effectiveness of the Letter of Authorization;

(4) A summary of take levels, monitoring efforts and findings at the Port of Anchorage to date.

(d) The National Marine Fisheries Service will review an application for a Letter of Authorization in accordance with § 217.206 and, if adequate and complete, issue a Letter of Authorization.

§ 217.207 Letters of Authorization.

(a) A Letter of Authorization, unless suspended or revoked, will be valid for a period of time not to exceed the period of validity of this subpart, but must be renewed annually subject to annual renewal conditions in § 217.208.

(b) Each Letter of Authorization will set forth:

(1) Permissible methods of incidental taking; and

(2) Requirements for mitigation, monitoring and reporting, including, but not limited to, means of effecting the least practicable adverse impact on the species, its habitat, and on the availability of the species for subsistence uses.

(c) Issuance and renewal of the Letter of Authorization will be based on a determination that the total number of marine mammals taken by the activity as a whole will have no more than a negligible impact on the affected species or stock of marine mammal(s), and that the total taking will not have an unmitigable adverse impact on the availability of species or stocks of marine mammals for taking for subsistence uses.

(d) Notice of issuance or denial of an application for a Letter of Authorization will be published in the **Federal Register** within 30 days of a determination.

§ 217.208 Renewal of Letters of Authorization.

(a) A Letter of Authorization issued under § 216.106 and § 217.207 of this chapter for the activity identified in § 217.200(a) will be renewed annually upon:

(1) Notification to NMFS that the activity described in the application submitted under § 217.206 will be undertaken and that there will not be a substantial modification to the described work, mitigation or monitoring undertaken during the upcoming 12 months;

(2) Timely receipt of the monitoring reports required under § 217.205(d) and (e), and the Letter of Authorization issued under § 217.207, which has been reviewed and accepted by NMFS; and

(3) A determination by NMFS that the mitigation, monitoring and reporting measures required under §§ 217.204 and 217.205 and the Letter of Authorization issued under §§ 216.106 and 217.207 of this chapter, were undertaken and will be undertaken during the upcoming annual period of validity of a renewed Letter of Authorization; and

(4) A determination by NMFS that the number of marine mammals taken during the period of the Letter of Authorization will be small, that the total taking of marine mammals by the activities specified in § 217.200(a), as a whole will have no more than a negligible impact on the species or stock of affected marine mammal(s), and that the total taking will not have an unmitigable adverse impact on the availability of species or stocks of marine mammals for subsistence uses.

(b) If a request for a renewal of a Letter of Authorization issued under §§ 216.106 and 217.208 of this chapter indicates that a substantial modification to the described work, mitigation or monitoring undertaken during the upcoming season will occur, NMFS will provide the public a period of 30 days for review and comment on the request.

(c) Notice of issuance or denial of a renewal of a Letter of Authorization will be published in the **Federal Register** within 30 days of a determination.

§ 217.209 Modifications of Letters of Authorization.

(a) Except as provided in paragraph (b) of this section, no substantive modification (including withdrawal or suspension) to the Letter of Authorization by NMFS, issued pursuant to §§ 216.106 and 217.207 of this chapter and subject to the provisions of this subpart, shall be made until after notification and an opportunity for public comment has been provided. For purposes of this paragraph, a renewal of a Letter of Authorization under § 217.208, without modification (except for the period of validity), is not considered a substantive modification.

(b) If the Assistant Administrator determines that an emergency exists that poses a significant risk to the well-being of the species or stocks of marine mammals specified in § 217.202(b), a Letter of Authorization issued pursuant to §§ 216.106 and 217.207 of this chapter may be substantively modified without prior notification and an opportunity for public comment. Notification will be published in the **Federal Register** within 30 days subsequent to the action.

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DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Parts 223 and 224

[Docket No. 080229341–9330–02]

RIN 0648–XF89

Endangered and Threatened Wildlife and Plants: Proposed Endangered, Threatened, and Not Warranted Status for Distinct Population Segments of Rockfish in Puget Sound

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; 12–month petition finding; request for comments.

SUMMARY: We, the NMFS, have completed Endangered Species Act (ESA) status reviews for five species of rockfish (*Sebastes* spp.) occurring in Puget Sound, Washington, in response to a petition submitted by Mr. Sam Wright of Olympia, Washington, to list these species in Puget Sound as threatened or endangered species. We reviewed best available scientific and commercial information on the status of these five stocks and considered whether they are in danger of extinction throughout all or a significant portion of their ranges, or are likely to become endangered within the foreseeable future throughout all or a significant portion of their ranges. For bocaccio (*S. paucispinis*), we have determined that the members of this species in the Georgia Basin are a distinct population segment (DPS) and are endangered throughout all of their range. We propose to list this bocaccio DPS as endangered. We have determined that yelloweye rockfish (*S. ruberrimus*) and canary rockfish (*S. pinnige*r) in the Georgia Basin are DPSs and are likely to become endangered within the foreseeable future throughout all of their range. We propose to list the Georgia Basin DPSs of yelloweye and canary rockfish as threatened. We determined that populations of greenstriped rockfish (S. elongatus) and redstripe rockfish (*S. proriger*) occurring in Puget Sound Proper are DPSs but are not in danger of extinction throughout all or a significant portion of their ranges or likely to become so in the foreseeable future. We find that listing the greenstriped rockfish Puget Sound Proper DPS and the redstripe rockfish Puget Sound Proper DPS is not warranted at this time.

Any protective regulations determined to be necessary and

advisable for the conservation of threatened yelloweye and canary rockfish under ESA section 4(d) would be proposed in a subsequent **Federal Register** notice. We solicit information to inform these listing determinations and the development of proposed protective regulations and designation of critical habitat in the event these species are listed.

DATES: Comments on this proposal must be received by June 22, 2009. A public hearing will be held promptly if any person so requests by June 8, 2009. Notice of the location and time of any such hearing will be published in the **Federal Register** not less than 15 days before the hearing is held.

ADDRESSES: You may submit comments by any of the following methods:

• Federal e-Rulemaking Portal: *http://www.regulations.gov*. Follow the instructions for submitting comments.

• Mail: Submit written comments to Chief, Protected Resources Division, Northwest Region, National Marine Fisheries Service, 1201 NE Lloyd Blvd., Suite 1100, Portland, OR 97232.

INSTRUCTIONS: All comments received are a part of the public record and will generally be posted to *http://www.regulations.gov* without change. All Personal Identifying Information (for example, name, address, etc.) voluntarily submitted by the commenter may be publicly accessible. Do not submit Confidential Business Information or otherwise sensitive or protected information. We will accept anonymous comments (enter N/A in the required fields, if you wish to remain anonymous). Attachments to electronic comments will be accepted in Microsoft Word, Excel, WordPerfect, or Adobe PDF file formats only. The rockfish petition, draft status report, and other reference materials regarding this determination can be obtained via the Internet at: *http://www.nwr.noaa.gov/* or by submitting a request to the Assistant Regional Administrator, Protected Resources Division, Northwest Region, NMFS, 1201 NE Lloyd Blvd., Suite 1100, Portland, OR 97232.

FOR FURTHER INFORMATION CONTACT: Eric Murray, NMFS, Northwest Region (503) 231–2378; or Dwayne Meadows, NMFS, Office of Protected Resources (301) 713–1401.

SUPPLEMENTARY INFORMATION:

Background

On April 9, 2007, we received a petition from Mr. Sam Wright of Olympia, Washington, to list stocks of bocaccio, canary rockfish, yelloweye rockfish, greenstriped rockfish, and redstripe rockfish in Puget Sound as endangered or threatened species under the ESA and to designate critical habitat. We declined to initiate a review of the species' status under the ESA, finding that the petition failed to present substantial scientific or commercial information to suggest that the petitioned actions may be warranted (72 FR 56986; October 5, 2007). On October 29, 2007, we received a letter from Sam Wright presenting information that was not included in the April 2007 petition, and requesting that we reconsider our October 5, 2007, decision not to initiate a review of the species' status. We considered the supplemental information provided in the letter and the information submitted previously in the April 2007 petition as a new petition to list these species and to designate critical habitat. The supplemental information included additional details on the life histories of bocaccio and greenstriped rockfish supporting the case that individuals of these species occurring in Puget Sound may be unique. There was also additional information on recreational harvest indicating significant declines of rockfish abundance. On March 17, 2008, we provided notice of our determination that the petition presented substantial scientific information indicating that the petitioned action may be warranted and requested information to assist with a status review to determine if these five species of rockfish in Puget Sound warranted listing under the ESA (73 FR 14195). Copies of the April and October 2007 petitions and our October 2007 and March 2008 petition findings are available from NMFS (see **ADDRESSES**, above).

ESA Statutory, Regulatory, and Policy Provisions

The ESA defines species to include subspecies or a DPS of any vertebrate species which interbreeds when mature (16 U.S.C. 1532(16); 50 CFR 424.02 (k)). The U.S. Fish and Wildlife Service and NMFS have adopted a joint policy describing what constitutes a DPS of a taxonomic species (61 FR 4722; February 7, 1996). The joint DPS policy identifies two criteria for making DPS determinations: (1) The population must be discrete in relation to the remainder of the taxon (species or subspecies) to which it belongs; and (2) the population must be significant to the remainder of the taxon to which it belongs.

A population segment of a vertebrate species may be considered discrete if it satisfies either one of the following conditions: (1) ''It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation≥; or (2) ''it is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D)'' of the ESA.

If a population segment is found to be discrete under one or both of the above conditions, its biological and ecological significance to the taxon to which it belongs is evaluated. This consideration may include, but is not limited to: (1) ''persistence of the discrete population segment in an ecological setting unusual or unique for the taxon; (2) evidence that the loss of the discrete population segment would result in a significant gap in the range of a taxon; (3) evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range; and (4) evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.''

The ESA defines an endangered species as one that is in danger of extinction throughout all or a significant portion of its range, and a threatened species as one that is likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range (16 U.S.C. 1532 (6) and (20)). The statute requires us to determine whether any species is endangered or threatened because of any of the following factors: the present or threatened destruction of its habitat, overexploitation, disease or predation, the inadequacy of existing regulatory mechanisms, or any other natural or manmade factors (16 U.S.C. 1533). We are to make this determination based solely on the best available scientific information after conducting a review of the status of the species and taking into account any efforts being made by states or foreign governments to protect the species. The steps we follow in implementing this statutory scheme are to review the status of the species, analyze the threats facing the species, assess whether certain protective efforts mitigate these threats, and then make our best determination about the species' future persistence.

Status Review

To assist in the status review, we formed a Biological Review Team (BRT) comprised of Federal scientists from our Northwest and Southwest Fisheries Science Centers. We also requested technical information and comments from State and Tribal co-managers in Washington, as well as from scientists and individuals having research or management expertise pertaining to rockfishes in the Pacific Northwest. We asked the BRT to review the best available scientific and commercial information, including the technical information and comments from co-managers, scientists and others, first to determine whether the five species of rockfish warrant delineation into one or more DPSs, using the criteria in the joint DPS policy. We then asked the BRT to assess the level of extinction risk facing any DPSs they identified, describing their confidence that the species is at high risk, moderate risk, or not at risk of extinction. We described a species with high risk as one that is at or near a level of abundance, productivity, and/or spatial structure that places its persistence in question. We described a species at moderate risk as one that exhibits a trajectory indicating that it is more likely than not to be at a high level of extinction risk in the foreseeable future, with the appropriate time horizon depending on the nature of the threats facing the species. In evaluating the extinction risk, we asked the BRT to describe the threats facing the species, according to the statutory factors listed under section 4(a)(1) of the ESA.

The BRT used structured decision making to guide its consideration of the questions presented. To allow for expressions of the level of uncertainty, the BRT adopted a ''likelihood point'' method. Each BRT member distributed 10 ''likelihood points'' among DPS scenarios and risk categories. This approach has been widely used by NMFS BRTs in previous DPS determinations (e.g., Pacific Salmon, Southern Resident Killer Whale). The BRT presented its findings in a draft status review report (hereafter ''draft status report'') for the five species of rockfish (Drake *et al.*, 2008). Information from the draft status report and findings of the BRT inform our proposed determinations.

Distribution and Life-History Traits of Rockfishes

Rockfishes are a diverse group of marine fishes (about 102 species worldwide and at least 72 species in the northeastern Pacific (Kendall, 1991)) and as a group are among the most common of bottom and mid-water dwelling fish on the Pacific coast of North America (Love *et al.*, 2002). Adult rockfish can be the most abundant fish in various coastal benthic habitats, such as kelp forests, rocky reefs, and rocky outcrops in submarine canyons at depths greater than 300 m (980 feet) (Yoklavich, 1998). The life history of rockfishes is different than that of most other bony fishes. Whereas most bony fishes fertilize their eggs externally, fertilization and embryo development in rockfishes is internal, and female rockfish give birth to live larval young. Larvae are found in surface waters and may be distributed over a wide area extending several hundred miles offshore (Love *et al.*, 2002). Larvae and small juvenile rockfish may remain in open waters for several months. The dispersal potential for larvae varies by species depending on the length of time larvae remain in the pelagic environment (i.e., ''pelagic larval duration'') and the fecundity of females (i.e., the more larval propagules a species produces, the greater the potential that some larvae will be transported long distances). Dispersal potential may also be influenced by the behavior of pre-settlement fish. For example, diel, tidal, or vertical migration can affect dispersal.

Larval rockfish feed on diatoms, dinoflagellates, tintinnids, and cladocerans, and juveniles consume copepods and euphausiids of all life stages (Sumida and Moster, 1984). Survival and subsequent recruitment of young rockfishes exhibit considerable interannual variability (Ralston and Howard, 1995). Juveniles and subadults may be more common than adults in shallow water and are associated with rocky reefs, kelp canopies, and artificial structures such as piers and oil platforms (Love *et al.*, 2002). Adults generally move into deeper water as they increase in size and age (Garrison and Miller, 1982; Love, 1996), and many species exhibit strong site fidelity to rocky bottoms and outcrops (Yoklavich *et al.*, 2000).

Adults eat bottom and mid-water dwelling invertebrates and small fishes, including other species of rockfish associated with kelp beds, rocky reefs, pinnacles, and sharp drop-offs (Love, 1996; Sumida and Moser, 1984). Many species of rockfishes are slow-growing, long-lived (50 140 years; Archibald *et al.*, 1981), and late maturing (6 12 yrs; Wyllie-Echeverria, 1987).

Environmental History and Features of Puget Sound

Puget Sound is a fjord-like estuary located in northwest Washington State and covers an area of about 2,330 km^2 (900 sq miles), including 4,000 km (2500 miles) of shoreline. Puget Sound is part of a larger inland system, the Georgia Basin, situated between southern Vancouver Island and the mainland coasts of Washington State and British Columbia. This extensive system is a series of interconnected basins separated by shallow sills. Puget Sound can be subdivided into five major basins: (1) North Puget Sound, (2) Main Basin, (3) Whidbey Basin, (4) South Puget Sound, and (5) Hood Canal. In this Notice, we use the term ''Puget Sound'' or ''greater Puget Sound'' to refer to these five basins. Each of the basins differs in features such as temperature regimes, water residence and circulation, biological conditions, depth profiles and contours, processes, species, and habitats (Drake *et al.*, 2008). We use the term ''Puget Sound Proper'' in this Notice to refer to all of these basins except North Puget Sound (Figure 1).

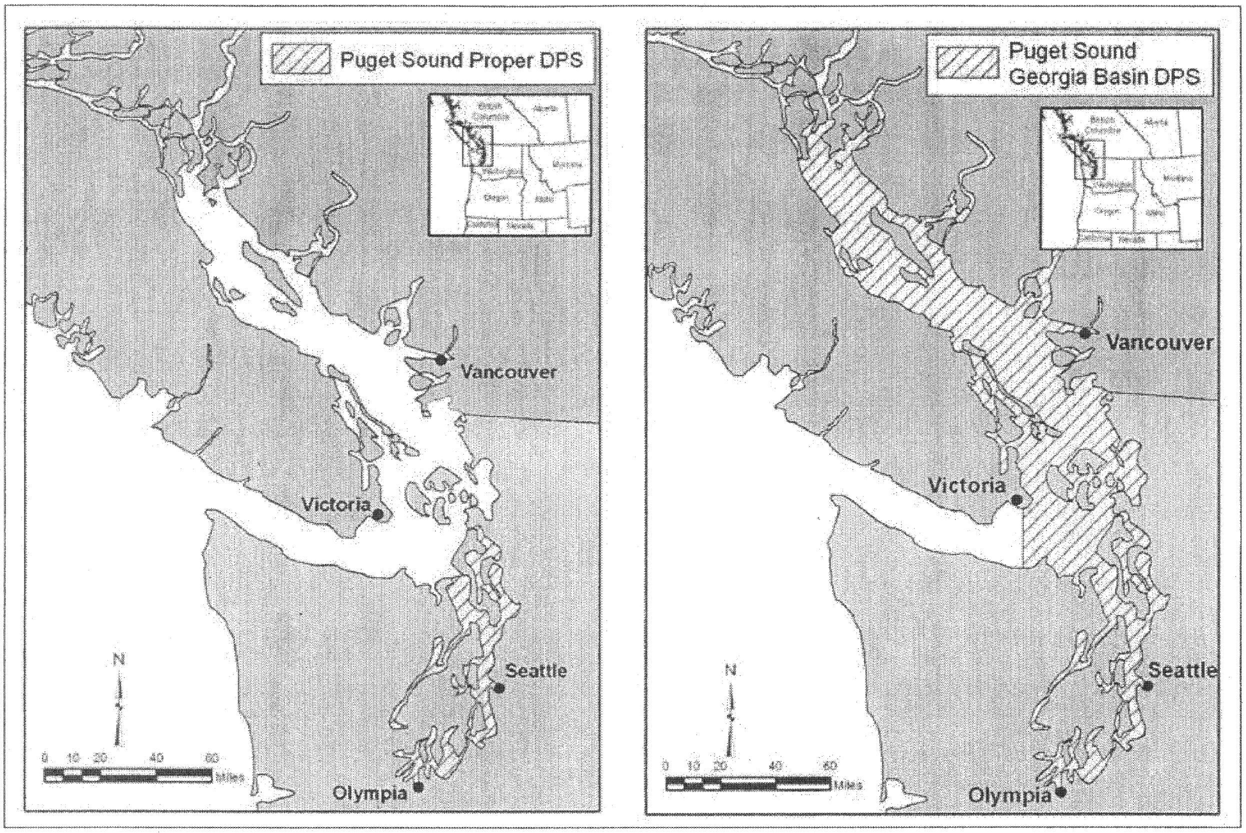

Figure 1. Approximate geographic boundaries for Puget Sound Proper and the Georgia Basin. The Strait of Georgia is the hatched area within Canada in the map on the right. The Figure is for purposes of illustration only and should not be used to identify precise boundaries.

In the Puget Sound system, net seaward outflow in the upper portion of the water column is driven by winter rainfall and summer snowmelt, and net landward inflow of high salinity ocean water occurs in the deeper portion of the water column (Masson, 2002; Thomson, 1994). Shallow sills within Puget Sound substantially reduce the flushing rate of freshwater, sediments, nutrients, contaminants, and many organisms. Concentrations of nutrients (i.e., nitrates and phosphates) are consistently high throughout most of the greater Puget Sound, largely due to the flux of oceanic water into the basin (Harrison *et al.*, 1994) and input of nutrients from freshwater runoff (Embrey and Inkpen, 1998).

Coastal areas within Puget Sound generally are characterized by high levels of rainfall and river discharge in the winter, while inland mountains are characterized by heavy snowfall in the winter and high snowmelt in late spring and early summer. Puget Sound's shorelines range from rocky sea cliffs to coastal bluffs and river deltas. Most of Puget Sound's shorelines are coastal bluffs, which are composed of erodable gravel, sand, and clay deposited by glaciers over 15,000 years ago (Downing, 1983; Shipman, 2004). Extensive development of coastal bluffs along the Sound has led to the widespread use of engineered structures designed to protect upland properties, railroads, and roads. These modifications have increased rapidly since the 1970s, with demonstrated negative impacts on the health of the ecosystem (Thom *et al.*, 1994).

Characteristics of the physical habitat such as depth, substrate, wave exposure, salinity, and gradient largely determine the plants and animals that can use particular areas of Puget Sound and the entire Georgia Basin. Eight major nearshore habitats have been characterized and quantified: rocky reefs, kelp beds, mixed sediment intertidal beaches, saltmarsh, tide flats, subtidal soft sediments, eelgrass beds, and open water/pelagic habitats (Dethier, 1990; Levings and Thom, 1994; NMFS, 2007). The shallow nearshore areas of Puget Sound contain eelgrass and seaweed habitats that support many marine fish and invertebrate populations at some time during their life cycle. Kelp beds and eelgrass meadows cover the largest area; floating kelps are found primarily over hard substrate along the Strait of Juan de Fuca and San Juan Islands, whereas eelgrass beds are estimated to cover 200 km^2 (77 mi^2) throughout Puget Sound, with the exception of South Sound (Nearshore Habitat Program, 2001; Mumford, 2007). Other major habitats include subaerial and intertidal wetlands (176 km^2)(68 mi^2), and mudflats and sandflats (246 km^2)(95 mi^2). In pelagic areas, the euphotic zone (zone that receives enough light for photosynthesis) extends to about 20 m (66 feet) depth in the relatively clear regions of North Puget Sound, and to 10 m (33 feet) depth in the more turbid waters of the South Sound basin. Most of the bottom of Puget Sound is comprised of soft sediments, ranging from coarse sands to fine silts and clays. Rocky reefs, composed of bedrock or a mixture of boulder and cobble substrates, are often characterized by strong currents and tidal action and support benthic suspension feeders and multiple species of fish, including several species of rockfish (Sebastes spp.). Approximately 95 percent of the rocky reef habitat in greater Puget Sound is located in North Puget Sound (Palsson *et al.*, 2008).

The human population in the greater Puget Sound region has increased rapidly over the last 2 decades. In 2005, the area housed approximately 4.4 million people, a 25 percent increase from 1991. According to the State Office of Management, the population is expected to grow to 4.7 to 6.1 million residents by 2025 (OFM, 2005).

Freshwater, marine, nearshore, and upland habitats throughout the greater Puget Sound region have been affected by a variety of human activities, including agriculture, heavy industry, timber harvest, and the development of sea ports and residential property (Sound Science, 2007).

Environmental History and Features of the Strait of Georgia

The Strait of Georgia is that portion of the Georgia Basin that lies in Canada (Figure 1). The coastal drainage of the Strait of Georgia is bounded to the west and south by the Olympic and Vancouver Island mountains and to the north and east by the Cascade and Coast mountains. At sea level, the Strait has a mild maritime climate and is dryer than other parts of the coast because of the rain shadow effect of the Olympic and Vancouver Island mountains.

The Strait of Georgia has a mean depth of 156 m (420 m maximum) and is bounded by narrow passages (Johnstone Strait and Cordero Channel to the north and Haro and Rosario straits to the south) and shallow submerged sills (minimum depth of 68 m (223 feet) to the north and 90 m (295 feet) to the south). The Strait of Georgia covers an area of approximately 6,800 km^2 (2625 sq miles)(Thomson, 1994), is approximately 220 km (137 miles) long, and varies from 18.5 to 55 km (12 to 34 miles) in width (Tully and Dodimead, 1957; Waldichuck, 1957). Both southern and northern approaches to the Strait of Georgia are through a maze of islands and channels, the San Juan and Gulf islands to the south and a series of islands to the north that extend for 240 km (149 miles) to Queen Charlotte Strait (Tully and Dodimead, 1957). Both northern channels (Johnstone Strait and Cordero Channel) are from 1.5 to 3 km (0.9 to 1.9 miles) wide and are effectively two-way tidal falls, in which currents of 22–28 km/hr (12–15 knots) occur at peak flood (Tully and Dodimead, 1957).

Freshwater inflows are dominated by the Fraser River, which accounts for roughly 80 percent of the freshwater entering the Strait of Georgia. Fraser River run-off and that of other large rivers on the mainland side of the Strait are driven by snow and glacier melt, and their peak discharge period is generally in June and July. Discharges from rivers that drain into the Strait of Georgia off Vancouver Island (such as the Chemainus, Cowichan, Campbell, and Puntledge rivers) peak during periods of intense precipitation, generally in November (Waldichuck, 1957).

Circulation in the Strait of Georgia occurs in a general counter-clockwise direction (Waldichuck, 1957). Tides, winds, and freshwater run-off are the primary forces for mixing, water exchange, and circulation. Tidal flow enters the Strait of Georgia predominantly from the south, creating vigorous mixing in the narrow, shallow straits and passes of the Strait of Georgia. The upper, brackish water layer in the Strait of Georgia is influenced by large freshwater run-off, and salinity in this layer varies from 5 to 25 practical salinity units (psu). Deep, high-salinity (33.5 to 34 psu), oceanic water enters the Strait of Georgia from the Strait of Juan de Fuca. The surface outflowing and deep inflowing water layers mix in the vicinity of the sills, creating the deep bottom layer in the Strait of Georgia. The basic circulation pattern in the southern Strait of Georgia is a southerly outflow of low-salinity surface water through the Rosario and Haro Straits (Crean *et al.*, 1988), with the northerly inflow of high salinity oceanic water from the Strait of Juan de Fuca at the lowest depths.

Marine habitat present in the Strait of Georgia includes two of the same types present in Puget Sound (kelp beds and eel grass beds) and five new habitat types. Total area of each habitat type is: estuarine marshes (3.82 km^2 (1.47 mi^2)), sandflats (90.4 km^2 (34.9 mi^2)), mudflats (155.1 km^2 (59.9 mi^2), rock-gravel 93.4 km^2 (36.1 mi^2)), kelp beds (313.8 km^2 (121.2 mi^2), eel grass beds (659 km^2 (254 mi^2)), and intertidal algae (93.4 km^2 (36.1 mi^2)) (Levings and Thom, 1994).

Although much of the land draining into the Strait of Georgia is sparsely populated, the densely populated cities of Vancouver and Victoria are located here. Environment Canada (2005) reports that the population of the Georgia Basin has doubled between 1970 and 2005. As in Puget Sound, human development of the area has caused ecosystem stress, including degraded water quality and loss of marsh and eel grass habitat (Transboundary Georgia Basin-Puget Sound Environmental Indicators Working Group, 2002). Filling, diking, water quality changes, and watershed modification have led to decreases in the amount of all habitat types (Levings and Thom, 1994).

Life History, Biology, and Status of the Petitioned Species

The life history, biology, and status of the petitioned species, summarized below, are described in detail in the draft status report (Drake *et al.*, 2008) and Palsson *et al.* (2008).

Bocaccio

Bocaccio range from Punta Blanca, Baja California, to the Gulf of Alaska off Krozoff and Kodiak Islands, Alaska (Chen, 1971; Miller and Lea, 1972). Within this range, they are most common from Oregon to northern Baja California (Love *et al.*, 2002). Bocaccio are elongate, laterally compressed fish with very large mouths (Love *et al.*, 2002). Their appearance often varies among individuals, with several common color variations. They are most frequently found between 50 and 250 m (160 and 820 feet) depth, but may be found as deep as 475 m (1,560 feet) (Orr *et al.*, 2000).

Copulation and fertilization occur in the fall, generally between August and November. Bocaccio larvae have relatively high dispersal potential, with a pelagic larval duration of approximately 155 days (Shanks and Eckert, 2005) and fecundity ranging from 20,000 to over 2 million eggs, considerably more than many other rockfish species (Love *et al.*, 2002). Larvae and pelagic juveniles tend to be found close to the surface, occasionally associated with drifting kelp mats. Most bocaccio remain pelagic for 3.5 months prior to settling to shallow areas, although some may remain pelagic as long as 5.5 months. Several weeks after settlement, fish move to deeper waters in the range of 18 30 m (60 100 feet) where they are found on rocky reefs (Carr, 1983; Feder, 1974; Johnson, 2006; Love, 2008). Adults inhabit waters from 12 478 m (40 1570 feet) depth but are most common at depths of 50–250 m (Feder, 1974; Love, 2002). While generally associated with hard substrata, adults do wander into mud flats. Bocaccio are also typically found well off the bottom (as much as 30 m (98 feet)) (Love *et al.*, 2002). Approximately 50 percent of adults mature in 4 to 6 years (MBC, 1987).

Large adult bocaccio have more movement potential than smaller, more sedentary species of rockfishes, but their occurrence in the Georgia Basin seems to be limited to certain areas. Bocaccio made up 8 9 percent of the Puget Sound recreational catch in the late–1970s (Palsson *et al.*, 2008), with the majority of fish caught in the areas around Point Defiance and the Tacoma Narrows in the South basin. Bocaccio have always been rare in the North Puget Sound surveys of the recreational shery (Drake *et al.*, 2008). In the Strait of Georgia, bocaccio have been documented in some inlets, but records are sparse, isolated, and often based on anecdotal reports (COSEWIC, 2002). Although the relationship between bocaccio habitat preference and distribution in the Georgia Basin is not fully understood, the available information indicates that they are frequently found in areas lacking hard substrate. This may be due to their pelagic behavior (willingness to occupy areas higher in the water column) or availability of prey items.

Adults are difficult to age, but are suspected to live as long as 54 years (Drake *et al.*, 2008). Bocaccio have low productivity because successful recruitment requires rare climatic and oceanic conditions. Tolimeri and Levin (2005) estimate that these conditions occur only about 15 percent of the time.

Bocaccio larvae are planktivores that feed on larval krill, diatoms, and dinoflagellates. Pelagic juveniles are opportunistic feeders, taking fish larvae, copepods, krill, and other prey. Larger juveniles and adults are primarily piscivores, eating other rockfishes, hake, sablefish, anchovies, lanternfishes, and squid. Chinook salmon, terns, and harbor seals are known predators of smaller bocaccio (Love *et al.* 2002). The main predators of adult bocaccio are marine mammals (COSEWIC, 2002).

Yelloweye Rockfish

Yelloweye rockfish range from northern Baja California to the Aleutian Islands, Alaska, but are most common from central California northward to the Gulf of Alaska (Clemens and Wilby, 1961; Eschmeyer *et al.*, 1983; Hart, 1973; Love, 1996). They are among the largest of the rockfishes, up to 11 kg (25 pounds), and easily recognizable by their bright yellow eyes and red-orange color (Love *et al.*, 2002). Yelloweye rockfish occur in waters 25 to 475 m (80 to 1,560 feet) deep (Orr *et al.*, 2000), but are most commonly found between 91 to 180 m (300 to 590 feet) depth (Love *et al.*, 2002). Yelloweye rockfish are among the longest lived of rockfishes, living up to at least 118 years (Love, 1996; Love *et al.*, 2002; O'Connell and Funk, 1987). Yelloweye rockfish juveniles settle primarily in shallow, high relief zones, crevices, and sponge gardens (Love *et al.*, 1991; Richards *et al.*, 1985). As they grow and move to deeper waters, adults continue to associate with rocky, high relief areas (Carlson and Straty, 1981; Love *et al.*, 1991; O'Connell and Carlisle, 1993; Richards *et al.*, 1985). Yelloweye rockfish can be found infrequently in aggregations, but are generally solitary, demersal residents with small home ranges (Coombs 1979; DeMott, 1983; Love *et al.*, 2002).

Yelloweye rockfish are less frequently observed in South Puget Sound than North Puget Sound (Miller and Borton, 1980), likely due to the larger amount of rocky habitat in North Puget Sound. Yelloweye rockfish are distributed throughout the Strait of Georgia in northern Georgia Basin including areas around the Canadian Gulf Islands and the numerous inlets along the British Columbia coast (Yamanaka *et al.*, 2006). Their distribution in these areas most frequently coincides with high relief, complex rocky habitats (Yamanaka *et al.* 2006).

Approximately 50 percent of adults are mature by 41 cm (16 inches) total length (about 6 years) (Love, 1996). Yelloweye rockfish store sperm for several months until fertilization occurs, commonly between the months of September and April, though fertilized individuals may be found in most months of the year, depending on where they are observed (Wyllie- Echeverria, 1987). Fertilization periods tend to get later as one moves from south to north in their range (DeLacy *et al.*, 1964; Hitz, 1962; Lea *et al.*, 1999; O'Connell 1987; Westrheim, 1975). Estimates of pelagic larval duration are not available for yelloweye rockfish, though we expect that it would be similar to or lower than that for bocaccio or canary rockfish (116 155 days; Varanasi, 2007). Fecundity ranges from 1.2 to 2.7 million eggs, considerably more than many other rockfish species (Love *et al.*, 2002). In Puget Sound, yelloweye rockfish are believed to fertilize eggs during the winter to summer months, giving birth early spring to late summer (Washington *et al.*, 1978). Although yelloweye rockfish are generally thought to spawn once a year (MacGregor, 1970), a study in Puget Sound offered evidence of at least two spawning periods per year (Washington *et al.*, 1978).

Yelloweye rockfish are opportunistic feeders, targeting different food sources during different phases of their life history, with the early life stages having typical rockfish diets as described for bocaccio above. Because adult yelloweye attain such large sizes, they are able to handle much larger prey, including smaller yelloweye, and are preyed upon less frequently (Rosenthal *et al.*, 1982). Typical prey of adult yelloweye rockfishes include sand lance, gadids, flatfishes, shrimps, crabs, and gastropods (Love *et al.*, 2002; Yamanaka *et al.*, 2006). Predators of yelloweye rockfish include salmon and orcas (Ford *et al.*, 1998; Love *et al.*, 2002).

Canary Rockfish

Canary rockfish range between Punta Colnett, Baja California, and the Western Gulf of Alaska (Boehlert, 1980; Mecklenburg *et al.*, 2002). Within this range, canary rockfish are most common off the coast of central Oregon (Richardson and Laroche, 1979). Adults are primarily orange with a pale grey or white background (Love *et al.*, 2002). Canary rockfish primarily inhabit waters 50 to 250 m (160 to 820 feet) deep (Orr *et al.*, 2000), but may be found up to 425 m (1,400 feet) depth (Boehlert, 1980). They can live to be 84 years old (Drake *et al.*, 2008). Canary rockfish were once considered fairly common in the greater Puget Sound area (Holmberg, 1967).

Female canary rockfish produce between 260,000 and 1.9 million eggs per year with larger females producing more eggs. Along the Pacific Coast, the relationship between egg production and female size does not seem to vary with geography (Gunderson, 1980; Love, 2002). Canary rockfish larvae have relatively high dispersal potential, with a pelagic larval duration of approximately 116 days (Shanks and Eckert, 2005). Fertilization occurs as early as September off central California (Lea, 1999) but peaks in December (Phillips, 1960; Wyllie-Echeverria, 1987), and parturition (birth) occurs between January and April and peaks in April (Phillips, 1960). Off the Oregon and Washington coasts, parturition occurs between September and March, with peaks in December and January (Barss, 1989; Wyllie Echeverria, 1987). In British Columbia, parturition occurs slightly later with the peak in February (Hart, 1973; Westrheim, 1975). Canary rockfish spawn once per year (Guillemot, 1985).

Female canary rockfish grow larger and more quickly than do males (Lenarz, 1991; STAT, 1999), and growth does not vary with latitude (Boehlert, 1980). A 58–cm (23–inch) long female is approximately 20 years of age; a male of the same age is about 53 cm (21 inches). Fish tend to move to deeper water as they grow larger (Vetter, 1997). While canary rockfish appear to be generally sedentary (Miller, 1973), tagging studies have shown that some individuals move up to 700 km (435 miles) over several years (Lea, 1999; Love, 2002). Canary rockfish larvae are planktivores, feeding primarily on nauplii (crustacean larvae), other invertebrate eggs, and copepods (Moser, 1991; Love, 2002). Juveniles are zooplanktivores, feeding on crustaceans such as harpacticoids (an order of copepods), barnacle cyprids (final larval stage), and euphasiid eggs and larvae. Predators of juvenile canary rockfish include other fishes, especially rockfishes, lingcod, cabezon and salmon, as well as birds and porpoises (Ainley, 1981; Love, 1991; Miller, 1973; Morejohn, 1978; Roberts, 1979). Adult canary rockfish are planktivores/carnivores, consuming euphasiids and other crustaceans and small fishes (Cailliet, 2000; Love, 2002). Predators of adult canary rockfish include yelloweye rockfish, lingcod, salmon, sharks, dolphins, seals (Antonelis Jr., 1980; Merkel, 1957; Morejohn, 1978; Rosenthal, 1982), and possibly river otters (Stevens, 1983).

Miller and Borton (1980) describe canary rockfish as being associated with the various rocky and coarse habitats that occur throughout the basins of Puget Sound. The Committee on the Status of Endangered Wildlife in Canada (COSEWIC) (2007) reports that canary rockfish are broadly distributed throughout the Strait of Georgia.

Greenstriped Rockfish

Greenstriped rockfish range from Cedros Island, Baja California, to Green Island in the Gulf of Alaska. Within this range, greenstriped rockfish are common between British Columbia and Punta Colnett in northern Baja California (Eschmeyer *et al.*, 1983; Hart, 1973; Love *et al.*, 2002). They are slim fish, with a distinctive color, and are unlikely to be mistaken for other rockfishes (Love *et al.*, 2002). Greenstriped rockfish is a deep-water species that can inhabit waters from 52 to 828 m (170 to 2,715 feet) in depth, but is most common between 100 and 250 m (330 and 820 feet) depth (Orr *et al.*, 2000). They are solitary fish, most often found resting on the bottom (Love *et al.*, 2002). Male greenstriped rockfish can live to approximately 37 years of age, and females to approximately 28 years of age (Love *et al.*, 1990).

Greenstriped rockfish females store sperm for several months until fertilization occurs, commonly between the months of February and May in areas north of California (O'Connell and Carlisle, 1993). Fertilized individuals are found earlier in more southerly areas (Lea *et al.*, 1999). Greenstriped rockfish are generally believed to spawn once a year (Shaw and Gunderson, 2006), but some evidence of multiple spawnings has been reported (Love *et al.*, 1990). Larvae are extruded at about 5 mm (0.2 inch) length (Matarese *et al.*, 1989) and remain pelagic for up to 2 months (Moser and Boehlert, 1991); settling at around 30 mm (1.2 inches) length (Johnson *et al.*, 1997). Individual greenstriped rockfish of both sexes start to mature at 150 mm (6 inches) length and 5 years of age, with 50 percent maturity occurring at 230 mm (9 inches) and 7–10 years (Shaw and Gunderson, 2006; Wyllie Echeverria, 1987). Females produce 11,000 to 300,000 eggs annually.

Greenstriped rockfish are active and opportunistic feeders, targeting different food sources during different phases of their life history. Larvae are diurnal, with nauplii, eggs, and copepods representing important food sources (Moser and Boehlert, 1991; Sumida *et al.*, 1985). Greenstriped rockfish adults are generally considered to be residential and may feed nocturnally, consuming bigger crustaceans, fishes, and cephalopods during those times (Allen, 1982). Juveniles are preyed upon by birds, nearshore fishes, salmon, and porpoises (Ainley *et al.*, 1993; Love *et al.*, 1991; Morejohn *et al.*, 1978). Adults have been recovered in the stomachs of sharks, porpoises, salmon, seals, and possibly river otters (Antonelis Jr. and Fiscus, 1980; Merkel, 1957; Morejohn *et al.*, 1978).

Greenstriped rockfish are distributed throughout Puget Sound, often associated with sand and coarse substrate (Miller and Borton, 1980; Palsson *et al.*, 2008). Palsson *et al.* (2008) report that greenstriped rockfish are occasionally caught in the western Strait of Juan de Fuca. Greenstriped rockfish are occasionally reported from North Puget Sound, but the low occurrence of reports may be due to the difficulty in surveying the rocky habitats of this area by conventional trawl sampling. COSEWIC has not undertaken a greenstriped rockfish status review in Canada.

Redstripe Rockfish

Redstripe rockfish occur from southern Baja California to the Bering Sea, Alaska (Hart, 1973; Love *et al.*, 2002). They are a streamlined fish with a red, pink, or tan color (Love *et al.*, 2002). Redstripe rockfish have been reported between 12 and 425 m (39 and 1,400 feet) in depth, but 95 percent occur between 150 and 275 m (490 and 900 feet) (Love *et al.*, 2002).

Redstripe rockfish may reach 55 years of age (Munk, 2001). They are most commonly found on a variety of substrates, from hard, high-relief reefs to sand-cobble interfaces. Juveniles settle to the bottom of sand-cobble substrates (Moser and Boehlert, 1991) and move as adults onto deeper rocky reefs and low-relief rubble bottoms. Redstripe rockfish can be found alone or in aggregations, usually near the sea-floor bottom (Love *et al.*, 2002b).

Estimates of pelagic larval duration and fecundity with which to infer dispersal potential are not available for redstripe rockfish, though we expect that larval duration would be similar to or slightly lower than that for bocaccio or canary rockfish (116 155 days; Varanasi, 2007). Approximately 50 percent of adults mature at 28 to 29 cm (11 to 11.5 inches) total length (Garrison and Miller, 1982). Redstripe rockfish females store sperm for several months until fertilization. Fertilization occurs between the months of April and May in areas north of California (O'Connell, 1987; Shaw, 1999; Wyllie-Echeverria, 1987). Larvae are extruded after a typical gestation period of a couple of months, peaking in July for British Columbia (Westrheim, 1975) and in June for Oregon (Shaw, 1999; Wyllie-Echeverria, 1987). Redstripe rockfish spawn once per year (Shaw, 1999). Larvae are extruded at about 5.4 mm length (0.2 inches) (Matarese *et al.*, 1989) and remain pelagic for up to 2 months (Moser and Boehlert, 1991). Recorded size at first maturity for redstripe rockfish is 210 to 220 mm (8.2 to 8.6 inches) length (Shaw, 1999). Size at 50 percent maturity was recorded in the 1970s to be 280 and 290 mm (11.0 and 11.4 inches) (Westrheim, 1975) for males and females, respectively, differing from samples collected in the 1990s (243 and 262 mm (9.5 and 10.0 inches)) for males and females (about 7 years old), respectively (Shaw, 1999). It is not known whether this represents changes in size at maturity over time or differential representation of individuals that geographically mature at larger sizes.

Redstripe rockfish are active and opportunistic feeders, and show feeding habits similar to the greenstriped rockfish. Larvae are diurnal, with nauplii, eggs, and copepods representing important food sources (Moser and Boehlert, 1991; Sumida *et al.*, 1985). Juveniles are diurnal zooplanktivores and feed mainly on calanoid copepods and barnacle cyprids (Allen, 1982; Gaines and Roughgarden, 1987; Love *et al.*, 1991). Adults may also feed nocturnally, consuming bigger crustaceans, fishes, and cephalopods (Allen, 1982). Juvenile redstripe rockfish are preyed upon by birds, nearshore fishes, salmon, and porpoises (Ainley *et al.*, 1993; Love *et al.*, 1991; Morejohn *et al.* 1978). Redstripe rockfish adults have been recovered in the stomachs of sharks, porpoises, salmon, seals, and possibly river otters (Antonelis Jr. and Fiscus, 1980; Merkel, 1957; Morejohn *et al.*, 1978).

Redstripe rockfish are associated with a wide range of rocky and coarse habitats in a broad range of depths throughout most basins of Puget Sound (Palsson *et al.*, 2008). Palsson *et al.* (2008) report that redstripe rockfish are commonly caught during trawl surveys in the central Strait of Juan de Fuca, channels of the San Juan Archipelago, in the central Strait of Georgia, and in Admiralty Inlet. COSEWIC has not undertaken a redstripe rockfish status review in Canada.

DPS Consideration

As described above, under the DPS policy a population segment is considered a DPS if it is both discrete from other populations within its taxon and significant to its taxon. The population segment may be considered discrete if it is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic differences may provide powerful direct evidence of this separation, because the presence of distinct genetic traits indicates that a population segment may be reproductively isolated. In addition to genetic information, various aspects of a population segment's biology, life history, and habitat may provide evidence of discreteness. For example, populations of a sedentary species may have limited reproductive exchange with other populations, and populations occupying habitat that is physically isolating may have little reproductive exchange with other isolated populations. This reproductive isolation over time may result in discreteness. For example, Yamanaka *et al.* (2006) concluded that for yelloweye rockfish, there are at least two distinct populations with limited genetic exchange occupying coastal North American waters between southeast Alaska and Oregon. The authors identified one population occupying the entire Pacific Coast and an inland population occupying the Strait of Georgia and possibly other inland marine waters including the Queen Charlotte Strait and Puget Sound.

There is limited direct genetic information comparing coastal populations of the petitioned rockfish species to populations within the Georgia Basin. In addition to that limited information, where available, we considered several lines of evidence to inform the consideration of discreteness of population segments within the Georgia Basin. These included genetic information from coastal populations of the petitioned species and the degree to which such information indicates stock structure among coastal populations; genetic information comparing Georgia Basin and coastal populations of other west coast rockfish species with life histories similar to the petitioned species; life-history traits of the petitioned species that could lead to reproductive isolation, and thus discreteness, of Georgia Basin populations (such as live-bearing of young, internal fertilization, short-pelagic larval stages, and fidelity to habitat); and characteristics of the species' habitat that could lead to physical isolation and thus discreteness of Georgia Basin populations (such as discontinuity of rocky habitats, bathymetric barriers, and current patterns and physical barriers that limit exchange of coastal and inland waters). The discussion below describes evidence of discreteness that may be relevant to any of the five rockfish species. The later discussion of individual species describes the considerations relevant to the discreteness of each individual species.

As described above under the DPS policy, in addition to being discrete, a population segment must also be significant to qualify as a DPS. The discussion of the policy above describes four characteristics that may make a discrete population segment significant. In the case of the petitioned rockfish species, the most relevant of these characteristics is the persistence of the discrete population segment in a unique ecological setting. The discussion below describes evidence of significance that may be relevant to any of the five rockfish species. The later discussion of individual species describes any additional considerations relevant to the significance of each individual species.

DPS Considerations Relevant to Discreteness of All Petitioned Species

Because there is little direct genetic information on the discreteness of most of the petitioned species in Puget Sound or the Georgia Basin, we considered genetic information on other rockfish species in Puget Sound and Georgia Basin with life histories similar to the petitioned species. In particular, NMFS' 2001 status review of copper, quillback, and brown rockfish (Stout *et al.*, 2001) concluded that there were DPSs of these rockfish in Puget Sound Proper based on genetic information. For copper rockfish, allozyme and DNA data from Seeb (1998) showed no particular genetic divergence for Puget Sound Proper specimens, but microsatellite data from Wimberger (in prep.) and Buonaccorsi *et al.* (2002) showed large differences between populations from within Puget Sound Proper and populations found outside Puget Sound Proper. Wimberger sampled copper rockfish from California, British Columbia, the San Juan Islands, the Canadian Gulf Islands, Admiralty Inlet, Central Puget Sound, and Hood Canal (the latter three populations are found within Puget Sound Proper). Wimberger found significant divergence between both Central Puget Sound and Admiralty Inlet populations, and all populations found outside of Puget Sound Proper. Equal divergence was found among Puget Sound Proper populations compared with San Juan, Gulf Island, and coastal populations as well.

Buonaccorsi *et al.* (2002) used a different set of microsatellite loci to compare populations of copper rockfish from Puget Sound Proper, Canadian Gulf Islands, Queen Charlotte Islands, and coastal California. They also found highly significant divergence among all sampling sites, indicating a clear divergence between populations within Puget Sound Proper and the Canadian Gulf Islands (in the Strait of Georgia). Buonaccorsi *et al.* (2002) also identified unique alleles in Puget Sound Proper, further evidence for isolation of Puget Sound Proper populations from other neighboring regions.

In addition to genetic information, Stout *et al.* (2001) pointed out that copper rockfish are live-bearing and have internal fertilization, a short pelagic larval stage, and high habitat fidelity. Copper rockfish are also considered to be non-migratory (Buonaccorsi *et al.*, 2002). All of these traits, combined with the physical isolation of Puget Sound Proper, could lead to reproductive isolation of copper rockfish in Puget Sound Proper.

For quillback rockfish, Seeb (1998) sampled four sites within Puget Sound Proper, one in the San Juan Islands (in the North Basin of Puget Sound), and coastal sites from California, Washington, and Alaska. Like copper rockfish, quillback rockfish are sedentary and show high fidelity to their home sites (Love *et al.*, 2002). Both allozyme and RFLP analyses indicated large differences in allele frequencies between Puget Sound Proper and the San Juan Islands. When the Puget Sound Proper samples were removed from the analysis, however, no significant divergence was found among the remaining populations (suggesting reproductive exchange among populations in California, Washington, Alaska, and the San Juan Islands, but reproductive isolation of the Puget Sound proper population). Wimberger (in prep.) found significant differences in microsatellite allele frequencies between Puget Sound Proper and the San Juan Islands. The San Juan Island population was more similar to Sitka, Alaska, than it was to Puget Sound Proper.

Brown rockfish have a distribution that is very different from copper and quillback rockfishes, as they are found in Puget Sound Proper but only rarely occur in North Puget Sound, Georgia Basin, or the Washington and Oregon coastline (Stout *et al.*, 2001). Genetic data support a divergence between Puget Sound Proper and California populations (Seeb, 1998). Buonaccorsi *et al.* (2002) sampled three sites within Puget Sound Proper, and compared them to coastal populations ranging from California to Mexico. They found significant divergence among the populations, and even between two of the Puget Sound Proper populations. Tagging studies indicate that juveniles and subadults may have relatively small home ranges (Love *et al.*, 2002). Puget Sound Proper populations exhibited extremely low genetic divergence compared to coastal samples, which suggested to the authors a potential founder effect combined with reproductive isolation, and/or a low effective population size.

In addition to genetic information for copper, quillback, and brown rockfish, there is genetic information available regarding some of the petitioned species that can help inform consideration of DPS structure of the other petitioned species. For the petitioned species, there is genetic information for yelloweye rockfish (Yamanaka *et al.*, 2006 and R. Withler (unpublished data as cited in Drake *et al.*, 2008)) indicating genetic differences between fish from inland marine waters (Queen Charlotte Strait and Georgia Basin) and the outer coast.

In addition to genetic information that is available for some rockfish species in the Georgia Basin, there are physical features of the Georgia Basin that affect all rockfish species in similar ways, potentially contributing to reproductive isolation and thus discreteness. The waters of the Georgia Basin are isolated from coastal waters by land masses (the Olympic Peninsula and Vancouver Island); underwater sills limit the movement of water, sediment, and bottom-dwelling species such as rockfish; and internal currents limit the exchange of water between the Basin and coastal areas. These geographic features tend to contain the dispersal of larval fish and the migration of adult fish within the Basin, and even within smaller areas within the Basin, such as Puget Sound Proper.

When the available genetic information was considered in concert with the ecological features of Puget Sound and the Georgia Basin and the life histories of the petitioned rockfishes, the BRT drew two general conclusions. First, the petitioned rockfishes in the inland marine waters (Puget Sound and the greater Georgia Basin) are likely to be reproductively isolated and genetically distinct from rockfish from the rest of the Pacific Coast. Second, and consistent with the findings of Stout *et al.* (2001), the more sedentary rockfishes are likely to be further reproductively isolated within Puget Sound Proper (the area that was the focus of the original listing petition). The more mobile rockfish are likely to be reproductively isolated within the Georgia Basin, but are not likely to be reproductively isolated within Puget Sound Proper.

DPS Considerations Relevant to Significance of All Petitioned Species

As described above in more detail, all five of the petitioned rockfish species occupy marine waters from California to Alaska, including coastal waters and the inland waters of the Georgia Basin. Throughout this range, the Georgia Basin is unique, for several reasons. The waters of the Georgia Basin are less saline than coastal waters because of the quantity of fresh water flowing into the Basin, particularly from the Fraser River. The greater amount of fresh water also results in stratification of water by salinity in the Georgia Basin to a greater extent than in coastal waters. Land masses and shallow sills limit the movement of deep-dwelling fish among subbasins within the Georgia Basin, as well as the movement of sediments and nutrients to a much greater extent than in coastal waters. In addition, the inland waters of the Georgia Basin are protected by the land features of the Olympic Peninsula and Vancouver Island, and by numerous islands within the Basin, which interrupts waves and currents and results in a less energetic environment than the coast. These features make the ecological setting of the Georgia Basin region substantially different than other regions in the range of these rockfish species.

While the Straits of Georgia and Juan de Fuca and North Puget Sound are relatively wide bodies of water with numerous islands, Puget Sound Proper is composed of narrow basins separated by shallow sills. The geographic and bathymetric features that constrain rockfish movement in the Georgia Basin are even more pronounced in Puget Sound Proper. The presence of rocky habitat is very limited in Puget Sound Proper, with most bottom substrates comprised of soft sediments, ranging from coarse sands to fine silts and clay. Rockfish in Puget Sound Proper are either limited to the small amount of rocky habitat or, like bocaccio, greenstriped rockfish, and redstripe rockfish, make use of habitat with softer bottom substrates.

DPS Conclusions by Species

Bocaccio

In 2002, our Southwest Fisheries Science Center conducted a status review for bocaccio (MacCall and He, 2002), focusing on a Southern DPS occupying the coastal area from the Oregon/California border to approximately 322 km (200 miles) south of the Mexico/U.S. border. The status review concluded that at least two DPSs of bocaccio were present off the coast of the Western United States and Mexico, the Southern DPS and at least one additional DPS (the Northern) to the north. The authors (MacCall and He, 2002) did not consider whether inland stocks of bocaccio in the northern portion of this species range might be separate DPSs or what their extinction risk might be, because only the southern DPS was the subject of an ESA petition at that time. That review resulted in a determination that listing of the southern DPS of bocaccio was not warranted.

No published studies have compared genetic characteristics of bocaccio from Puget Sound and outer coastal areas, but there have been several studies of genetic variation in bocaccio along the outer coast. Wishard *et al.* (1980) examined allozyme variation in nine coastal sampling locations ranging from Baja California to southern Oregon, with sample sizes ranging from 12 to over 100 individuals per locality. They found two highly polymorphic loci and three others with low levels of variation. They found overlapping confidence intervals for allele frequencies across sampling locations and no evidence for population differentiation. More recently, Matala *et al.* (2004) examined genetic variation in bocaccio at seven microsatellite loci in samples from eight locations from Baja California to British Columbia, including both sides of Point Conception. Samples were adults, except in the Santa Barbara channel where age–0 fish were taken. The results indicate that coastal bocaccio are not a single breeding population. A large-scale pattern of isolation by distance was not observed in the data. However, using a series of comparisons of smaller, geographically contiguous subsets of samples, the authors found some evidence that geographically proximate samples tended to be more similar genetically. The authors suggested that these results might best be explained by the interacting effects of oceanographic patterns and the species' life history, both of which result in some exchange between populations in close proximity, but limit exchange over larger distances.

Some aspects of bocaccio life history indicate that populations in the Georgia Basin might not be discrete from coastal populations, in particular the ability of adult bocaccio to move over long distances and the modest levels of differentiation among coastal populations described above. For this reason, and because of the lack of direct genetic information comparing inland and coastal populations, the BRT considered it possible that Georgia Basin populations are not discrete from coastal populations, that their presence in the Georgia Basin might be the result of a rare recruitment/migration event from coastal stocks. If that were the case, bocaccio age structure in the Basin would be dominated by a single year class. However, available size frequency data provide evidence that there are multiple year classes spread out over the available time series (MacCall, 2008). In addition, coastal bocaccio are dominated by a strong 1999 year class, but bocaccio in the Georgia Basin are not, providing further evidence against a hypothesis of a single population with frequent reproductive exchange.

The BRT concluded that the best available scientific information instead suggests that bocaccio populations in the Georgia Basin are discrete from coastal populations. Information supporting this conclusion includes the presence of multiple year classes within the Georgia Basin (indicating that bocaccio in the Basin are an independently reproducing entity and not the result of a rare recruitment/migration event from coastal stocks); the lack of a strong 1999 year class in the Georgia Basin, compared to coastal populations which do have a strong 1999 year class (suggesting separate recruitment regimes acting on Georgia Basin populations compared to coastal populations and also suggesting demographic independence); and the presence of large sexually mature individuals (suggesting the capacity for independent reproduction).

Inferences from the genetic evidence for discreteness of copper, quillback, brown, and yelloweye rockfish in the Georgia Basin also supports a conclusion that bocaccio in the Georgia Basin are discrete from coastal populations. Similarities in life histories between bocaccio and the four species for which we do have genetic information include: live-bearing of young, pelagic larval and juvenile stages, and eventual settlement to benthic habitats as fish reach adulthood. All of these species also consume similar prey items and spend at least some time in association with coarse substrates.

For the above reasons, the BRT concluded that the weight of the evidence supports the existence of a discrete population segment of bocaccio in the Georgia Basin more than it supports the existence of a single coastal/Georgia Basin population.

The BRT concluded there was no available information to support a conclusion that population segments of bocaccio within the Georgia Basin are discrete from one another. The factors supporting a conclusion that there are not discrete population segments of bocaccio within the Georgia Basin include the apparent similarity in age structure across the Basin, the fact that mature reproductive age adults have been found throughout the Basin, the fact that suitable habitat is spread throughout the Basin in a pattern that would allow movement of adults within the Basin, and the fact that bocaccio adults are able to move over relatively long distances (i.e., relative to other rockfish species). Because of this species potential for movement and wide habitat availability throughout Georgia Basin, the BRT did not feel that the evidence of within Georgia Basin genetic differences for copper, quillback, and brown rockfishes discussed above was relevant to bocaccio.

Under the DPS policy, having concluded that there is likely a discrete population segment of Georgia Basin bocaccio we must next consider whether the discrete population segment is significant to the species to which it belongs. As described above, the Georgia Basin is a unique ecological setting for all west coast rockfish. In addition, unlike coastal bocaccio, which are most frequently found in association with rocks and boulder fields, bocaccio in the Georgia Basin have been frequently found in areas with sand and mud substrate. We therefore conclude that the discrete population segment of boccacio in the Georgia Basin is also significant and thus a DPS (Figure 1).

In its previous status review, described above, NMFS identified two DPSs of coastal bocaccio (MacCall and He, 2002). The Georgia Basin bocaccio DPS identified in this draft status review would represent a third bocaccio DPS, distinct from both the southern and northern coastal DPSs identified in the previous review.

Yelloweye Rockfish

No published studies have compared genetic characteristics of yelloweye rockfish from Puget Sound and outer coastal areas. A Canadian study (Yamanaka *et al.*, 2006) using nine microsatellite loci in yelloweye rockfish collected from Oregon to southeast Alaska found small allele frequency differences among all the coastal samples; however, three samples from the inside waters of the Strait of Georgia and Queen Charlotte Strait had significantly reduced levels of genetic variability and formed a distinctive genetic cluster. The authors suggested that these results imply restricted gene flow between inland and coastal populations and a lower effective size for populations within the Strait of Georgia. Subsequently, samples taken in 2005 2007 from waters between Vancouver Island and Mainland British Columbia have been screened at the same nine polymorphic microsatellite loci (R. Withler, personal communication, July 2008). Preliminary analysis of these new samples shows that these patterns remain consistent: all the samples from inland waters form a coherent genetic cluster, and inside-outside comparisons typically yield much higher values of genetic differentiation than do comparisons of two coastal samples or two inland samples. In the north, there appears to be a fairly sharp transition between inland and coastal forms in the vicinity of the Gordon Channel. Whether a similar pattern occurs in the south is not known, as no samples from Puget Sound have been analyzed and only a single fish was collected from the Strait of Juan de Fuca. Nevertheless, these results suggest that yelloweye rockfish from the rest of the Georgia Basin are also likely to be genetically differentiated from the coastal population.

Several other lines of evidence support a conclusion that yelloweye rockfish in the Georgia Basin are discrete from coastal populations of yelloweye rockfish. Two aspects of the life history of yelloweye rockfish discussed earlier favor genetic and potentially demographic isolation from coastal populations. First, as both adults and juveniles, yelloweye rockfish are tightly associated with rocky substrata (or invertebrate prey associated with hard substrate). Such substrata are infrequent and patchy in distribution in North Puget Sound and the Georgia Strait, and are very rare in Puget Sound

Proper. Second, yelloweye rockfish show very limited movement as adults. These two aspects of their life history, combined with the retentive patterns of circulation of the Georgia Basin, support a conclusion that yelloweye rockfish in the Georgia Basin are discrete from coastal populations of yelloweye rockfish.

Inferences from the genetic evidence for discreteness of copper, quillback, and brown rockfish in the Georgia Basin also support a conclusion that yelloweye rockfish in the Georgia Basin are discrete from coastal populations. Similarities in life histories between yelloweye and the three species for which we do have genetic information include: live-bearing of young, pelagic larval and juvenile stages, and eventual settlement to benthic habitats as fish reach adulthood. All of these species also consume similar prey items and spend at least some time in association with coarse substrates.

For the above reasons, the BRT concluded that the weight of the evidence supports the existence of a discrete population segment of yelloweye in the Georgia Basin more than it supports the existence of a single coastal/Georgia Basin population.

The BRT concluded there was no available information to support a conclusion that population segments of yelloweye within the Georgia Basin are discrete from one another. The BRT also concluded that it was unlikely that the small amount of rocky habitat within in Puget Sound Proper would be able to support a self sustaining population of yelloweye rockfish. Since the majority of yelloweye habitat occurs in North Puget Sound and in the Strait of Georgia , the BRT did not feel that the evidence of within Georgia Basin genetic differences for copper, quillback, and brown rockfishes discussed above was relevant to yelloweye rockfish.

Under the DPS policy, having concluded that there is likely a discrete population segment of Georgia Basin yelloweye, we must next consider whether the discrete population segment is significant to the species to which it belongs. As described above, the Georgia Basin is a unique ecological setting for all west coast rockfish, satisfying the significance criterion of the DPS policy and supporting a conclusion that the discrete population segment of yelloweye in the Georgia Basin is also significant and thus a DPS.

Although the BRT did not examine additional DPS delineations among coastal populations of yelloweye rockfish, the BRT findings support a conclusion that the coastal populations constitute at least one additional DPS. As the BRT concluded, coastal populations are discrete from Georgia Basin populations. Because coastal populations occupy the majority of the species' range (as described above under Life History, Biology, and Status of the Petitioned Species), they would also certainly meet the DPS requirement of being significant to the taxon. Therefore, we conclude that coastal populations constitute at least one additional yelloweye rockfish DPS.

Canary Rockfish

No published studies have compared genetic characteristics of canary rockfish from Puget Sound and outer coastal areas. The allozyme study mentioned above (Wishard *et al.*, 1980), which examined large samples from 8 eight coastal locations in northern California, Oregon, and Washington, found low levels of heterozygosity in this species and some evidence for stock structure. In particular, samples taken south of Cape Blanco (southern Oregon) lack an allele that occurs at low frequency in populations to the north.

The BRT concluded that the best available scientific information suggests that canary rockfish populations in the Georgia Basin are discrete from coastal populations. Canary rockfish populations were historically most abundant in South Puget Sound, which is the basin in Puget Sound furthest from coastal waters, and is separated from coastal waters by three sills, which can present barriers to migration. Inferences from the genetic evidence for discreteness of copper, quillback, brown, and yelloweye rockfish in the Georgia Basin also support a conclusion that canary rockfish in the Georgia Basin are discrete from coastal populations. Similarities in life histories between canary rockfish and the four species for which we do have genetic information include: live-bearing of young, pelagic larval and juvenile stages, and eventual settlement to benthic habitats as fish reach adulthood. All of these species also consume similar prey items and spend at least some time in association with coarse substrates.

For the above reasons, the BRT concluded that the weight of the evidence supports the existence of a discrete population segment of canary rockfish in the Georgia Basin more than it supports the existence of a single coastal/Georgia Basin population.

The BRT concluded there was no available information to support a conclusion that population segments of canary rockfish within the Georgia Basin are discrete from one another. Because of this species potential for movement, the BRT did not feel that the evidence of within Georgia Basin genetic differences for copper, quillback, and brown rockfishes discussed above was relevant to canary rockfish.

Under the DPS policy, having concluded that there is likely a discrete population segment of Georgia Basin canary rockfish we must next consider whether it is significant to the species to which it belongs. As described above, the Georgia Basin is a unique ecological setting for all west coast rockfish, satisfying the significance criterion of the DPS policy and supporting a conclusion that the discrete population segment of canary rockfish in the Georgia Basin is also significant and thus a DPS.

Although the BRT did not examine additional DPS delineations among coastal populations of canary rockfish, the BRT findings support a conclusion that the coastal populations constitute at least one additional DPS. As the BRT concluded, coastal populations are discrete from Georgia Basin populations. Because coastal populations occupy the majority of the species' range (as described above under Life History, Biology, and Status of the Petitioned Species), they would also certainly meet the DPS requirement of being significant to the taxon. Therefore, we conclude that coastal populations constitute at least one additional canary rockfish DPS.

Redstripe Rockfish

No published studies have examined population genetic structure of redstripe rockfish in the Northeast Pacific. The BRT concluded that the best available scientific information supported a conclusion that the redstripe rockfish population segment in Puget Sound Proper is discrete from other redstripe rockfish populations in the rest of Georgia Basin and in coastal waters. Compared to other rockfish species, redstripe rockfish tend to occur in the mud/sand habitat that characterizes much of Puget Sound Proper. Due to the relatively deep habitat occupied by adult redstripe rockfish, the shallow sills of Puget Sound Proper would present an obstacle to northward migration of this species. Inferences from the genetic evidence for discreteness of copper, quillback, and brown rockfish in the Georgia Basin also support a conclusion that redstripe rockfish in Puget Sound Proper are discrete from other populations in the Georgia Basin. Similarities in life histories between redstripe rockfish and those three species, for which we do have genetic information include: live-bearing of young, pelagic larval and juvenile stages, and eventual settlement to benthic habitats as fish reach adulthood. All of these species also consume similar prey items and spend at least some time in association with coarse substrates.

Under the DPS policy, having concluded that there is likely a discrete population segment of Puget Sound Proper redstripe rockfish we must next consider whether the discrete population segment is significant to the species to which it belongs. As described above, Puget Sound Proper is a unique ecological setting for all west coast rockfish. In addition, the BRT noted that historical records indicated a long-standing presence of this species in Puget Sound Proper, lending further support to the conclusion that the Puget Sound Proper population segment is significant to the redstripe rockfish species. We therefore conclude that restripe rockfish in Puget Sound Proper satisfy the significance criterion of the DPS policy and should thus be considered a DPS (Figure 1).

Although the BRT did not examine additional DPS delineations among coastal populations of redstripe rockfish, the BRT findings support a conclusion that the coastal populations constitute at least one additional DPS. As the BRT concluded, coastal populations are discrete from Georgia Basin populations. Because coastal populations occupy the majority of the species' range (as described above under Life History, Biology, and Status of the Petitioned Species), they would also certainly meet the DPS requirement of being significant to the taxon. Therefore, we conclude that coastal populations constitute at least one additional redstripe rockfish DPS.

Greenstriped Rockfish

Very little genetic information is available for greenstriped rockfish. A preliminary study of mitochondrial DNA control region sequences (J. Hess, unpublished data) compared data from coastal samples (British Columbia, Washington, and California) and samples collected from the Strait of Juan de Fuca. Preliminary results are consistent with those for coastal populations of other rockfish species: most haplotypes shared by more than one individual were found in all populations sampled, and the only significant pair wise comparison was Washington coast vs. California. However, sample sizes were low (12–40 individuals), so power to detect differences was also low. Furthermore, because no samples were available from Puget Sound Proper, this preliminary study provided no information about the relationship between greenstriped rockfish in Puget Sound and the Pacific coast.

Like redstripe rockfish, greenstriped rockfish tend to occur in the mud/sand habitat that characterizes much of Puget Sound Proper. Also similar to redstripe rockfish, the BRT felt that the shallow sills of Puget Sound Proper might present a migration obstacle to greenstriped rockfish. Some available information supports this conclusion, while other information suggests the sills might not present a migration obstacle to this species. Other information supporting a Puget Sound Proper DPS includes the fact that this species does not appear to occur in a large area north of Admiralty Inlet and south of the San Juan Islands, suggesting a distribution gap between the Puget Sound Proper area and the rest of the Georgia Basin and the coast. The BRT also found no compelling information to suggest that populations of greenstriped rockfish in Puget Sound Proper would be any less discrete from other Georgia Basin populations than was the case for the previously reviewed species (Stout *et al.*, 2001). The only information that was contrary to a Puget Sound Proper DPS was the possibility that the large intra-annual variation in the apparent abundance of the species in Puget Sound Proper could reflect periodic immigration from other areas. Ultimately, the BRT largely relied on the information from the other rockfish species, particularly the previous status review of copper, quillback, and brown rockfish (Stout *et al.*, 2001), to conclude there is likely a Puget Sound Proper DPS of greenstriped rockfish. Similarities in life histories between greenstriped rockfish and those three species, for which we do have genetic information include: live-bearing of young, pelagic larval and juvenile stages, and eventual settlement to benthic habitats as fish reach adulthood. All of these species also consume similar prey items and spend at least some time in association with coarse substrates. Thus for greenstriped rockfish, Puget Sound Proper is discrete from other greenstriped rockfish populations in the rest of Georgia Basin and in coastal waters.

Consistent with the earlier conclusions of Stout *et al.* (2001), Puget Sound Proper is an ecologically unique environment that differs from other parts of Georgia Basin, thus satisfying the significance criterion of the DPS policy and should thus be considered a DPS.

Although the BRT did not examine additional DPS delineations among coastal populations of greenstriped rockfish, the BRT findings support a conclusion that the coastal populations constitute at least one additional DPS. As the BRT concluded, coastal populations are discrete from Georgia Basin populations. Because coastal populations occupy the majority of the species' range (as described above under Life History, Biology, and Status of the Petitioned Species), they would also certainly meet the DPS requirement of being significant to the taxon. Therefore, we conclude that coastal populations constitute at least one additional greenstriped rockfish DPS.

Western Boundary of the Georgia Basin DPS

The BRT noted that the Strait of Juan de Fuca is a transition zone between the oceanic waters of the California Current and inland waters of Georgia Basin. There was general agreement among BRT members that there is unlikely to be a sharp boundary that separates populations residing in these two systems (Drake *et al.*, 2008). The BRT considered two possible western boundaries, the mouth of the Sekiu River and the Victoria Sill. The Sekiu River is used as the western boundary in the Washington Department of Fish and Wildlife (WDFW) assessment of rockfishes (Palsson *et al.*, 2008). The BRT considered the Sekiu River a precautionary boundary in that it is very unlikely that any biologically relevant divisions would occur west of that point. The Victoria Sill bisects the Strait of Juan de Fuca and runs from east of Port Angeles north to Victoria. This sill is a significant oceanographic feature in the Strait of Juan de Fuca. The deep oceanic water in the Juan de Fuca Strait extends up to a depth of about 100 m (328 feet) at the Pacific end of the strait, and its thickness diminishes along the strait to just a few meters at the Victoria Sill (Masson, 2002). Patterns of circulation created by the sill create discontinuities in temperature, salinity (Masson and Cummins, 2000), nitrogen (Mackas and Harrison, 1997), primary production (Foreman *et al.*, 2008), and water column organic carbon (Johannessen *et al.*, 2008). The Victoria Sill also appears to have the potential to restrict larval dispersal (Engie and Klinger, 2007; Paul Chittaro, NWFSC, unpublished data). Using the FEMAT voting procedure described previously, BRT members distributed their votes among the two western boundary options. Victoria Sill received 72 percent of the votes. Thus, the BRT concluded that the Victoria Sill likely represents the western boundary in this DPS scenario. We concur.

Extinction Risk Assessment

The ESA (Section 3) defines ''endangered species'' as ''any species which is in danger of extinction throughout all or a significant portion of its range.'' ''Threatened species'' is defined as ''any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.'' We consider a variety of factors in evaluating the level of risk faced by a DPS, including: (1) absolute numbers of fish and their spatial and temporal distributions, (2) current abundance and carrying capacity of the habitat in relation to historical abundance and carrying capacity, (3) trends in abundance, based on indices such as catch statistics, catch per unit effort (CPUE), and spawner-recruit ratios, (4) climate variability, and (5) size distribution of adult fish. Additional risk factors, such as disease prevalence or evolution in life-history traits, also may be considered in the evaluation of risk to a population. The discussion that follows describes each of these considerations, which we then incorporate in the risk discussion below for each species, as relevant.

Absolute Numbers

The absolute number of individuals in a population is important in assessing two aspects of extinction risk. First, small populations may not be sustainable in the face of environmental fluctuations and small-population stochasticity, even if the population currently is stable or increasing (Gilpin and Soule, 1986; Thompson, 1991). Second, present abundance in a declining population is an indicator of the time expected until the population reaches critically low numbers (Caughley and Sinclair, 1994). In addition to absolute numbers, the spatial and temporal distributions of adult population sizes are important in assessing risk to a DPS.

Assessments of marine fish populations have focused on determining abundance and trends from models fit to catch, survey, and biological data. Catch records, fishery and survey catch per unit effort (CPUE), and biomass estimates from research cruises constitute most of the data available to estimate population abundance. The estimated numbers of reproductive adults is the most important measure of abundance in assessing the status of a population. Data on other life-history stages can be used as a supplemental indicator of abundance. In the case of the five petitioned species, very little information is available on their absolute abundance in the Georgia Basin and Puget Sound. Though the BRT did estimate the size of the five petitioned rockfish species using estimates of total rockfish abundance presented in Palsson *et al.* (2008), the BRT focused largely on trends in various abundance indices.

Historical Abundance and Carrying Capacity

An understanding of historical abundance and carrying capacity can provide insights into a population's sustainability under current conditions. For example, estimates of historical abundance provide the basis for establishing long-term abundance trends and also provide a benchmark for an abundance that was presumably sustainable. A comparison of past and present habitat capacity can also indicate long-term population trends from habitat loss, as well as potential habitat fragmentation, which can affect population viability. For a species that is at low abundance or has experienced declines in abundance, a comparison of current abundance to current carrying capacity may provide insight into the causes for decline and the potential for recovery.

Trends in Abundance

Short- and long-term trends in abundance serve as primary indicators of risk in natural populations. Trends may be calculated with a variety of quantitative data, including catch, CPUE, and survey data. Trend analyses for the five species considered in this status review are limited by the lack of long time series of abundances in greater Puget Sound for these species. In addition, although abundance time series are available for other, more common, Puget Sound rockfish species, these time series are characterized by a lack of regular sampling, by use of different survey methods for each species, and, for harvest data, by the effect of frequently revised harvest regulations. The BRT took several approaches to utilize the best available data in order to estimate the abundance trends, and these are discussed in greater detail below.

Climate Variability

Coupled changes in atmospheric and ocean conditions have occurred on several different time scales and have influenced the geographical distributions, and hence local abundances, of marine fishes. On time scales of hundreds of millennia, periodic cooling produced several glaciations in the Pleistocene Epoch (Imbrie *et al.*, 1984; Bond *et al.*, 1993). The central part of greater Puget Sound was covered with ice about 1 km (0.6 miles) thick during the last glacial maximum about 14,000 years ago (Thorson, 1980). Since the end of this major period of cooling, several population oscillations of pelagic fishes, such as anchovies and sardines, have been noted on the West Coast of North America (Baumgartner *et al.*, 1992). These oscillations, with periods of about 100 years, have presumably occurred in response to climatic variability. On decadal time scales, climatic variability in the North Pacific and North Atlantic Oceans has influenced the abundances and distributions of widespread species, including several species of Pacific salmon (Francis *et al.*, 1998, Mantua *et al.*, 1997) in the North Pacific, and Atlantic herring (Alheit and Hagen, 1997) and Atlantic cod (Swain, 1999) in the North Atlantic. Recent declines in marine fish populations in greater Puget Sound may reflect recent climatic shifts. However, we do not know whether these climatic shifts represent long-term changes or short-term fluctuations that may reverse in the near future. Although recent climatic conditions appear to be within the range of historical conditions, the risks associated with climatic changes may be exacerbated by human activities (Lawson, 1993).

Size Distributions

Fisheries often target larger, older, more mature fish, resulting in a population with fewer such individuals than an unfished population would have. Older females generally produce more larvae, and their larvae survive at higher rates, than those of younger females. Thus their removal can decrease the productivity of the overall population, particularly for slow-growing, long-lived species such as rockfish.

The BRT reported that size-frequency distributions for bocaccio in the 1970s included a wide range of sizes, with recreationally caught individuals from 25 to 85 cm (10 to 33 inches) in length. This broad size distribution suggests a spread of ages, with some successful recruitment over multiple years. A similar range of sizes is also evident in data from the 1980s. These patterns are more likely to result from a self-sustaining population within the Georgia Basin rather than sporadic immigration or recruitment from coastal populations. The temporal trend in size distributions for bocaccio also suggests size truncation of the population, with larger fish becoming less common over time until the 1990s. By the decade of the 2000s, no bocaccio data were available, so the BRT was not able to determine if the size truncation continued in this decade.

The BRT reported that canary rockfish exhibited a broad spread of sizes in the 1970s. However, by the 2000s, there were far fewer size classes represented and no fish greater than 55 cm (22 inches) were recorded in the recreational data. Although some of this truncation may be a function of the overall lower number of sampled fish, the data in general suggest few older fish remain in the population.

For yelloweye rockfish, the BRT reported that recreationally caught fish in the 1970s spanned a broad range of sizes. By the decade of the 2000s, there was some evidence of fewer older fish in the population. However, overall numbers of fish in the database were also much lower, making it difficult to determine if size truncation occurred.

For greenstriped and redstripe rockfish, the BRT noted that these species have a small maximum size. Although common in the recreational catch data for the 1970s and 1980s, greenstriped rockfish are represented by few individuals in catch data from the 1990s and 2000s. Size distributions do not suggest any size truncation over this time period. Low numbers reported in the catch may be a function of decreasing bag limits over time, and the likelihood of discarding of this less desired species by recreational fishermen. Large numbers of redstripe were retained by fishermen in the 1980s, but very few were available in the database for the 1990s and 2000s. There was no evidence of size truncation in this species over time, but too few fish were measured in the later decades to provide a meaningful analysis.

Risk Assessment Methods

In assessing risk, NMFS BRTs consider the best scientific information available, which often includes both qualitative and quantitative information. In previous NMFS status reviews, BRTs have used a ''risk matrix'' method to organize and summarize the professional judgment of a panel of professional scientists regarding the degree of risk facing a species based on the available information. This approach is described in detail by Wainright and Kope (1999) and has been used for over 10 years in Pacific salmonid status reviews (e.g., Good *et al.*, 2005; Hard *et al.*, 2007), as well as in reviews of Pacific hake, walleye pollock, Pacific cod (Gustafson *et al.*, 2000), Puget Sound rockfishes (Stout *et al.*, 2001b), Pacific herring (Stout *et al.* 2001a; Gustafson *et al.*, 2006), and black abalone (Butler *et al.*, 2008). In this risk matrix approach, the collective condition of individual populations is summarized at the DPS level according to four demographic risk criteria: abundance, growth rate/productivity, spatial structure/connectivity, and diversity. These viability criteria, outlined in McElhany *et al.* (2000), reflect concepts that are well founded in conservation biology and are generally applicable to a wide variety of species. These criteria describe demographic risks that individually and collectively provide strong indicators of extinction risk. The summary of demographic risks and other pertinent information obtained by this approach is then considered by the BRT in determining the species' overall level of extinction risk.

After reviewing all relevant biological information for the species, each BRT member assigns a risk score to each of the four demographic criteria. The scoring for the risk criteria correspond to the following values: 1–very low risk, 2–low risk, 3–moderate risk, 4–high risk, 5–very high risk. The scores were tallied (means, modes, and range of scores), reviewed, and the range of perspectives discussed by the BRT before making its overall risk determination. Although this process helps to integrate and summarize a large amount of diverse information, the risk matrix scores do not always translate directly into a determination of overall extinction risk. Other factors must be considered. For example, a DPS with a single extant sub-population might be at a high level of extinction risk because of high risk to spatial structure/connectivity, even if it exhibited low risk for the other demographic criteria. Another species might be at risk of extinction because of moderate risks to several demographic criteria.

After completing the risk matrix approach for each DPS, the BRT evaluated their overall extinction risk. The BRT was asked to use three categories of risk to describe the species' status ''high risk'' of extinction; ''moderate risk'' of extinction; or ''not at risk'' of extinction. To allow individuals to express uncertainty in determining the overall level of extinction risk facing the species, the BRT adopted the ''likelihood point'' method referred to previously.

Abundance Trends Data Reviewed by the BRT

The main data available on Puget Sound rock sh trends are from surveys of recreational anglers conducted by WDFW. These data are collected from punch cards sent in by licensed anglers and from dockside surveys. WDFW extrapolates the rock sh per angler data up to total catch using an estimate of number of trips derived from the salmon recreational shery. The data are reported both for the targeted catch (targeting bottom sh) and the incidental catch (targeting salmon). For the trend analyses conducted by the BRT, only the data from the shery targeting bottomfish were used because the bottomfish information was recorded in an inconsistent fashion in the salmon catch report (Drake *et al.*, 2008). The BRT utilized data covering the time period from 1965–2007.

The recreational data have numerous limitations. In particular, during 1994 to 2003, the total catch was still estimated using salmon shery data, yet restrictions on the salmon shery resulted in limited information. In addition, the bag limit on rock sh was lowered from 15 sh in 1983 to 1 rock sh per trip in both the north Puget Sound and Puget Sound Proper in 2000. Reductions in bag limits both directly reduce the sh per trip by capping the maximum and may lead to changes in angler targeting leading to reductions in the number of rock sh taken per trip. To correct for the effects of bag limits and changes in angler targeting, the trend analyses conducted by the BRT treated each bag limit period as a separate dataset and a scaling parameter to adjust the mean for each period was estimated.

Data from commercial fisheries were also examined by the BRT. Commercial data with effort information is available from records on the bottom trawl shery operating until 1988. Effort data (hours trawled) are available from 1955. Due to some concerns in the sheries literature about CPUE data from commercial sheries not correlating with actual population abundances, these data were not used for the trend analyses.

Data from the WDFW trawl survey (a shery independent survey) were included in the trend analysis conducted by the BRT. The survey is described in detail by Palsson *et al.* (2008). These trawl surveys cover 1987 to 2000, are depth stratified, and done in twelve regions. The rocky habitat used by bocaccio, canary rockfish and yelloweye rockfish is not effectively sampled by trawl gear, while the unconsolidated habitat used by redstripe rockfish and greenstriped rockfish can be trawled effectively. As a result, the BRT used the WDFW trawl survey data primarily with respect to the latter two species.

Another data source included in the BRT analysis is sightings of rock sh by recreational SCUBA divers throughout the Puget Sound as part of a program by the Reef Environmental Education Foundation (REEF, 2008), which trains recreational divers to identify and record sh species during recreational dives. The data are reported in relative abundance categories: single = single sh, few = 2–10 sh, many = 11–100 sh, and abundant = 100+ sh. The REEF database was used to determine presence/absence per dive (at any abundance) and also to determine minimum and maximum rock sh abundance by using the upper and lower ends of the categories to convert the categorical levels to numerical levels.

In addition to the data sources described above, the BRT reviewed numerous historical documents, short-term research projects, and graduate theses from regional universities. In general, historical reports confirm that the five petitioned species have consistently been part of the Puget Sound fish fauna. For example, Kincaid (1919) noted that the family Scorpaenidae (which includes rockfishes) constituted ''one of the most important and valuable groups of fishes found on the Pacific Coast.'' He produced an annotated list of Puget Sound fishes that documented 13 species of rockfish that were known to inhabit Puget Sound, including two of the petitioned species reported with different common nanmes: the ''orange rockfish'' (S. pinniger) that was ''abundant in deep water'', and the ''red rockfish or red snapper'' (S. ruberrimus), the largest of this group, ''common in deep water'' and ''brought to market in considerable quantities.'' Smith (1936) provided one of the first scientific reports on Puget Sound commercial fisheries focused on the fleet of otter trawlers which targeted flatfish landed for market in Seattle. The fishery occurred primarily over relatively soft-bottom areas. Seven rockfish species were indicated as being taken by this fishery, including three of the petitioned species ''orange rockfish'' (S. pinniger), ''red snapper'' (S. ruberrimus), and ''olive-banded rock cod'' (S. elongatus). Haw and Buckley's (1971) text on saltwater fishing in Washington marine waters, including Puget Sound, was designed to popularize recreational sport (hook and line) fishing in the region to the general public. Fishing locations and habitat preferences were indicated for three species of rockfish: canary, yelloweye, and bocaccio. Canary rockfish were found at depths over 150 feet (46 m) and were not restricted to rocky bottom areas. This species occurred in certain locations as far south as Point Defiance and was taken in large numbers at Tacoma Narrows, but was considered more abundant in the San Juan Islands, North Puget Sound, and Strait of Juan de Fuca. Rockfish were found at depths over 150 feet (46 m) on rocky bottoms, and primarily occurred in north Puget Sound, the Strait, and the outer coast. Finally, bocaccio were frequently caught in the Tacoma Narrows.

Two documents (Delacy *et al.*, 1972; Miller and Borton, 1980) compiled all available data on Puget Sound fish species distributions and relative number of occurrences since 1971 and 1973, respectively, from the literature (including some records noted above), fish collections, unpublished log records, and other sources. Twenty-seven representatives of the family Scorpaenidae are listed in these documents, including all five species considered in this status review (total records indicated in parentheses): greenstriped rockfish (54): most records occur in Hood Canal, although they were also collected near Seattle, primarily associated with otter trawls; bocaccio (110): most records occur from the 1970's in Tacoma Narrows and Appletree Cove (near Kingston) associated with sport catch; canary rockfish (114): most records occur from the 1960s to 1970s in Tacoma Narrows, Hood Canal, San Juan Islands, Bellingham, and Appletree Cove associated with sport catch; redstripe rockfish (26): most records are from Hood Canal sport catch, although a few were also taken in Central Sound/Seattle; yelloweye rockfish (113): most records occur from the early 1970's in the San Juan Islands (Sucia Island) and Bellingham Bay associated with the sport catch.

Summary of Previous Risk Analyses

The WDFW conducted an extensive review of the current status of all Puget Sound rockfishes (Palsson *et al.*, 2008). The authors examined historic patterns of abundance, results of WDFW surveys, and ecosystem stressors to produce a qualitative risk assessment. Palsson *et al.* (2008) note a precipitous decline in several species of rockfish, including bocaccio, yelloweye rockfish, and canary rockfish. They concluded that fishery removals (including bycatch from other fisheries) are highly likely to limit recovery of depleted rockfish populations in Puget Sound. In addition, they concluded that habitat disruption, derelict fishing gear, low dissolved oxygen, chemical toxicants, and predation are moderate threats to Puget Sound rockfish populations.

WDFW evaluated the status of rockfishes in Puget Sound using information on fishery landings trends, surveys, and species composition trends (Musick *et al.*, 2000). Their evaluation was based on the American Fisheries Society's Criteria for Marine Fish Stocks (Musick *et al.*, 2000). This method uses biological information and life history parameters such as population growth rates, age at maturity, fecundity, maximum age, etc. These parameters in concert with information regarding population trends are used to classify populations as depleted, vulnerable, precautionary or healthy. WDFW interpreted ''depleted'' to mean that there is a high risk of extinction in the immediate future, while ''vulnerable'' was considered to be likely to be endangered or threatened in the near future. ''Precautionary'' was interpreted to mean that populations were reduced in abundance, but that population size was stable or increasing. After applying the criteria, WDFW concluded that yelloweye rockfish were depleted in both North and South Puget Sound. Canary rockfish were also considered depleted in North and South Puget Sound. Greenstriped rockfish and redstripe rockfish were both considered to be healthy. Bocaccio were considered to have a precautionary status. The precautionary status of bocaccio was the result of a lack of information for bocaccio, as well as their increased rarity in South Puget Sound.

An evaluation on the status of yelloweye rockfish was prepared for the Canadian Committee on the Status of Endangered Wildlife in Canada (COSEWIC). COSEWIC concluded that there are two designatable units of yelloweye rockfish in Canada: an ''inside'' designatable unit that encompasses the Strait of Georgia, Johnstone Strait and Queen Charlotte Strait, and an ''outside'' designatable unit that extends from southeast Alaska to northern Oregon. The two designatable units are distinguished on the basis of genetic information indicating restricted gene flow, and age at maturity. For the inside designatable unit, submersible surveys in 1984 and 2003 showed statistically nonsignificant declines in mean, median and maximum sightings per transect. Commercial handline and longline CPUEs declined 59 percent and 49 percent respectively from 1986 to 2004. Age and length information indicates that the proportion of old individuals declined from the 1980s into the early 1990s. Overall, the COSEWIC report concluded that yelloweye rockfish abundance has declined more than 30 percent in a third of a yelloweye generation. COSEWIC also conducted status reviews for canary rockfish and bocaccio; however, these reports focused on coastal populations. In both cases, populations were determined to be threatened.

Coastal populations of yelloweye rockfish, canary rockfish and bocaccio are considered ''overfished'' by the U.S. Pacific Fisheries Management Council.

Current Abundance

Because of a lack of systematic sampling targeting rare rockfishes, absolute estimates of population size of the petitioned species cannot be generated with any accuracy. However, a rough estimate of the order of magnitude of population size can be determined from information assembled by WDFW. Palsson *et al.* (2008) extrapolated results from a video survey to estimate the population size of the common rockfish species (copper rockfish, quillback rockfish, black rockfish and brown rockfish) in Puget Sound Proper as about 40,683 and in North Puget Sound as 838, 944. The BRT applied the percent frequency of the petitioned species in the recreational catch to these numbers to conclude that the population sizes of boccacio, yelloweye rockfish, and canary rockfish are quite small, probably less than 10,000 in Georgia Basin and less than 1,000 in Puget Sound Proper. The absolute abundance of greenstriped and redstripe rockfish are unknown, but these species appear highly abundant in certain areas (Drake *et al.*, 2008).

Abundance Trends

The BRT did not generate quantitative estimates of trend in abundance for the ve species in the current petition because the low sampling of the catches in many years, particularly the early years, provides insufficient yearly estimates. Because of the nature of the available data, the BRT used the overall trend in all rockfishes (heavily influenced by common species such as copper, brown, and quillback rockfishes) to make inferences about the magnitude of trend in the petitioned species. They did this by looking for changes in the frequency of the petitioned species relative to the common species. The BRT examined this evidence for changes in the frequency of the petitioned species in the recreational catch, WDFW trawl surveys, and REEF dive surveys. If the petitioned species are not declining as fast as the ''total rock sh'' time series, then their frequency should be increasing relative to other more common species. On the other hand, they should become less frequent if they are declining more quickly.

The three most common species during 1965–2007 in the North Puget Sound (black rockfish, copper rockfish and quillback rockfish) and Puget Sound Proper (brown rockfish, copper rockfish, and quillback rockfish) increased in proportion of the total from 1980 through 1990, and currently comprise approximately 90 percent of the recreational catch. Four of the ve petitioned species (boccacio, canary rockfish, greenstriped rockfish, and yelloweye rockfish) became progressively less frequent in the recreational catch during the same time period.

Estimates of the declining trend in the total population of rockfish in Puget Sound were approximately 3 percent per year, although this figure varied depending on what assumptions were included in the model estimating the trend (see Drake *et al.*, 2008 for details). This rate of annual decline corresponds to an average decline of about 70 percent over the 1965–2007 time period the BRT examined. Since the relative frequency of the petitioned species declined, the BRT concluded that the decline of the petitioned species must have been greater than the 70 percent observed in the total rockfish population.

Extinction Risk Assessment Conclusions

Bocaccio

The BRT concluded that the bocaccio Georgia Basin DPS is at ''high risk'' of extinction throughout all of its range. Bocaccio appear to have declined in frequency in Puget Sound Proper, relative to other species, from the 1970s to the present. From 1975–1979, bocaccio were reported as an average of 4.63 percent of the total rockfish catch. From 1980–1989, they were 0.24 percent of the rock sh identified, and from 1996 to 2007, bocaccio have not been observed out of the 2238 rock sh identified in the dockside surveys of the recreational catches. In a sample this large, the probability of observing at least 1 bocaccio would be 99.5 percent assuming it was at the same frequency (0.24 percent) as in the 1980s. The BRT concluded that there is strong support in the data for a decline in the frequency of bocaccio relative to other species in Puget Sound Proper. The BRT noted that other data sources (SCUBA surveys) indicate that although rare, bocaccio rock sh were present in Puget Sound Proper as recently as 2001. Relying on the estimate of Palsson *et al.* (2008) of 40,683 rockfish in Puget Sound Proper, a 0.24 percent frequency rate would mean there were about 100 individual bocaccio in Puget Sound Proper in the 1980's. In North Puget Sound, bocaccio have always been rare in the surveys of the recreational shery. In the Strait of Georgia, bocaccio have been documented in some inlets, but records are sparse, isolated, and often based on anecdotal reports (COSEWIC, 2002).

A majority of the BRT concluded that the downward population size trend was, by itself, sufficient to indicate that the Georgia Basin DPS of bocaccio had a high risk of extinction. The BRT was also concerned that bocaccio as a species have a very low intrinsic rate of population growth, even in the absence of harvest or other threats that may limit productivity, and the size distribution of bocaccio in Puget Sound appeared to be trending toward smaller, less productive sizes (see above). Bocaccio are also characterized by highly variable recruitment that may be largely driven by environmental conditions which may occur only infrequently (Tolimieri and Levin, 2005). Even in the absence of continued exploitation, the BRT therefore concluded that Georgia Basin bocaccio were at risk due to their low abundance and low intrinsic population growth rate.

Threats to this DPS include areas of low dissolved oxygen within their range, the potential for continued losses as bycatch in recreational and commercial harvest, and the reduction of kelp habitat necessary for juvenile recruitment. The BRT's conclusions regarding the overall risk to the Georgia Basin bocaccio DPS were weighted to ''high risk'' (66 percent) with substantially less support for ''moderate risk'' (32 percent) and almost no support for ''not at risk'' (2 percent).

Although there have been no confirmed observations of bocaccio in Georgia Basin for approximately 7 years, the BRT concluded that there was no compelling reason to believe that the DPS has been extirpated. In particular, although it has disappeared from the recreational catch, the recreational fishery does not provide a complete sampling of Georgia Basin. Given the lack of an intensive effort to completely enumerate bocaccio, and the long life-span of the species, the BRT concluded that it is likely that the DPS still exists at a very low abundance and would be observed with a sufficiently intensive observation program.

Yelloweye Rockfish

The BRT concluded that the yelloweye rockfish Georgia Basin DPS is at ''moderate risk'' of extinction throughout all of its range. The frequency of yelloweye rock sh in Puget Sound Proper does not show a consistent trend, with percent frequencies less than 1 in the 1960s and 1980s and about 3 percent in the 1970s and 1990s. Relying on the estimate of Palsson *et al.* (2008) of 40,683 rockfish in Puget Sound Proper, a 3 percent frequency rate would mean there are about 1,200 individual canary rockfish in Puget Sound Proper. In North Puget Sound, however, the frequency of yelloweye rock sh decreased from a high of greater than 3 percent in the 1970s to a frequency of 0.65 percent in the most recent samples. Based on this decline in frequency in North Puget Sound, combined with the overall decline in rockfish abundance in Puget Sound, the BRT concluded that the current trend in abundance contributes significantly to the extinction risk of the DPS. Like bocaccio and canary rockfish, the BRT also noted that the low intrinsic productivity combined with continuing threats from bycatch in commercial and recreational harvest, loss of near shore habitat, chemical contamination, and areas of low dissolved oxygen, increase the extinction risk of this species. The BRT further noted the downward trends in the size of yelloweye rockfish in Puget Sound (see above). The BRT's conclusions regarding the overall risk to the Georgia Basin canary rockfish DPS were heavily weighted toward ''moderate risk'' (59 percent), with minority support for ''high risk'' (23 percent) and ''not at risk'' (18 percent).

Canary Rockfish

The BRT concluded that the canary rockfish Georgia Basin DPS is at ''moderate risk'' of extinction throughout all of its range. There appears to be a steep decline in the abundance of canary rockfish in the Georgia Basin, reflected in the species becoming less frequent in the recreational rockfish catch data since 1965. In Puget Sound Proper, canary rockfish occurred at frequencies above 2 percent of the total rockfish catch in the 1960s and 1970s, but by the late 1990s had declined to about 0.76 percent. Relying on the estimate of Palsson *et al.* (2008) of 40,683 rockfish in Puget Sound Proper, a 0.76–percent frequency rate would mean there are about 300 individual canary rockfish in Puget Sound Proper. In North Puget Sound, the frequency of canary rockfish exceeded 6 percent in the 1960s and declined to 0.56 percent in the 1990s. Based on this decline in frequency, combined with the overall decline in rockfish abundance in Puget Sound, the BRT concluded that the current trend in abundance contributes significantly to the extinction risk of the DPS.

The BRT also noted that the species' low intrinsic productivity combined with continuing threats from bycatch in commercial and recreational harvest, loss of near shore habitat, chemical contamination, and areas of low dissolved oxygen, increase the extinction risk of this species. The BRT further noted the downward trends in the size of the canary rockfish in Puget Sound (see above). The BRT noted that this species is more mobile than many other rockfish species, which may help preserve genetic diversity by increasing connectivity among breeding populations. However, the BRT noted the lack of specific information on canary rockfish population structure within the Georgia Basin, and that there does not appear to be a stronghold for canary rockfish anywhere within the range of the DPS. The BRT's conclusions regarding the overall risk to the Georgia Basin canary rockfish DPS were heavily weighted toward ''moderate risk'' (56 percent), with minority support for ''high risk'' (24 percent) and ''not at risk'' (20 percent).

Greenstriped Rockfish

The BRT concluded that the greenstriped rockfish Puget Sound Proper DPS is ''not at risk'' of extinction throughout all of its range. Greenstriped rock sh do not occur in the recreational catch data from North Puget Sound and occur very infrequently in the Puget Sound Proper recreational catch data, presumably due to the low value attached to this species. Bag limits were imposed in 1983 and the bag limit was further reduced in 1994 and 2000. Since greenstriped rock sh are smaller than other species, the bag limit may lead to discarding and thus under-representation of greenstriped rockfish in the recreational catch. Greenstriped rock sh appear in a low frequency in the WDFW sheries independent trawl survey, but they were caught in the most recent years of the WDFW trawl survey in Puget Sound Proper (in both 2002 and 2005). Thus, although greenstriped rock sh have not been reported from the recreational catch from 1999–2007, they are still present in Puget Sound Proper. The BRT noted the lack of information on the abundance trends of greenstriped rockfish, but noted that Puget Sound Proper has large areas of the unconsolidated habitats that are used by this species, and that this species has somewhat higher intrinsic productivity than other rockfish species. The BRT noted that this species is not preferred by recreational anglers, and may therefore be less susceptible to overharvest. Because this species is also more of a habitat generalist than many other rockfish, the BRT concluded it was not at risk from habitat loss or reduced diversity. Size distributions do not suggest any size truncation since the 1970s. The BRT did note that areas of low dissolved oxygen are a potential risk factor. The BRT conclusions regarding the overall risk the DPS were weighted toward ''not at risk'' (59 percent), with ''moderate risk'' receiving minority support (32 percent) and ''high risk'' receiving very little support (9 percent).

Redstripe Rockfish

The BRT concluded that the redstripe rockfish Puget Sound Proper DPS is ''not at risk'' of extinction throughout all of its range. Redstripe rockfish do not occur in the catch data from North Puget Sound. In Puget Sound Proper, however, redstripe rock sh appeared frequently in the recreational catch (between 1–14 percent) from 1980 to 1985. Previous to that, from 1965 to 1979, redstripe rockfish appeared much less frequently (less than 1 percent). After 1985, the frequency of redstripe rockfish declined in the recreational data, and since 1996 it does not appear in the catch data. A bag limit was imposed in 1983 and the bag limit was further reduced in 1994 and 2000. Since redstripe rockfish are smaller than other species, bag limits may lead to discarding and thus under-representation of redstripe rockfish in the recreational catch. In the 1980s and 1990s, redstripe rockfish appeared at a low frequency (less than 1.5 percent) in the WDFW trawl survey. The frequency increased dramatically in 2002 and 2005, with redstripe rockfish making up 39 and 48 percent of the individuals caught. The BRT concluded that these high estimates may be statistical outliers, however, and are not necessarily indicative of an actual increase in abundance in recent years. However, the biomass of redstripe rockfish in the Puget Sound trawls was significantly higher in 2008 than in 1995, indicating a potential increase in abundance. The BRT also noted that the presence of redstripe rockfish in the WDFW trawl survey indicates that redstripe rockfish are present in Puget Sound but are no longer being recorded in the dockside surveys of the recreational catch, for undetermined reasons. Overall, the BRT noted that the total abundance and trends in abundance for this species were not well known, but concluded that the available data indicated that the species was at least locally abundant within Puget Sound.

The BRT also noted that this species has a shorter generation time and higher intrinsic rate of productivity than many other rockfish species. The BRT noted that this species is not preferred by recreational anglers, and may therefore be less susceptible to overharvest. Because this species is also more of a habitat generalist than many other rockfish, the BRT concluded it was not at risk from habitat loss or reduced diversity. The BRT did note that areas of low dissolved oxygen and chemical contamination are potential risk factors for this species. There was no evidence of size truncation in this species over time, but too few fish were measured in the later decades to provide a meaningful analysis. The BRT conclusions regarding the overall risk to the DPS were weighted toward ''not at risk'' (58 percent), with ''moderate risk'' receiving minority support (32 percent), and ''high risk'' receiving little support (10 percent).

Summary of Factors Affecting the Five DPSs of Rockfish

As described above, section 4(a)(1) of the ESA and NMFS implementing regulations (50 CFR 424) state that we must determine whether a species is endangered or threatened because of any one or a combination of the following factors: (1) the present or threatened destruction, modification, or curtailment of its habitat or range; (2) overutilization for commercial, recreational, scientific, or educational purposes; (3) disease or predation; (4) inadequacy of existing regulatory mechanisms; or (5) other natural or man-made factors affecting its continued existence. The primary factors responsible for the decline of these five DPSs of rockfishes are overutilization for commercial and recreational purposes, water quality problems including low dissolved oxygen, and inadequacy of existing regulatory mechanisms. The factors for decline are so similar for the petitioned DPSs of rockfish that they are addressed collectively in the following section. This section briefly summarizes findings regarding threats to the five DPSs of rockfishes. More details can be found in the draft status report (Drake *et al.*, 2008) and Palsson *et al.* (2008).

The Present or Threatened Destruction, Modification, or Curtailment of its Habitat or Range

The BRT identified habitat destruction as a threat to petitioned rockfish. In particular, loss of rocky habitat, loss of eelgrass and kelp, introduction of non-native species that modify habitat, and degradation of water quality were identified as specific threats to rockfish habitat in the Georgia Basin.

Adults of bocaccio, canary rockfish, and yelloweye rockfish are typically associated with rocky habitats. Palsson *et al.* (2008) report that such habitat is extremely limited in Puget Sound, with only 10 km^2 (3.8 sq miles) of such habitat in Puget Sound Proper, and 207 km^2 (80 sq miles) in North Puget Sound. Rocky habitat is more common in the Strait of Georgia and Strait of Juan de Fuca. Palsson *et al.* (2008) note that this habitat is threatened by, or has been impacted by, construction of bridges, sewer lines and other structures, deployment of cables and pipelines, and burying from dredge spoils and natural subtidal slope failures.

Eelgrass, kelp, and other submerged vegetation provide important rockfish habitat, particularly for juveniles. In 2006, there were about 20,234 hectares (78 sq miles) of eelgrass in Puget Sound, with about a third of this in Padilla and Samish bays. Monitoring of eelgrass began in 2000, and although coverage declined until 2004, since that time it has remained unchanged throughout Puget Sound. Localized declines have occurred, with local losses in Hood Canal ranging from 1 to 22 percent per year (Puget Sound Action Team, 2007). Kelp cover is highly variable and has shown long-term declines in some regions, while kelp beds have increased in areas where artificial substrate provides additional kelp habitat (Palsson *et al.*, 2008).

Non-indigenous species are an emerging threat to biotic habitat in Puget Sound. *Sargassum muiticum* is an introduced brown alga that is now common throughout much of the Sound. The degree to which *Sargassum* influences native macroalgae, eelgrass, or rockfish themselves is not presently understood. Several species of non-indigenous tunicates have been identified in Puget Sound. For example, *Ciona savignyi* was initially seen in one location in 2004, but within 2 years spread to 86 percent of sites surveyed in Hood Canal (Puget Sound Action Team, 2007). The exact impact of invasive tunicates on rockfish or their habitats is unknown, but results in other regions (e.g., Levin *et al.*, 2002) suggest the potential for introduced invertebrates to have widespread impacts on rocky-reef fish populations.

Over the last century, human activities have introduced a variety of toxins into Puget Sound and the Georgia Basin at levels that may affect rockfish populations or the prey that support them. Several urban embayments in the Sound have high levels of heavy metals and organic compounds (Palsson *et al.*, 2008). About 32 percent of the sediments in Puget Sound are considered to be moderately or highly contaminated (Puget Sound Action Team, 2007). Organisms that live in or eat these sediments are consumed, thus transferring contaminants up the food web to higher level predators like rockfishes, and to a wider geographic area.

Not surprisingly, contaminants such as polychlorinated biphenyls (PCBs), chlorinated pesticides (e.g., DDT), and polybrominated diphenyl ethers (PBDEs) appear in rockfish collected in urban areas (Palsson *et al.*, 2008). However, while the highest levels of contamination occur in urban areas, toxins can be found in the tissues of animals in all regions of the sound (Team, 2007). Indeed, rockfish collected in rural areas of the San Juan Islands revealed high levels of mercury and hydrocarbons (West *et al.*, 2002).

Although risks from contaminants can affect all life history stages of rockfish, few studies have investigated the effects of toxins on rockfish ecology or physiology. Contaminants may influence growth rates of rockfish. For example, Palsson *et al.* (2008) describe a case in which male rockfish have lower growth rates than females an unusual pattern for rockfish since males typically grow faster than females. The explanation may be that male rockfish tend to accumulate PCBs while female's body burden does not increase with time since they reduce their toxin level when they release eggs. Thus, the observed difference in growth rate may result from the higher contaminant concentration in males versus females.

Rockfish may also experience reproductive dysfunction as a result of contaminant exposure. Although no studies have shown an effect on rockfish, other fish in Puget Sound that have been studied do show a substantial impact. For instance, in English sole, reproductive function is reduced in animals from contaminated areas, and this effectively decreases the productivity of the species (Landahl *et al.*, 1997).

The full effect of contaminants on rockfish in the Georgia Basin remains unknown, but there is clearly a potential for impact. Unfortunately, good physical rockfish habitat is located in areas that are now subject to high levels of contaminants. This is evidenced by the fact that rockfish were historically captured in great numbers in these areas (compare Palsson *et al.*, 2008 and Puget Sound Action Team, 2007). Palsson *et al.* (2008) suggest that these areas, often in urban embayments, have become de facto no-take zones because people avoid fishing there. Now, many of the areas where rockfish are not subjected to fishing pressure are contaminated, potentially creating a barrier to recovery.

In addition to chemical contamination, water quality in Puget Sound is also influenced by sewage, animal waste, and nutrient inputs. The Washington Department of Ecology has been monitoring water quality in Puget Sound for several decades. Monitoring includes fecal coliform, nitrogen, ammonium, and dissolved oxygen. In 2005, of the 39 sites sampled, 8 were classified as highest concern, and 10 were classified as high concern. Low levels of dissolved oxygen have been an increasing concern. Hood Canal has seen persistent and increasing areas of low dissolved oxygen since the mid 1990s. Typically, rockfish move out of areas with dissolved oxygen less than 2 mg/l; however, when low dissolved oxygen waters were quickly upwelled to the surface in 2003, about 26 percent of the rockfish population was killed (Palsson *et al.*, 2008). In addition to Hood Canal, Palsson *et al.* (2008) report that periods of low dissolved oxygen are becoming more widespread in waters south of Tacoma Narrows.

Overutilization for Commercial, Recreational, Scientific or Educational Purposes

The BRT and WDFW (Palsson *et al.* 2008) identify overutilization for commercial and recreational purposes as the most severe threat to petitioned rockfish in the Georgia Basin. Because individual species of rockfish were historically not indentified in fisheries statistics, it is impossible to estimate rates of fishing mortality and thus impossible to conduct a detailed quantitative analysis of the effects of fishing on rockfish populations. Nonetheless, there is little doubt that overfishing played a major role in the declines of rockfish in Puget Sound (Drake *et al.*, 2008; Palsson *et al.*, 2008). Moreover, the life histories of the petitioned species (especially bocaccio, canary rockfish, and yelloweye rockfish) make them highly susceptible to overfishing and, once populations are at a low level, recovery can require decades (Levin *et al.*, 2006; Love *et al.*, 2002; Parker *et al.*, 2000). In particular, rockfish grow slowly, have a long life span and low natural mortality rates, mature late in life, often have sporadic reproductive success from year to year, may display high fidelity to specific habitats and locations, and require a diverse genetic and age structure to maintain healthy populations (Love *et al.*, 2002).

Estimates of rockfish harvest in Puget Sound are available for the last 87 years (Palsson *et al.*, 2008). Commercial harvest was very low prior to World War II, rose during the War, and then averaged 125,000 pounds (56,700 kg) between 1945 and 1970. In the 1970s, harvest increased dramatically, peaking in 1980 at 880,000 pounds (399,200 kg). Catches remained high until the early 1990s and then declined dramatically (Palsson *et al.*, 2008). From 1921–1970 a total of 3,812,000 pounds (1,729,000 kg) of rockfish were landed in Puget Sound, while nearly this same level of harvest (3,968,000 pounds; 1,800,000 kg) was achieved in only 7 years (from 1977–1983). The average annual harvest from 1977–1990 was nearly four times pre–1970 levels.

Although an estimate of fishing mortality is not available, some available evidence suggests that the fishing mortality experienced by the petitioned species would have been very high. Palsson *et al.* (2008) provide a rough estimate of the total rockfish biomass in Puget Sound during the 1999–2004 time period of 3,205,521 pounds (1,454,000 kg) less than the total harvest from 1977–1983. Although the BRT considered the estimate provided by Palsson *et al.* (2008) as only a coarse estimate of biomass, it is clear that fishing removed a substantial fraction of the rockfish biomass during the 1977–1990 time frame. For comparison, exploitation rates for canary rockfish during the 1980s and 1990s along the U. S. Pacific Coast ranged from 5–19 percent (Stewart, 2007), bocaccio ranged from 5–31 percent (MacCall, 2008), and yelloweye rockfish ranged from less than 5 percent to about 17 percent (Wallace, 2007). In each of these cases, these high exploitation rates were followed by dramatic declines in population size (Sewart, 2007; Wallace, 2007; MacCall, 2008). Given the life history of rockfish and the level of harvest in Puget Sound, the BRT concurred with WDFW (Palsson *et al.*, 2008) and identified overutilization for commercial and recreational purposes as the most severe threat to petitioned rockfish in the Georgia Basin.

Fishery removals can affect both the absolute abundance of rockfish as well as the relative abundance of larger fish. Palsson *et al.* (2008) examined studies comparing rockfish populations in marine reserves in Puget Sound to populations outside reserves, and related this information to long-term trends in rockfish catch data, to draw conclusions about the effects of fishing on Puget Sound rockfish. They noted that rockfish in marine reserves in Puget Sound generally are at higher densities than rockfish outside reserves. They considered this information in the context of steep declines in the catch of rockfish after the early 1980s to conclude that the current low abundance of rockfish in Puget Sound is likely the result of overfishing. They further noted that rockfish in marine reserves in Puget Sound are larger than rockfish outside the reserves. Coupled with information that the size of rockfish in Puget Sound has declined in recent decades, they concluded that fishing has also likely altered the age structure of rockfish populations by removing larger older individuals.

Age truncation (the removal of older fish) can occur at even moderate levels of fishing for rockfish (Berkeley *et al.*, 2004b). Age truncation has been widely demonstrated for Sebastes populations all along the west coast (Mason, 1998; Harvey *et al.*, 2006), even for species not currently categorized as overfished by the Pacific Fishery Management Council. It can have ''catastrophic'' effects for long-lived species such as rockfish (Longhurst, 2002). For Puget Sound rockfish, it is likely that the age truncation effects of past overfishing are long-lasting and may constitute an ongoing threat, particularly because older, larger, older females are likely to be more fecund.

In addition, fishing can have dramatic impacts on the size or age structure of the population, with effects that can influence ongoing productivity. Notably, declines in size and age of females can significantly impact reproductive success. Below, we outline the evidence for maternal effects on reproductive success and discuss the possibility that such effects occur in the petitioned species.

Because most rockfish females release larvae on only one day each year (with a few exceptions in southern populations), the timing of parturition can be crucial in terms of matching favorable oceanographic conditions for larvae. Larger or older females release larvae earlier in the season compared to smaller or younger females in black, blue, yellowtail, kelp, and darkblotched rockfish (Sogard *et al.*, 2008; Nichol and Pikitch, 1994). Maternal effects on larval quality have been documented for black, blue, gopher, and yellowtail rockfish (Berkeley *et al.*, 2004; Sogard *et al.*, 2008). The mechanism for maternal effects on larval quality across species is the size of the oil globule provided to larvae at parturition, which provides the developing larva with energy insurance against the risks of starvation (Berkeley *et al.*, 2004; Fisher *et al.*, 2007), and in black rockfish enhances early growth rates (Berkeley *et al.*, 2004). An additional maternal effect in black rockfish indicates that older females are more successful in producing progeny that recruit from primary oocyte to fully developed larva (Bobko and Berkeley, 2004).

In a broad span of species, there is evidence that age or size truncation is associated with increased variability in recruitment (e.g., Icelandic cod (Marteinsdottir and Thorarinsson, 1998), striped bass (Secor, 2000), Baltic cod (Wieland *et al.*, 2000), and a broad suite of California Current species (Hsieh *et al.*, 2006)). For long-lived species, reproduction over a span of many years is considered a bet-hedging strategy that has a buffering effect at the population level, increasing the likelihood of some successful reproduction over a period of variable environmental conditions (Longhurst, 2002). When reproductive effort is limited to younger ages, this buffering capacity is lost and populations more closely follow short-term fluctuations in the environment (Hsieh, 2006).

In summary, it is likely that past overfishing has reduced the abundance of the petitioned DPSs, leading to the current low abundance levels that place their future viability at risk. In addition, it is likely that past overfishing has reduced the proportion of large females in the petitioned DPSs, harming the productivity of the populations and affecting their ability to recover from current low levels of abundance. Ongoing fisheries also create risks for the petitioned DPSs, and are discussed below under The Inadequacy of Existing Regulatory Mechanisms.

Disease or Predation

The BRT identified predation as a threat to the five DPSs of rockfishes. Rockfish are important prey items of lingcod (Beaudreau and Essington, 2007). Populations of lingcod have been low in Puget Sound, but are increasing in recent years (Palsson *et al.*, 2008). Ruckelshaus *et al.* (in press) examined the potential effect of predation by lingcod on rockfish recovery. Their models indicate that even very small increases in predation mortality within marine protected areas (i.e., 1.2 percent) are sufficient to negate the benefit of zero fishing pressure that occurs within the protected areas.

Predation by pinnipeds may be locally significant. Four pinniped species are found in the waters of the State of Washington: harbor seals, California sea lions, Steller sea lions, and northern elephant seals. Harbor seal populations have increased from in the 100s during the 1970s to more than 10,000 at present (Jeffries *et al.*, 2003). The harbor seal is the only pinniped species that breeds in Washington waters, and is the only pinniped with known haul-out sites in the San Juan Islands (Jeffries *et al.*, 2000). Harbor seals are considered a threat to local fisheries in many areas (Bjorge *et al.*, 2002; Olesiuk *et al.*, 1990), and in Washington, Oregon, and California, consumption of rockfishes by California sea lions and harbor seals is estimated to be almost half of what is harvested in commercial fisheries (NMFS 1997). In Puget Sound, harbor seals are considered opportunistic feeders that consume seasonally and locally abundant prey (London *et al.*, 2001; Olesiuk *et al.*, 1990).

About 2,000 Steller sea lions occur seasonally in Washington waters, with dozens found in Puget Sound, particularly in the San Juan Islands (Palsson *et al.*, 2008). About 8 percent of the Steller sea lion diet is rockfish (Lance and Jeffries, 2007). Though not abundant, their large size and aggregated distribution suggest that their local impact on rockfish could be significant.

Fifteen species of marine birds breed along the Washington coast; seven of these have historically been found breeding in the San Juan Islands/Puget Sound area (Speich and Wahl, 1989). The predominant breeding marine birds in the San Juan Islands are pigeon guillemots, double-crested cormorants, pelagic cormorants, and members of the western gull/glaucous-winged gull complex (Speich and Wahl, 1989). The first three species are locally abundant. Although these avian predators can consume juvenile rockfish, whether they have a significant impact on rockfish populations is unknown.

Rockfish are susceptible to diseases and parasites (Love *et al.*, 2002), but disease and parasite impacts on the petitioned species are not known. Palsson *et al.* (2008) suggest that stress associated with poor water quality may exacerbate the incidence and severity of naturally occurring diseases to the point of directly or indirectly decreasing survivorship of the petitioned species.

The Inadequacy of Existing Regulatory Mechanisms

Sport and Commercial Fishing Regulations

Significant efforts to protect rockfish in Puget Sound from overharvest began in 1982 when the Washington Department of Fisheries (now the WDFW) published the Puget Sound Groundfish Management Plan. This plan identified rockfish as an important commercial and recreational resource in the Sound and established acceptable biological catch levels to control harvest (Palsson *et al.*, 2008). The acceptable biological catch levels were based on recent average catches and initially set at 304,360 kg (671,000 total pounds) of rockfish for Puget Sound. This plan emphasized recreational fisheries for rockfish while limiting the degree of commercial fishing. During the 1980s, WDFW continued to collect information on rockfish harvest with an emphasis on increasing the amount of information available on rockfish bycatch in non-targeted fisheries (e.g., salmon fishery). In 1983, rockfish recreational harvest limits were reduced from 15 fish to 10 fish in North Puget Sound and to 5 fish in South Puget Sound. The 1982 Groundfish Management Plan was updated in 1986 and extended the preference for recreational fisheries over commercial fishing for rockfish to the San Juan Islands and the Strait of Juan de Fuca (Palsson *et al.*, 2008). During this same time, WDFW received a Federal grant to monitor recreational catches of rockfish and collect biological data on rockfish populations in the Sound. Information was collected, and new management scenarios for rockfish were developed but never implemented.

In 1991, WDFW adopted a significant change in strategy for rockfish management in Puget Sound. The strategy, called ''passive management,'' ended all monitoring of commercial fisheries for groundfish and collection of biological data (Palsson *et al.*, 2008). The switch in strategy was at least partially due to the closing by the State legislature of commercial fishing in Puget Sound south of Foulweather Bluff. The termination of monitoring created a data gap in rockfish biological data for the 1990s. In 1994, the recreational daily bag limit for rockfish was reduced to 5 fish in North Puget Sound and 3 fish in South Puget Sound. In addition, WDFW adopted regulations to close remaining trawl fisheries in Admiralty Inlet.

In 1996, the Washington State Fish and Wildlife Commission established a new policy for Puget Sound Groundfish management. The policy stated that the commission would manage Puget Sound groundfish, especially Pacific cod, in a conservative manner in order to minimize the risk of overharvest and to ensure the long-term health of the resource. During the next two years, WDFW developed a groundfish management plan (Palsson *et al.*, 1998) that identified specific goals and objectives to achieve the commission's precautionary approach (Palsson *et al.*, 2008). The plan also called for the development of species-specific (including many rockfishes) conservation and use plans. To date, plans for the various species of rockfishes have not been developed. In 2000, WDFW established a one rockfish daily bag limit for all of Puget Sound, and in 2002 and 2003, prohibited the retention of canary and yelloweye rockfishes. In 2004, WDFW promulgated additional protective regulations limiting harvest of rockfish to the open salmon and lingcod seasons, prohibiting spearfishing for rockfish east of Sekiu, and only allowing the retention of the first rockfish captured. Monitoring of recreational fisheries has also increased, with estimates of total rockfish catches by boat-based anglers now available.

Bycatch and subsequent discarding of rockfish is currently thought to be quite high in the recreational fishery (Palsson *et al.*, 2008). WDFW reported bycatch rates of greater than 20 percent (20 percent of rockfish caught are released) prior to the 1980s, but in recent years bycatch rates are in excess of 50 percent. The recent increase is ostensibly the outcome of the reduction in the allowable daily catch of rockfish (Palsson *et al.*, 2008). Palsson *et al.* (2008) reports that for every rockfish landed in Puget Sound, 1.5 are released.

WDFW records (as summarized in Palsson *et al.*, 2008) show that between 2004 and 2007, an average of 23 kg/yr (50 pounds) of canary rockfish were harvested and 160 kg/yr (353 pounds) were released in North Puget Sound, while an average of 82 kg/yr (181 pounds) were harvested and 151 kg/yr (333 pounds) were released in South Puget Sound. An average of 6 kg/yr (13 pounds) of yelloweye rockfish were harvest and 189 kg/yr (417 pounds) were released in North Puget Sound while no yelloweye rockfish were harvest and an average of 14 kg/yr (30 pounds) were released in South Puget Sound. These data show that despite the ban on retention of canary and yelloweye rockfish, a small number of fish were harvested in years following the ban. Although the reported harvest levels may appear low, canary and yelloweye rockfish are currently at low abundance and removal of individuals, particularly large females, may limit recovery. Although no data is presented for bocaccio, this species is present at such low abundance that removal of any individuals would be detrimental to recovery. As discussed earlier, most released rockfish will also die.

The current fishery regulations may inadequately protect bocaccio, canary, and yelloweye rockfish. Fishers targeting other species of rockfish or other types of popular fishes such as salmon and lingcod are likely to hook the occasional bocaccio, canary, or yelloweye rockfish. This is because all of the aforementioned fishes' distributions overlap within the Georgia Basin. They also consume similar or identical prey items, making them vulnerable to fishing lures or baits imitating these prey items. The continued decline in these three petitioned species is further evidence that the current fishery regulations are inadequate.

Almost no greenstriped or redstripe rockfish were reported as harvested or released from North or South Puget Sound during the period from 2004 to 2007. These fishes are not popular among recreational fishers and inhabit water deeper than is typically fished with currently available recreational fishing gear. Although it is likely the occasional greenstriped and redstripe rockfish are discarded during recreational fisheries and not reported, current recreational fishery regulations appear adequate to protect these species.

During each year from 2004 to 2007, a large number of rockfish harvested or released were recorded as unidentified. Although the canary, yelloweye, greenstriped, and redstripe rockfish are among the more easily identified rockfishes, it is likely that some additional harvested or released fish from these species are recorded in the unidentified category. The same situation likely exists for bocaccio, and some fish may be harvested or released without being recorded. Information about shore-based catches, and bycatch of rockfish in salmon fisheries, is still not available and these may be significant sources of mortality for the petitioned species. Rockfish discard levels vary among fisheries targeting different species about 60 percent in the bottomfish fishery, 76 percent in the salmon fishery, and nearly 50 percent in other fisheries (Palsson *et al.* 2008). Commerical catch data do not include information on bycatch, and there is a lack of an effective program to make direct observations of bycatch aboard fishing vessels operating in Puget Sound. Given the very high mortality rate of discarded rockfish (Parker *et al.*, 2006), and the low resiliency of rockfish populations to exploitation, the BRT concluded that current levels of bycatch are an important threat to the petitioned species.

Tribal Fishing

Several species of rockfish have been historically harvested by Native Americans. Since 1991, rockfishes harvested by tribal fishers have represented less than 2 percent of total Puget Sound rockfish harvest (Palsson *et al.*, 2008). Information from the Northwest Indian Fisheries Commission indicates that total reported rockfish catches by member tribes from 2000 to 2005 range between 10.9 and 368 kg (24 and 811 pounds). Tribal regulations in Puget Sound vary by tribe from a ban on commercial harvest of rockfish to a 15–fish bag limit for personal use. The currently low rockfish abundance in this area has significantly decreased the interest in harvest of rockfish by tribal fishers (William Beattie, Northwest Indian Fisheries Commission, personal communication).

Other Natural or Manmade Factors Affecting Its Continued Existence

Rockfishes are known to compete interspecifically for resources (Larson, 1980). Harvey *et al.*, (2006) documented the decline of bocaccio in the California Current, and used bioenergetic models to suggest that recovery of coastal populations of bocaccio may be inhibited by other more common rockfishes. In Puget Sound, more abundant species such as copper rockfish and quillback rockfish may interact with juvenile bocaccio, canary rockfish, or yelloweye rockfish and limit the ability of these petitioned species to recover from perturbations. However, evidence documenting competition in Puget Sound is generally lacking and most species abundances are declining, which implies that competition is currently less significant.

Chinook and coho salmon consume larval and juvenile rockfish, and they also compete for prey with small size classes of rockfish (Buckley, 1997). Thus, large releases of hatchery salmon have the potential to influence the population dynamics of the petitioned species. Total hatchery releases in Puget Sound have mirrored those in the California Current region (Naish *et al.*, 2007), with about 2 million fish released in the early 1970s, reaching a peak of over 8 million in the early 1990s. Current annual releases are around 4 million (Palsson *et al.*, 2008). Although releases of hatchery salmon have the potential to affect the petitioned rockfishes, considerable uncertainty remains about how detrimental the effect may be.

Rockfish are unintentionally captured as part of fishing activities targeting other species (e.g., the lingcod fishery and the setnet fishery for spiny dogfish (Squalus acanthias), particularly in South Puget Sound (Drake *et al.*, 2008)). Although fishers may return rockfish to the water, the mortality rate of these fish is extremely high (Parker *et al.*, 2006). Although there are some methods available that could lower the mortality rates of discarded rockfish (summarized by Palsson *et al.*, 2008), application of these methods in the Puget Sound fishery would be difficult (Palsson *et al.*, 2008). WDFW considers bycatch of rockfish to be a ''high impact stressor'' on rockfish populations (Palsson *et al.*, 2008).

Palsson *et al.* (2008) report that more than 3,600 pieces of abandoned fishing gear (especially gillnets) have been located in Puget Sound. About 35 percent of this derelict gear has been removed. Derelict nets continue fishing and are known to kill rockfish (Palsson *et al.*, 2008). While the total impact of this abandoned gear has not been fully evaluated, WDFW has concluded that derelict gear is likely to moderately affect local populations of rockfish (Palsson *et al.*, 2008).

Patterns of circulation and productivity in Puget Sound are fundamentally influenced by climate conditions. Changes in the timing of freshwater input affect stratification and mixing in the Sound, while changes in wind pattern influence the amount of biologically important upwelled water that enters the Strait of Juan de Fuca from the coast (Snover *et al.*, 2005). Direct studies on the effect of climate variability on rockfish are rare, but all the studies performed to date suggest that climate plays an extremely important role in population dynamics. The negative effect of the warm water conditions associated with El Niño appear to be common across rockfishes (Moser *et al.*, 2000). Field and Ralston (2005) noted that recruitment of all species of rockfish appeared to be correlated at large scales and hypothesized that such synchrony was the result of large-scale climate forcing. Exactly how climate influences the petitioned species in Puget Sound is unknown; however, given the general importance of climate to Puget Sound and to rockfish, it is likely that climate influences the dynamics of the petitioned species. Any future changes in climate patterns could affect the ability of rockfishes in Puget Sound to recover.

Efforts Being Made to Protect Rockfish in Puget Sound and the Georgia Basin

Section 4(b)(1)(A) of the ESA requires the Secretary of Commerce to take into account efforts being made to protect a species that has been petitioned for listing. Accordingly, we will assess conservation measures being taken to protect these five rockfish DPSs to determine whether they ameliorate the species' extinction risks (50 CFR 424.11(f)). In judging the efficacy of conservation efforts that have not yet been implemented, or have been implemented but have not yet demonstrated their effectiveness, we consider the following: the substantive, protective, and conservation elements of such efforts; the degree of certainty that such efforts will reliably be implemented; the degree of certainty that such efforts will be effective in furthering the conservation of the species (68 FR 15100; March 28, 2003); and the presence of monitoring provisions that track the effectiveness of recovery efforts, and that inform iterative refinements to management as information is accrued.

Habitat Protection

In the Puget Sound ecosystem, several Federal laws protect marine habitat as well as the watersheds that flow into the Sound. Federal programs carried out under the Clean Water Act (CWA) help ensure that water quality is maintained or improved and that discharge of fill material into rivers and streams is regulated. Several sections of this law, such as section 404 (discharge of fill into wetlands), section 402 (discharge of pollutants into water bodies), and section 404(d) (designation of water quality limited streams and rivers), regulate activities that might degrade waters flowing into Puget Sound. In addition, the Puget Sound region contains hundreds of CWA 303(d) designated waters, where high levels of pollutants, such as Polychlorinated biphenyls (PCBs), have already been documented. Although programs carried out under the CWA are well funded and enforcement of this law occurs, it is generally accepted that Puget Sound has ongoing water quality problems, particularly due to storm water runoff, that are not currently adequately mitigated by this law. This is evidenced by recent low oxygen events in Puget Sound that killed large numbers of rockfish (Drake *et al.*, 2008).

The Coastal Zone Management Act and Coastal Zone Act Reauthorization Amendments of 1990 encourage states and tribes to preserve, protect, develop, and where possible, restore or enhance valuable natural coastal resources such as wetlands, floodplains, estuaries, beaches, dunes, barrier islands, and coral reefs, as well as the fish and wildlife using those habitats. Despite these provisions, the status of rockfishes and other species continues to decline.

In Puget Sound and elsewhere along the west coast, governments and non-governmental organizations are working to restore depressed salmon stocks. Rockfish in Puget Sound benefit from these efforts indirectly, primarily through improved water quality in streams that flow into Puget Sound. As part of these efforts, the State of Washington established the Puget Sound Partnership in 2007, a new agency consisting of an executive director, an ecosystem coordination board, and a Puget Sound science panel. The Partnership was created to oversee the restoration of the environmental health of Puget Sound by 2020, and was directed to create a long-term plan called the 2020 Action Agenda released in December 2008. The Partnership met this deadline, but does not presently have a track record to support a conclusion that the control or reduction of pollutants into Puget Sound is reasonably foreseeable. Therefore, it is not possible to draw conclusions about Partnership efforts and how they may reduce pollution and contamination or other threats to rockfish populations.

There are also local efforts underway to identify and protect important habitats in Puget Sound. In 2004, the San Juan County Board of Commissioners designated the entire marine waters of the county as a Marine Stewardship Area. Under the Marine Stewardship Area designation, the county is working with other government agencies and using public input from Indian Tribes, county residents, non-resident landowners, visitors, and others with an interest in the county's marine ecosystems to closely examine adopted goals, develop specific objectives, and determine what additional protections are necessary to achieve those objectives. The results of this work will be the designation of specific locations within the marine stewardship area where different levels of voluntary or regulatory protection could be established in a coordinated effort by marine site managers in the County waters to meet the goals. It is unclear what impact these actions may have.

In Canada, the Georgia Basin Action Plan is a multi-partnered initiative describing its mission as working to improve sustainability in the Georgia Basin. This group conducts physical and biological monitoring throughout the basin and funds collaborative restoration and enhancement projects. This group's progress reports indicate that most projects that would benefit rockfishes focus on improving water quality. These projects are expected to benefit rockfishes by reducing the level of contaminants, but given the current water quality problems throughout the basin, it is likely to take many years to make significant progress.

After 2000, WDFW began to expand the role of marine reserves in rockfish management (Palsson *et al.*, 2008). Fourteen of these marine reserves in

Puget Sound are occupied by rockfish (Palsson *et al.*, 2008). Reserves include conservation areas where all non-tribal harvest of rockfish is prohibited, and marine preserve areas where bottom fish and shellfish harvest is prohibited, but salmon fishing is allowed during open seasons. Analysis by WDFW indicates that marine reserves may help restore abundance of rockfish species, but it is unclear how rockfish assemblages and their predators and prey are affected by the establishment of these reserves (Palsson *et al.*, 2008).

Fisheries and Oceans Canada has developed an extensive network of rockfish conservation areas off the coast of British Columbia (Fisheries and Oceans Canada, 2007). Many of these conservation areas fall within the range of the bocaccio, yelloweye rockfish, and canary rockfish Georgia Basin DPSs. None of them are located within the range of the greenstriped and redstripe rockfish Puget Sound Proper DPSs. Within the Canadian conservation areas, recreational fishing is limited to harvesting invertebrates by hand picking or SCUBA, harvesting crab by trap, harvesting shrimp and prawn by trap, and capturing smelt by gillnet. These restrictions reduce rockfish mortality by eliminating directed harvest of rockfish and restricting fishing methods that may have significant rockfish bycatch. For commercial fisheries, invertebrates can be taken by hand picking or SCUBA; crabs by trap; prawns by trap; scallops by trawl; salmon by seine or gillnet; herring by gillnet, seine, and spawn-on-kelp; sardine by gillnet, seine, and trap; smelt by gillnet; euphausiid (krill) by mid-water trawl; opal squid by seine; and groundfish by mid-water trawl. For commercial groundfish fishing, methods that may result in rockfish bycatch are still permissible. Thus, these actions may still harm rockfish populations, and populations continue to decline.

Proposed Determinations

Section 4(b)(1) of the ESA requires that the listing determination be based solely on the best scientific and commercial data available, after conducting a review of the status of the species and after taking into account those efforts, if any, being made by any state or foreign nation to protect and conserve the species. We have reviewed the best scientific and commercial information available including the petition, the reports of the BRT (Drake *et al.*, 2008), co-manager comments, and other available published and unpublished information, and we have consulted with species experts and other individuals familiar with the rockfishes.

For the reasons stated above, and as summarized below, we conclude: (1) bocaccio, canary rockfish, and yelloweye rockfish inhabiting the Georgia Basin meet the discreteness and significance criteria for DPSs; (2) redstripe and greenstriped rockfish inhabiting Puget Sound Proper meet the discreteness and significance criteria for DPSs; (3) Georgia Basin bocaccio are in danger of extinction throughout their range; (4) Georgia Basin canary rockfish and yelloweye rockfish are likely to become endangered throughout their ranges in the foreseeable future; and redstripe and greenstriped rockfish in Puget Sound Proper are not likely to become endangered throughout all or a significant portion of their ranges in the foreseeable future.

Bocaccio occurring in the Georgia Basin are discrete from other members of their species based on the following: (1) Information from other rockfish species shows genetic differences between rockfish inhabiting coastal waters and inland marine waters of the Pacific Northwest; (2) differences in bocaccio age structure between coastal and inland stocks support the conclusion that these populations are isolated; (3) unlike coastal bocaccio, which are most frequently found in association with rocks and boulder fields, bocaccio in the Georgia Basin have been frequently found in areas with sand and mud substrate. Yelloweye rockfish occurring in the Georgia Basin are discrete from other members of their species based on the following: (1) Information from yelloweye studies and studies of other rockfish species shows genetic differences between rockfish inhabiting coastal waters and inland marine waters of the Pacific Northwest; (2) although yelloweye rockfish have the potential to move large distances as adults, they generally remain sedentary as adults, limiting gene flow between coastal and inland populations; (3) lack of suitable habitat for yelloweye rockfish in Puget Sound Proper indicates that a larger geographic area including the Georgia Basin would be needed to support a viable DPS of this species. Canary rockfish occurring in the Georgia Basin are discrete from other members of their species based on the following: (1) Information from other rockfish species shows genetic differences between rockfish inhabiting coastal waters and inland marine waters of the Pacific Northwest; (2) canary rockfish were historically abundant in South Puget Sound and their movement potential as adults would allow some interactions with fish in North Puget Sound, but bathymetry and current patterns most likely limit interactions with coastal populations. These DPSs meet the significance criteria because they occupy the unique ecological setting of the Georgia Basin. The current patterns of the inland marine waters, interactions between fresh and saltwater, the protection afforded by the land features of the Olympic Peninsula and Vancouver Island, and sill-dominated bathymetry make the Georgia Basin different from other coastal areas occupied by these species and likely lead to unique adaptations in these species.

We conclude that greenstriped and redstripe rockfish occupying Puget Sound Proper (inland waters south of Admiralty Inlet) meet the discreteness and significance criteria for DPSs. Members of these species occurring in this area are discrete from other members of their species based on the following: (1) Information from other rockfish species shows genetic differences between rockfish inhabiting coastal waters and inland marine waters of the Pacific Northwest (e.g., Puget Sound, Georgia Basin, etc.) and additional genetic differences between some rockfish species occupying Puget Sound Proper and those occupying the rest of the Georgia Basin; (2) suitable mud/sand habitat for these two species is abundant in Puget Sound Proper but less common in the Strait of Juan de Fuca and North Puget Sound; (3) there is a large geographic break between greenstriped rockfish populations occupying Puget Sound Proper and those occupying the Strait of Juan de Fuca; (4) greenstriped and redstripe rockfish tend to occupy deeper habitat (Love *et al.*, 2002) than the other petitioned species and they very rarely travel over the shallow sills of Puget Sound Proper, likely limiting interactions between populations in Puget Sound Proper and the rest of the Georgia Basin. These discrete population segments meet the significance criteria because they occupy a unique ecological setting. The current patterns, interactions between fresh and saltwater, sill-dominated bathymetry, and abundance of mud/sand habitat make Puget Sound Proper different from other areas in the Georgia Basin and coastal waters occupied by these species.

On the basis of the best available scientific and commercial information, we have determined that the Georgia Basin DPS of bocaccio is currently in danger of extinction throughout all of its range. Factors supporting this conclusion include: (1) reduced abundance, to the point where it is almost undetectable; (2) infrequent recruitment events dependent on rare weather and ocean conditions; (3) high susceptibility to overfishing; (4) high mortality rate (resulting in further reduction of population productivity and abundance) associated with incidental capture in fisheries (due to the inability of its swim bladder to accommodate the rapid change in pressure when brought to the surface), despite improvements (summarized in the previous sections) in current commercial, recreational, and tribal fishing regulations; and (5) exposure to continuing water quality problems within the range of the Georgia Basin. Therefore, we propose to list the Georgia Basin DPS of bocaccio as endangered.

We have determined that the Georgia Basin DPSs of canary and yelloweye rockfish are not presently in danger of extinction, but are likely to become so in the foreseeable future throughout all of their range. Factors supporting a conclusion that these DPSs are not presently in danger of extinction include: (1) These DPS's abundances have been greatly reduced from historic levels, but fish are still present in significant enough numbers to be caught in recreational fisheries and research trawls; (2) large female members of these species are highly fecund, and, if allowed to survive and reproduce successfully, can produce large numbers of offspring; and (3) WDFW has prohibited retention of these species. Factors supporting a conclusion that these DPSs are likely to become in danger of extinction in the foreseeable future include: (1) These DPS's abundances have greatly decreased from historic levels and abundance trends are negative; (2) individuals of these species appear to be absent in areas where they were formerly abundant (i.e., canary rockfish in South Puget Sound); (3) although these species were formerly abundant in the catch, they are less frequent now; (4) although current commercial, recreational, and tribal fishing regulations have been changed to offer more protection to these DPSs, these species are still vulnerable to being hooked in salmon and lingcod fisheries in the Georgia Basin and almost always die after release, further reducing population productivity and abundance; and (5) current protective measures for habitat in the Georgia Basin are insufficient to ameliorate the threats to these species as evidenced by continuing water quality problems in this area. We propose to list the Georgia Basin DPSs of yelloweye and canary rockfish as threatened.

We conclude that the Puget Sound Proper DPSs of greenstriped and redstripe rockfishes are not presently in danger of extinction, nor are they likely to become so in the foreseeable future throughout all or a significant portion of their ranges. Factors supporting this conclusion include: (1) Abundances for these DPSs are lower than historical levels, but seem to have been constant over recent years; (2) these species have patchy but wide distributions, indicating that connectivity remains high; (3) redstripe rockfish are very abundant in some areas within Puget Sound Proper; (4) these species are generally not targeted by recreational fishers; (5) exposure to continuing water quality problems within the range of the Georgia Basin; and (6) these species are habitat generalists and are not reliant on the rock habitats that are rare in Puget Sound Proper. Therefore, we conclude that listing the Puget Sound Proper greenstriped and redstripe rockfish DPSs as threatened or endangered under the ESA is not warranted at this time.

Take Prohibitions and Protective Regulations

Section 9 of the ESA prohibits certain activities that directly or indirectly affect endangered species. These section 9(a) prohibitions apply to all individuals, organizations, and agencies subject to U.S. jurisdiction. In the case of threatened species, ESA section 4(d) requires the Secretary to issue regulations he deems necessary and appropriate for the conservation of the species. We have flexibility under section 4(d) to tailor protective regulations based on the needs of and threats to the species. The section 4(d) protective regulations may prohibit, with respect to threatened species, some or all of the acts which section 9(a) of the ESA prohibits with respect to endangered species. We will evaluate protective regulations pursuant to section 4(d) for the threatened rockfish DPSs and propose any considered necessary and advisable for conservation of these species in a future rulemaking. In order to inform our consideration of appropriate protective regulations for these DPSs, we seek information from the public on the threats to yelloweye and canary rockfish in the Georgia Basin and possible measures for their conservation.

Other Protections

Section 7(a)(2) of the ESA and NMFS/U.S. Fish and Wildlife Service (FWS) regulations require Federal agencies to confer with us on actions likely to jeopardize the continued existence of species proposed for listing or result in the destruction or adverse modification of proposed critical habitat. If a proposed species is ultimately listed, Federal agencies must consult on any action they authorize, fund, or carry out if those actions may affect the listed species or its critical habitat. Examples of Federal actions that may affect the proposed rockfish DPSs include: point and non-point source discharge of persistent contaminants, contaminated waste disposal, dredging in marine waters, development of water quality standards, fishery management practices, and transportation management.

Peer Review

In December 2004, the Office of Management and Budget (OMB) issued a Final Information Quality Bulletin for Peer Review establishing minimum peer review standards, a transparent process for public disclosure of peer review planning, and opportunities for public participation. The OMB Bulletin, implemented under the Information Quality Act (Public Law 106–554), is intended to enhance the quality and credibility of the Federal Government's scientific information, and applies to influential or highly influential scientific information disseminated on or after June 16, 2005. To satisfy our requirements under the OMB Bulletin, we are obtaining independent peer review of the draft status report, which supports this proposal to list three DPSs of rockfish in Puget Sound and Georgia Basin as threatened or endangered; all peer reviewer comments will be addressed prior to dissemination of the final report and publication of the final rule.

Critical Habitat

Critical habitat is defined in section 3 of the ESA as: ''(i) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of this Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) which may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of this Act, upon a determination by the Secretary that such areas are essential for the conservation of the species'' (16 U.S.C. 1532(5)(A)). ''Conservation'' means the use of all methods and procedures needed to bring the species to the point at which listing under the ESA is no longer necessary (16 U.S.C. 1532(3)).

Section 4(a)(3)(A) of the ESA requires that, to the maximum extent prudent and determinable, critical habitat be designated concurrently with the listing of a species (16 U.S.C. 1533(a)(3)(A)(i)). Section 4(b)(2) requires that designation of critical habitat be based on the best scientific data available, after taking into consideration the economic, national security, and other relevant impacts of specifying any particular area as critical habitat (16 U.S.C. 1533(b)(2)).

Once critical habitat is designated, section 7 of the ESA requires Federal agencies to ensure that they do not fund, authorize, or carry out any actions that are likely to destroy or adversely modify that habitat. This requirement is in addition to the section 7 requirement that Federal agencies ensure that their actions do not jeopardize the continued existence of listed species.

At this time, critical habitat is not determinable for bocaccio, canary rockfish, or yelloweye rockfish. We are currently compiling information to prepare a critical habitat proposal for bocaccio, canary rockfish, and yelloweye rockfish in the Puget Sound and the Georgia Basin. Therefore, we seek public input and information to assist in gathering and analyzing the best available scientific data to support a critical habitat designation. After considering all available information, we will initiate rulemaking with the publication of a proposed designation of critical habitat in the **Federal Register**, opening a period for public comment and providing the opportunity for public hearings.

Joint NMFS/FWS regulations for listing endangered and threatened species and designating critical habitat at 50 CFR 424.12(2)(b) state that the agency ''shall consider those physical and biological features that are essential to the conservation of a given species and that may require special management considerations or protection.'' Pursuant to the regulations, such requirements include, but are not limited to the following: (1) space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing of offspring, germination, or seed dispersal; and generally; (5) habitats that are protected from disturbance or are representative of the historic geographical and ecological distributions of a species. The regulations also state that the agency shall focus on the principal biological or physical constituent elements within the specific areas considered for designation. These constituent elements may include, but are not limited to: spawning sites, feeding sites, seasonal wetland or dryland, water quality or quantity, geological formation, vegetation type, tide, and specific soil types. While we have not yet analyzed the habitat needs of these rockfish DPSs, essential features of rockfish habitat may include free passage, forage, benthic substrate, and water quality.

In accordance with the Secretarial Order on American Indian Tribal Rights, Federal-Tribal Trust Responsibilities, and the ESA, we will coordinate with federally recognized American Indian Tribes on a Government-to-Government basis to determine how to make critical habitat assessments in areas that may impact Tribal trust resources. In accordance with our regulations at 50 CFR 424.13, we will consult as appropriate with affected states, interested persons and organizations, other affected Federal agencies, and, in cooperation with the Secretary of State, with the country or countries in which the species concerned are normally found or whose citizens harvest such species from the high seas.

Public Comments Solicited

To ensure that the final action resulting from this proposal will be as accurate and effective as possible, we solicit comments and suggestions from the public, other governmental agencies, the Government of Canada, the scientific community, industry, environmental groups, and any other interested parties. Comments are encouraged on this proposal (See **DATES** and **ADDRESSES**). Specifically, we are interested in information regarding: (1) population structure of bocaccio, yelloweye rockfish, and canary rockfish; (2) biological or other relevant data concerning any threats to the rockfish DPSs we propose for listing; (3) the range, distribution, and abundance of these rockfish DPSs; (4) current or planned activities within the range of the rockfish DPSs we propose for listing and their possible impact on these DPSs; and (5) efforts being made to protect rockfish DPSs we propose to list.

Critical Habitat

We also request quantitative evaluations describing the quality and extent of marine habitats for the proposed rockfish DPSs as well as information on areas that may qualify as critical habitat for the proposed DPSs. Specific areas that include the physical and biological features essential to the conservation of the DPSs, where such features may require special management considerations or protection, should be identified. We are requesting information about these areas, particularly information indicating whether these unoccupied areas may be essential to conservation of these species. Although the range of these DPSs extends into Canada, ESA implementing regulations at 50 CFR 424.12(h) specify that critical habitat shall not be designated within foreign countries or in other areas outside of U.S. jurisdiction. Therefore, we request information only on potential areas of critical habitat within the United States or waters within U.S. jurisdiction.

Section 4(b)(2) of the ESA requires the Secretary to consider the ''economic impact, impact on national security, and any other relevant impact'' of designating a particular area as critical habitat. Section 4(b)(2) authorizes, but does not require, the Secretary to exclude from a critical habitat designation those particular areas where the Secretary finds that the benefits of exclusion outweigh the benefits of designation, unless excluding that area will result in extinction of the species. We seek information regarding the conservation benefits of designating areas in Puget Sound as critical habitat for the rockfish DPSs we propose to list under the ESA. We also seek information on the economic benefit of excluding areas from the critical habitat designation, and the economic benefits of including an area as part of the critical habitat designation. In keeping with the guidance provided by the OMB (2000; 2003), we seek information that would allow us to monetize these effects to the extent possible, as well as information on qualitative impacts to economic values. We also seek information on impacts to national security and any other relevant impacts of designating critical habitat in these areas.

Data reviewed may include, but are not limited to: (1) scientific or commercial publications, (2) administrative reports, maps or other graphic materials, information received from experts, and (3) comments from interested parties. Comments and data particularly are sought concerning: (1) maps and specific information describing the amount, distribution, and use type (e.g., spawning, rearing, or migration) of habitat areas for the proposed rockfish DPSs, including information on whether such areas are currently occupied; (2) information regarding the benefits of designating particular areas as critical habitat; (3) information regarding the benefits of excluding particular areas from critical habitat designation (4) current or planned activities in the areas that might be proposed for designation and their possible impacts; (5) any foreseeable economic, national security, or other potential impacts resulting from designation, in particular, any impacts on small entities; (6) whether specific unoccupied areas (e.g., areas where bocaccio, yelloweye rockfish, or canary rockfish have been extirpated) may be essential to the conservation of these DPSs; and (7) potential peer reviewers for a proposed critical habitat designation, including persons with biological and economic expertise relevant to the species, region, and designation of critical habitat. We seek information regarding critical habitat for these three Georgia Basin rockfishes as soon as possible, but by no later than June 22, 2009.

Public Hearings

If requested by the public by June 8, 2009, hearings will be held within the range of the proposed Georgia Basin rockfishes. If hearings are requested, details regarding location(s), date(s), and time(s) will be published in a forthcoming **Federal Register** notice.

References

A complete list of all references cited herein is available upon request (see **ADDRESSES** section).

Classification

National Environmental Policy Act

The 1982 amendments to the ESA, in section 4(b)(1)(A), restrict the information that may be considered when assessing species for listing. Based on this limitation of criteria for a listing decision and the opinion in Pacific Legal Foundation v. Andrus, 675 F. 2d 825 (6th Cir. 1981), we have concluded that ESA listing actions are not subject to the environmental assessment requirements of the National Environmental Policy Act (See NOAA Administrative Order 216–6).

Executive Order 12866, Regulatory Flexibility Act, and Paperwork Reduction Act

As noted in the Conference Report on the 1982 amendments to the ESA, economic impacts cannot be considered when assessing the status of a species. Therefore, the economic analysis requirements of the Regulatory Flexibility Act are not applicable to the listing process. In addition, this proposed rule is exempt from review under Executive Order 12866. This proposed rule does not contain a collection-of-information requirement for the purposes of the Paperwork Reduction Act.

Federalism

In keeping with the intent of the Administration and Congress to provide continuing and meaningful dialogue on issues of mutual State and Federal interest, this proposed rule will be given to the relevant state agencies in each state in which the species is believed to occur, and those states will be invited to comment on this proposal. We have conferred with the State of Washington in the course of assessing the status of the petitioned populations of rockfishes, and considered, among other things, Federal, state and local conservation measures. As we proceed, we intend to continue engaging in informal and formal contacts with the states, and other affected local or regional entities, giving careful consideration to all written and oral comments received.

List of Subjects

50 CFR Part 223

Endangered and threatened species, Exports, Imports, Transportation.

50 CFR Part 224

Endangered and threatened species.

Dated: April 15, 2009.

Samuel D. Rauch III,

Deputy Assistant Administrator for Regulatory Programs, National Marine Fisheries Service.

For the reasons set out in the preamble, 50 CFR parts 223 and 224 are proposed to be amended as follows:

PART 223—THREATENED MARINE AND ANADROMOUS SPECIES

1. The authority citation for part 223 continues to read as follows:

Authority: 16 U.S.C. 1531 1543; subpart B, § 223.201–202 also issued under 16 U.S.C. 1361 *et seq.*; 16 U.S.C. 5503(d) for § 223.206(d)(9) *et seq.*

2. In § 223.102 paragraph (c) is amended by adding and reserving paragraphs (c)(25) through (c)(26) and adding new paragraphs (c)(28) and (c)(29) to read as follows:

§ 223.102 Enumeration of threatened marine and anadromous species.

(c) * * *

Species[1]		Where Listed	Citation(s) for listing determination(s)	Citation(s) for critical habitat designation(s)
Common name	Scientific name			
*	*	*	*	*
(28)Georgia Basin/Puget Sound DPS – Rockfish, Yelloweye	*Sebastes ruberrimus*.	Washington, and British Columbia.	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].
(29)Georgia Basin/Puget Sound DPS – Rockfish, Canary	*Sebastes pinniger*.	Washington, and British Columbia.	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].
*	*	*	*	*

[1]Species includes taxonomic species, subspecies, distinct population segments 9DPSs) (for a policy statement; see 61 FR4722, February 7, 1996), and evolutionarily significant units (ESUs) (for a policy statement; see 56 FR 58612, November 20, 1991).

PART 224—ENDANGERED MARINE AND ANADROMOUS SPECIES

3. The authority citation for part 224 continues to read as follows:

Authority: 16 U.S.C. 1531–1543 and 16 U.S.C. 1361 *et seq.*

4. Amend the table in § 224.101, by adding an entry for ''Georgia Basin/ Puget Sound DPS – Bocaccio'' at the end of the table in § 224.101(a) to read as follows:

§ 224.101 Enumeration of endangered marine and anadromous species.

* * * * *

(a) * * *

Species[1]		Where Listed	Citation(s) for listing determination(s)	Citation(s) for critical habitat designation(s)
Common name	Scientific name			
*	*	*	* *	* *
Georgia Basin/ Puget Sound DPS–Bocaccio	*Sebastes paucispinis*.	Washington, and British Columbia.	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].	[INSERT FR CITATION & DATE WHEN PUBLISHED AS A FINAL RULE].
*	*	*	* *	* *

[1]Species includes taxonomic species, subspecies, distinct population segments 9DPSs) (for a policy statement; see 61 FR4722, February 7, 1996), and evolutionarily significant units (ESUs) (for a policy statement; see 56 FR 58612, November 20, 1991).

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