

Contaminants in Fish from the California Coast, 2009-2010

Appendix 1: Characteristics of the species sampled. Information on trophic level, feeding position, habitat, and range from Fishbase (www.fishbase.org).

Group	Species	Trophic Level	Size Sampled (mm) range (median)	Age at Size Sampled Range (calculated mean from growth curve)	Primary Prey	Feeding Position	Habitat	Range	Depth
Hound Sharks (Triakidae)	Leopard Shark (<i>Triakis semifasciata</i>)	3.7±0.5	930-1410 (1238)	16 Kusher et al. 1992	nektonic and benthic fishes, crustaceans, octopi and clams	benthic	enclosed muddy bays, estuaries and lagoons	Oregon to Baja	0-91m
	Gray Smoothhound (<i>Mustelus californicus</i>)	3.5±0.5	616-685 (630)	2 Yudin and Cailliet 1990	mostly crabs, ghost shrimp, and small fish	benthic	inshore and offshore soft bottom, entering shallow muddy bays	Northern CA to Baja	0-200m
	Brown Smoothhound (<i>Mustelus henlei</i>)	3.6±0.5	826-1144 (978)	15+ ? Yudin and Cailliet 1990	crabs, shrimp and some fishes	benthic	offshore, soft bottom	Northern CA to Baja	0-200m
Dogfish Sharks (Squalidae)	Spiny Dogfish (<i>Squalus acantias</i>)	4.3±0.7	995-1140 (1011)		fishes, crustaceans, squid and octopi	benthic/ mid-water	Near bottom in enclosed bays and estuaries, also mid-water and near surface	Bering Sea to Chile	0-1460m

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Barracudas (Sphyraenidae)	Pacific Barracuda (<i>Sphyraena argentea</i>)	4 (4.5±0.8)	450-590 (479)		small anchovies, smelt, squid, and other small, schooling fish	Mid-water	Usually near shore or near the surface; Pelagic spawners; Young enter bays	Alaska to southern Baja California; rare north of Pt. Concep. in California	0-18m
Basses (Serranidae)	Spotted Sand bass (<i>Paralabrax maculatofasciatus</i>)	4 (4.2±0.6)	195-430 (327)		small fishes and benthic crustaceans, clams	demersal	sand or mud bottom near rocks and eelgrass	Monterey, CA to Mexico	0-60m
	Kelp Bass (<i>Paralabrax clathratus</i>)	3.9±0.6	185-512 (316)	5 (Young 1963) 7 (Love et al. 1996)	Small fishes (including anchovies, sardines, surfperch), squid, octopus, crabs, shrimps, and amphipods	mid-water	in or near kelp beds, but may be associated with any structure	Washington to Baja	0-50m
	Barred Sand bass (<i>Paralabrax nebulifer</i>)	3.5±0.5	257-590 (346)	7 (Love et al. 1996)	fishes and crustaceans	demersal	sandy bottom among or near rocks	Santa Cruz, CA to Baja	0-183m

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Rockfish (Scorpaenidae)	Olive Rockfish (<i>Sebastes serranoides</i>)	3.9±0.6	208-425 (322)	4 Lea et al. 1999	fishes (particularly juvenile rockfishes), octopi, squid, copepods and crab larvae	mid-water	areas of reef or giant kelp, over hard, high relief	Northern CA to Baja (abundant SoCal to Mendocino County)	0-146m
	Yellowtail Rockfish (<i>Sebastes chrysomelas</i>)	3.5±0.5	290-350 (313)	5 Lea et al. 1999	Pelagic crustaceans, fish, krill, plankton	demersal	holes and crevices in rocky areas; Found in intertidal areas	Northern CA to Baja CA	0-37m
	Copper Rockfish (<i>Sebastes caurinus</i>)	4.1±0.7	340-522 (411)	9 Lea et al. 1999 20 Love et al. 2002	Shrimp, crab, octopi, small fish	demersal	shallow, protected bays and inlets, among rocks and kelp beds	Alaska to central Baja California	10-183m
	Vermilion Rockfish (<i>Sebastes miniatus</i>)	3.8±0.6	229-551 (437)	7 Lea et al. 1999	Shrimp, squid, octopi, fish (mainly smaller rockfish)	demersal	shallow to deep rocky reefs, less common on deep ones	BC Canada to central Baja CA	183-274m
	Rosy Rockfish (<i>Sebastes rosaceus</i>)	3.6±0.6	175-257 (215)	8 Lea et al. 1999	Squid, crustaceans, fish	demersal		Washington to central Baja CA	15-128m
	Quillback Rockfish (<i>Sebastes maliger</i>)	3.8±0.6	423-439 (431)		shrimp, crab	demersal	rocky bottoms and reefs;	Alaska to Central CA	0-274m

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							never far from cover		
	Kelp Rockfish (<i>Sebastes atrovirens</i>)	3.4±0.5	269-335 (294)		shrimp, amphipods, small fish	demersal	found on or near bottom in kelp beds or rocky areas	Central CA to Baja CA	0-46m
	Gopher Rockfish (<i>Sebastes carnatus</i>)	3.6±0.5	147-371 (281)	7 Lea et al. 1999	crabs, brittle stars, mysids	demersal	Inhabit holes or crevices in rocky areas; territorial	Northern CA to central Baja CA	0-55m
	China Rockfish (<i>Sebastes nebulosus</i>)	3.8±0.6	245-385 (332)	11 Lea et al. 1999	brittle stars, shrimp, fish, other animals on the bottom	demersal	Inshore along rocks and reefs	Alaska to Redondo Beach, CA	3-128m
	Brown Rockfish (<i>Sebastes auriculatus</i>)	4.0±0.6	205-392 (302)	5 Love and Johnson 1998	small fish, crab, shrimp, isopods, and polychaetes	demersal	hard bottom; aggregate near rocks, oil platforms, sewer pipes	Alaska to Baja	0-128m
	Black Rockfish (<i>Sebastes melanops</i>)	4.4±0.8	213-511 (380)	5 Wallace et al. 1999 (in Love et al. 2002)	juvenile rockfish, euphausiids and amphipods (upwelling), and invertebrates (non-upwelling)	mid-water	kelp beds	Alaska to SoCal	0-366m
	Black and Yellow Rockfish (<i>Sebastes chrysomelas</i>)	3.5±0.5	254-302 (270)	7 Lea et al. 1999	crustaceans, mollusks and fishes	demersal	holes and crevices in rocky areas; intertidal areas	Northern CA to central Baja CA	0-37m
	Blue Rockfish (<i>Sebastes mystinus</i>)	2.8±0.3	51-395 (293)	7-11 Miller and Geibel	tunicates, hydroids, jellyfishes, and larval and juvenile fishes	mid-water	deep rocky reefs or hard, flat substrates	Bering Sea to Baja	0-100m

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				1973 8 Love et al 2002					
	Spotted Scorpionfish (<i>Scorpaena guttata</i>)	4 (3.8±0.6)	200-322 (290)		crab, squid, octopus, fishes and shrimp	demersal	rocky areas of bays and along shore, especially in caves and crevices	Santa Cruz, CA to Baja CA	0- 183m
Macker els (Scombr idae)	Pacific Chub Mackerel (<i>Scomber japonicus</i>)	3.1±0.4	199-335 (240)	1 Hwang et al. 2008	copepods, crustaceans, euphausiids, small fishes and squids	mid- water	pelagic	Indo-Pacific	0- 300m
Croaker (Sciaeni dae)	Yellowfin Croaker (<i>Umbrina roncador</i>)	3.5±0.5	121-376 (195)		crustaceans and fishes	benthic	coastal waters and estuaries	Pt. Concep. To Gulf of CA (old records have as far north as SF)	0-45m
	White Croaker (<i>Genyonemus lineatus</i>)	3.4±0.5	164-300 (220)	7-8	polychaetes, small shrimps, crabs and mollusks	benthic	Over sandy bottoms	BC to Baja	0- 183m
	Spotfin Croaker (<i>Roncador stearnsii</i>)	3.3±0.4	138-372 (221)		marine worms, clams, crabs and small crustaceans	demersal	sandy shores and bays, mostly in shallow surf zones	Pt. Concep. to south Baja CA	0-15m
	Queenfish (<i>Seriphus politus</i>)	3.7±0.6	156-174 (165)		small shrimps, marine worms and fishes	demersal	inshore, often over sandy bottoms. Common in	Oregon to south Baja CA	1-21m

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							bays and tidal sloughs, around pilings		
	Black Croaker (<i>Cheilotrema saturnum</i>)	3.6±0.6	234-261 (242)		Crabs,shrimp	demersal	near the bottom, often in caves and crevices of exposed coasts and open bays	Northern CA to Baja CA	0-46m
Sand Flounder (Paralichthyidae)	California Halibut (<i>Paralichthys californicus</i>)	4.5±0.6	266-810 (670)	7-9	fishes and squids	demersal	sandy bottoms, also in bays and estuaries	Northern WA to Baja	0-183m
Eagle and Manta Rays (Myliobatidae)	Bat Ray (<i>Myliobatis californica</i>)	3 (3.1±0.3)	176-921 (405)		bivalves, snails, polychaetes, shrimps, and crabs	demersal	sandy and muddy bays and sloughs, also on rocky bottom and in kelp beds	Oregon to Gulf of CA	0-46m
Temperate Basses (Moronidae)	Striped Bass (<i>Morone saxatilis</i>)	4.5±0.8	460-790 (600)	6 (Moyle 2002)	Zooplankton, invertebrates, fish	demersal	estuaries, bays, and coastal areas	British Columbia to northern Baja CA	0-30m
Tilefishes (Malacanthidae)	Ocean Whitefish (<i>Caulolatilus princeps</i>)	4 (3.9±0.6)	270-286 (279)	1-3	Worms, Shrimp, Crab, Octopi, Squid, small Fish	demersal	rocky bottoms; also found on soft sand and mud bottoms.	British Columbia to Peru	10-91m
Sea	Opaleye (<i>Girella</i>)	2-3	194-230		Algae	benthic	Intertidal tide	Oregon to	2-30m

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Chubs (Kyphosidae)	<i>nigricans</i>	(2.2±0.1)	(221)		Sometimes eat Shrimp, Amphipods, Jellies		pools; near or over rocks and in kelp beds	south Baja CA	
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Greenlings (Hexagrammidae)	Lingcod (<i>Ophiodon elongatus</i>)	4.3±0.7	551-932 (682)	5-6 (Miller and Geibel 1973)	mostly fishes but also crustaceans, octopi and squid	demersal	near rocks	Alaska to Baja	0-475m
	Kelp Greenling (<i>Hexagrammos decagrammus</i>)	3.6±0.6	220-422 (360)		crustaceans, polychaete worms, brittle stars, mollusks, and small fishes	demersal	rocky inshore areas, common on kelp beds, also on sand bottoms	Alaska to SoCal	0-46m
Surfperch (Embiotocidae)	White Surfperch (<i>Phanerodon furcatus</i>)	3.4±0.5	99-345 (202)	>7(?) Eckmayer 1979	Opportunistic Crabs, Worms, Amphipods	demersal	near piers, docks, in bays and sandy areas, but usually in quiet water and offshore areas near rocks	British Columbia to northern Baja CA	0-43m
	Shiner Surfperch (<i>Cymatogaster aggregata</i>)	3.0±0.3	50-199 (110)	2 Eckmayer 1979	calanoid copepods, crustaceans, mollusks	mid-water/ demersal	eelgrass beds, piers and pilings	Alaska to Baja	0-146m
	Rainbow Surfperch (<i>Hypsurus caryi</i>)	3.3±0.5	185-342 (280)		amphipods, crabs, worms, shrimp	demersal	rocky shores, often at edges of kelp beds, occasionally over sand but not in surf	Northern CA to northern Baja CA	0-40m
	Pile Surfperch (<i>Rhacochilus vacca</i>)	3xx	280-375 (340)		hard-shelled mollusks, crabs and	demersal	Rocky shore, kelp, pilings	Alaska to Baja CA	0-46m

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					barnacles				
	Barred surfperch (<i>Amphistichus argenteus</i>)	3.5±0.6	105-363 (186)	3 Carlisle et al. 1960	sand crabs, clams and other inverts	benthic	surf of sand beaches, also near rocks, pilings and other structures	Bodega Bay, CA to Baja	0-7m
	Black perch (<i>Embiotoca jacksoni</i>)	3.2±0.5	152-316 (232)		amphipods, crabs, worms	benthic	rocky areas near kelp, sand bottoms of coastal bays and around piers and pilings	Ft Bragg, CA to Baja	0-46m
Sculpins (Cottidae)	Cabezon (<i>Scorpaenichthys marmoratus</i>)	3.6±0.5	380-575 (467)	3-4 (O'Connell 1953)	crustaceans, fish and mollusks	demersal	rocky, sandy and muddy bottoms, kelp beds	Southeastern AK to Baja	0-200m
New World Silversides (Atherinopsidae)	Topsmelt (<i>Atherinops affinis</i>)	2.8±0.3	80-377 (128)	xx	zooplankton, algae, benthic invertebrates (Lane and Hill 1975)	benthic/ mid-water	bays, muddy and rocky areas and kelp beds	Vancouver Island to Baja	0-26m
	Jacksmelt (<i>Atherinopsis californiensis</i>)	3.1±0.5	240-279 (265)	5-7	crustaceans, fish larvae	mid-water	inshore areas, including bays	Yaquina Bay, OR to Baja	0-29m

Benthic – feeding on the bottom

Demersal – feeding on or near bottom

Trophic levels are the hierarchical strata of a food web characterized by organisms that are the same number of steps removed from the primary producers. The USEPA's 1997 Mercury Study Report to Congress used the following criteria to designate trophic levels based on an organism's feeding habits:

Trophic level 1: Phytoplankton.

Trophic level 2: Zooplankton and benthic invertebrates.

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Trophic level 3: Organisms that consume zooplankton, benthic invertebrates, and TL2 organisms.

Trophic level 4: Organisms that consume trophic level 3 organisms.

Sources:

<http://hmsc.oregonstate.edu/projects/msap/PS/masterlist/index.html>

<http://www.fishbase.org>

<http://www.dfg.ca.gov/marine/>

<http://biogeodb.stri.si.edu/sfstep/>

Lee et al. 1999. Biological aspects of nearshore rockfishes