</i>)	Blue List	Endangered	Special Concern (COSEWIC)	Threatened
Harbor Porpoise (<i>Phocoena phocoena</i>)	Blue List	Candidate	Special Concern (COSEWIC, SARA)	
Humpback whale (<i>Megaptera novaeangliae</i>), N. Pacific	Blue List	Endangered	Threatened (COSEWIC, SARA)	Endangered
Killer Whales, N. Residents (<i>Orcinus orca</i>)	Blue List	Endangered	Threatened (COSEWIC, SARA)	
Killer Whales, Offshore (<i>Orcinus orca</i>)	Blue List	Endangered	Special Concern to Threatened (COSEWIC); Special Concern (SARA)	
Killer Whales, S. Residents (<i>Orcinus orca</i>)	Red List	Endangered	Endangered (COSEWIC, SARA)	Endangered
Killer Whales, Transients (<i>Orcinus orca</i>)	Red List	Endangered	Threatened (COSEWIC, SARA)	
Northern Elephant Seal (<i>Mirounga angustirostris</i>)			Candidate (COSEWIC)	

SPECIES	BRITISH COLUMBIA	WASHINGTON STATE	CANADA	U.S.A.
Northern Fur Seal (<i>Callorhinus ursinus</i>)	Red List		Threatened (COSEWIC)	
Pacific White-sided Dolphin (<i>Lagenorhynchus obliquidens</i>)			Candidate (COSEWIC)	
Sea Otter, northern (<i>Enhydra lutris kenyoni</i>)	Red List to Blue List	Endangered	Special Concern (COSEWIC, SARA)	Species of Concern
Steller Sea-lion (eastern population) (<i>Eumetopias jubatus</i>)	Blue List	Threatened	Special Concern (COSEWIC, SARA)	Threatened

*Items in bold represent legal status changes made between September 1, 2008 and January 1, 2011.

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 (Current study)	55%	44%	56%	29%	113