Abstract—The dusky rockfish (*Sebastes ciliatus*) of the North Pacific Ocean has been considered a single variable species with light and dark forms distributed in deep and shallow water, respectively. These forms have been subjected to two distinct fisheries separately managed by federal and state agencies: the light deep form is captured in the offshore trawl fishery; the dark shallow form, in the nearshore jig fishery. The forms have been commonly recognized as the light dusky and dark dusky rockfishes. From morphological evidence correlated with color differences in some 400 specimens, we recognize two species corresponding with these color forms. *Sebastes ciliatus* (Tilesius) is the dark shallow-water species found in depths of 5–160 m in the western Aleutian Islands and eastern Bering Sea to British Columbia. The name *Sebastes variabilis* (Pallas) is resurrected from the synonymy of *S. ciliatus* to apply to the deeper water species known from depths of 12–675 m and ranging from Hokkaido, Japan, through the Aleutian Islands and eastern Bering Sea, to Oregon. *Sebastes ciliatus* is uniformly dark blue to black, gradually lightening on the ventrum, with a jet black peritoneum, a smaller symphyseal knob, and fewer lateral-line pores compared to *S. variabilis*. *Sebastes variabilis* is more variable in body color, ranging from light yellow to a more usual tan or greenish brown to a nearly uniform dark dorsum, but it invariably has a distinct red to white ventrum. Synonymies, diagnoses, descriptions, and geographic distributions are provided for each species.

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The dusky rockfishes (Teleostei: Scorpaeniformes) of the North Pacific Ocean: resurrection of *Sebastes variabilis* (Pallas, 1814) and a redescription of *Sebastes ciliatus* (Tilesius, 1813)

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Among the approximately 92 species of *Sebastes* found in the North Pacific, two commercially important species long identified under the name *Sebastes ciliatus* have been taxonomically problematic. The name *S. ciliatus* (Tilesius, 1813) has been commonly applied to specimens considered to represent a single variable species ranging from northern Japan to British Columbia (Barsukov, 1964; Westrheim, 1973; Shinohara et al., 1994; Mecklenburg et al., 2002), and the name *S. variabilis* (Pallas, 1814) has been treated as a junior synonym (Jordan and Gilbert, 1881; Eigenmann and Beeson, 1894; Jordan and Evermann, 1898; Blanc and Hureau, 1968). Two color forms within *S. ciliatus* have been reported and hypothesized to be distinct species (Quast and Hall, 1972; Eschmeyer et al., 1983; Kessler, 1985; Fig. 1). The typically light-colored form, commonly known as the light dusky rockfish, is often found in large aggregations over the outer continental shelf and upper slope at depths down to 675 m, and less frequently in nearshore habitats. The dark-blue to black form, commonly known as the dark dusky rockfish, is found in more shallow habitats from nearshore rocky reefs to depths no greater than 160 m.

These forms have been subjected to two distinct fisheries separately managed by U.S. federal and Alaska state agencies since 1998. The light-colored deep form is captured in the offshore trawl fishery and is the dominant species of the pelagic shelf rockfish fisheries complex regulated by the National Marine Fisheries Service (NMFS). Specific catch limits are set under the designation "dusky rockfish." The occasional catch of the dark form in these offshore waters has also been considered "dusky rockfish." The dark-colored shallow form is found commonly in the nearshore jig fishery regulated by the Alaska Department of Fish and Game. The dark form, routinely misidentified as *S. melanops*, may comprise up to 25% of the catch in the "black rockfish" jig fishery off Kenai Peninsula (Clausen et al.[1]) and is managed only as "other rockfish" bycatch within the fishery.

Early allozyme analyses (Tsuyuki et al., 1965, 1968) indicated significant genetic differences among samples identified as *S. ciliatus*. A more detailed analysis of several *Sebastes* species (Seeb, 1986) and a later study focused

[1] Clausen, D. M., C. R. Lunsford, and J. T. Fujioka. 2002. Pelagic shelf rockfish. *In* Stock assessment and fishery evaluation report for the groundfish resources of the Gulf of Alaska for 2002, p. 383–417. North Pacific Fishery Management Council, 605 W 4th Ave, Suite 306, Anchorage, AK 99501.

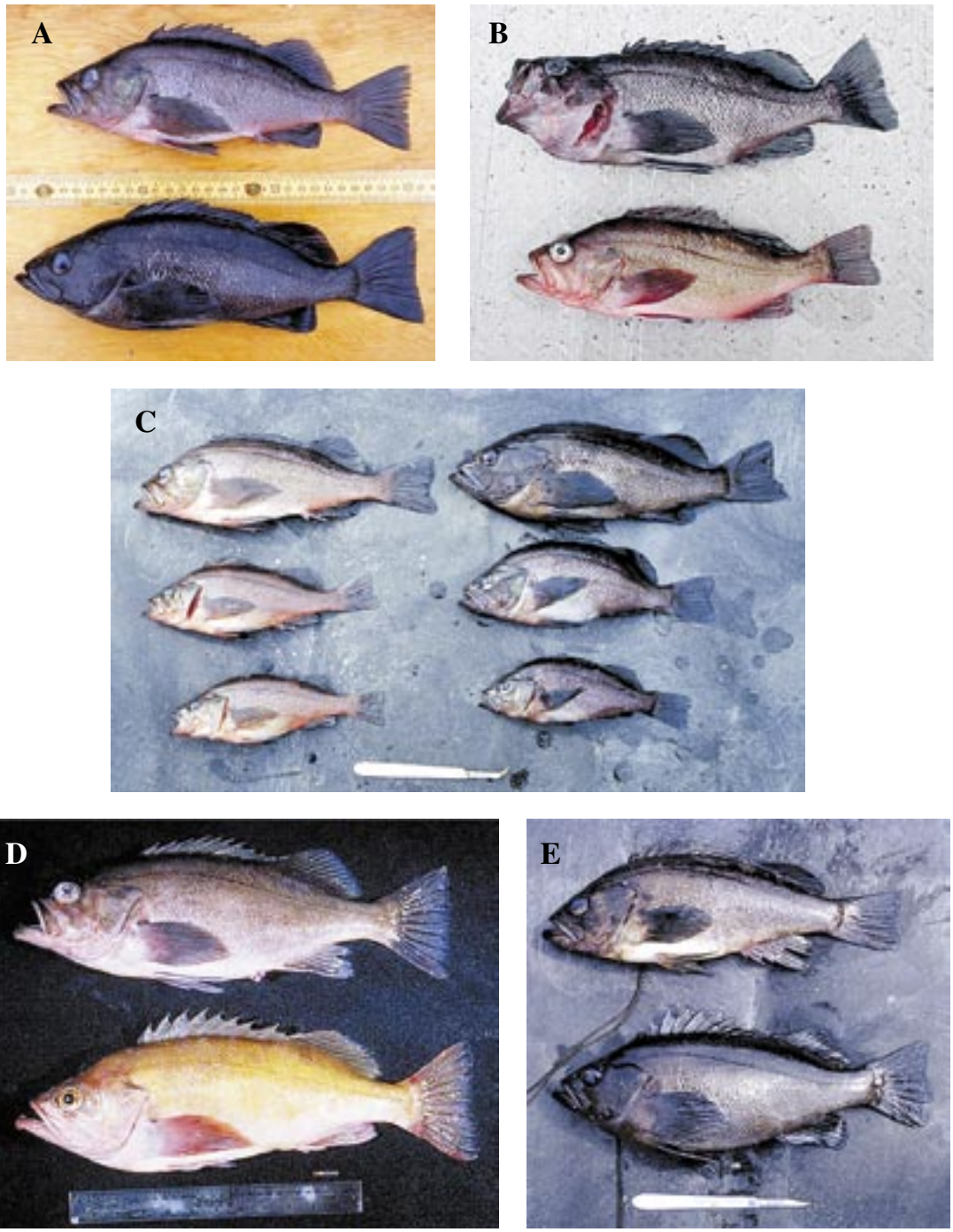

Figure 1

(**A**) *Sebastes variabilis* (top), UW 43494, 225.2 mm, and *S. ciliatus* (bottom), UW 43493, neotype, 266.4 mm, collected at 37 and 25 m depth, respectively, in Lynn Canal near Funter Bay, southeast Alaska. (**B**) *Sebastes ciliatus* (top), UW 45512, 235.2 mm, and *S. variabilis* (bottom), UW 45511, 206.2 mm, collected syntopically at 67 m depth in the northern Gulf of Alaska, 57.38061°N, 154.8009°W. (**C**) *Sebastes variabilis* (left), UW 43494, 150.6–225.2 mm, and *S. ciliatus* (right), UW 43492, 153.7–241.1 mm, collected at 37 and 25 m depth, respectively, in Lynn Canal near Funter Bay, southeast Alaska. (**D**) *Sebastes variabilis*, UW 43251, 390 mm (top) and 410 mm (bottom), northern Gulf of Alaska, 59.50446°N, 145.2262°W, 135 m depth. (**E**) *Sebastes melanops* (top), UW 43490, and *S. ciliatus* (bottom), UW 43484, 313 mm, collected at 25 m depth in Soapstone Cove, southeast Alaska.

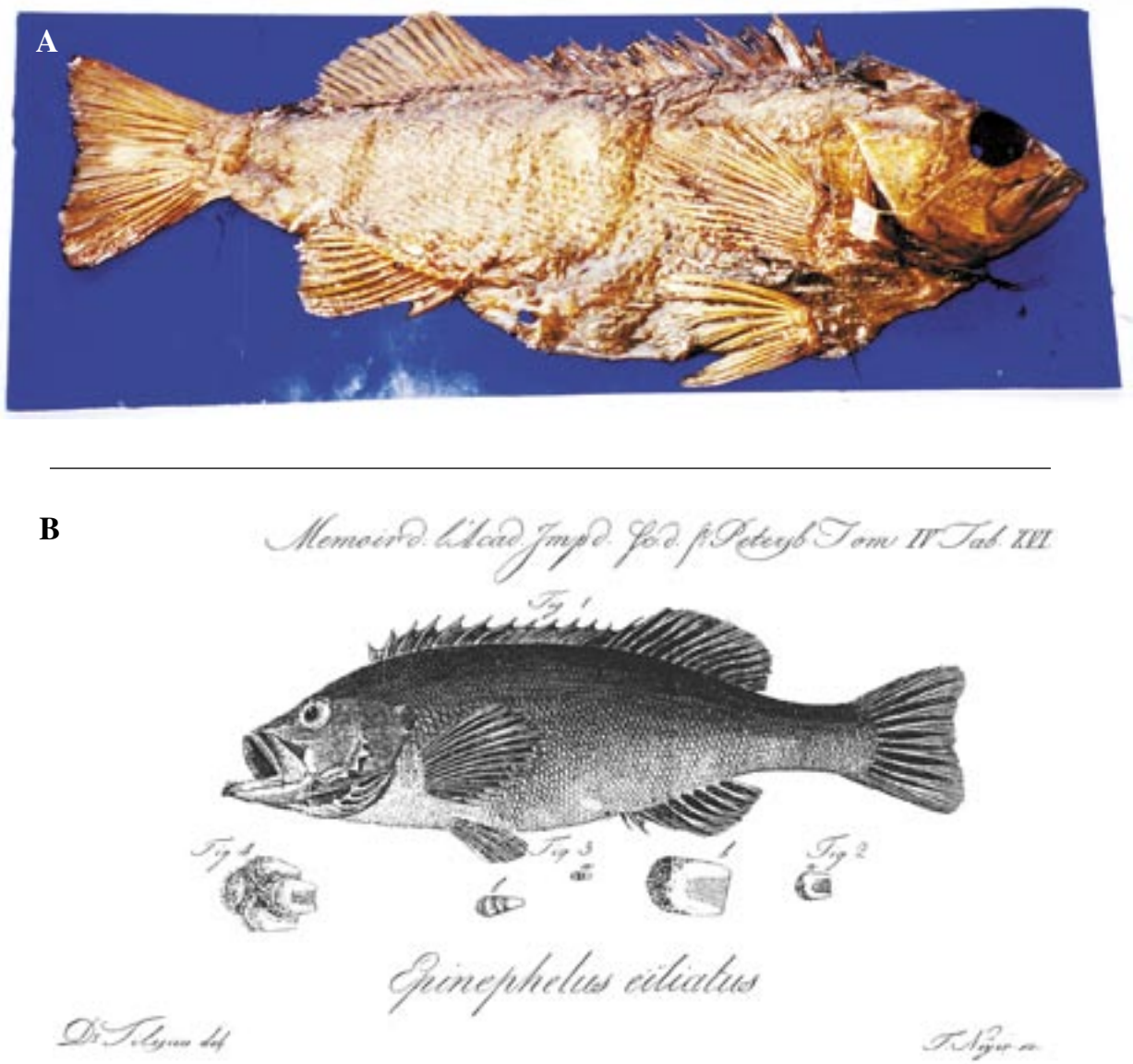

Figure 2

(**A**) *Perca variabilis* Pallas, MNHN 8670, lectotype, 343.7 mm, "mari Americam borealum." (**B**) *Epinephelus ciliatus* Tilesius, illustration of holotype after Tilesius (1813), specimen presumed lost.

on *S. ciliatus* (Westrheim and Seeb[2]) concluded that the two color forms were distinct sister species. Seeb's recent work with microsatellite DNA data has revealed discrete genetic differences between the two, as well as some evidence for infrequent hybridization (Seeb[3]). Sequence data from NADH dehydrogenase subunit regions of the mitochondrial genome, however, have not revealed differences between the two forms (López[4], Gray[5]), nor have sequence data from other work on closely related species of *Sebastes* (Bentzen et al., 1998; Sundt and Johansen, 1998; Roques et al., 2001).

[2] Westrheim, S. J., and L. W. Seeb. 1997. Unpubl. manuscript. Investigation of the *Sebastes ciliatus* species group, 36 p. Fisheries and Oceans Canada, Pacific Biological Station, Nanaimo, BC, Canada V9R 5K6.

[3] Seeb, L. W. 2002. Personal commun. Alaska Department of Fish and Game, 333 Raspberry Road, Anchorage, AK 99518-1599.

[4] López, J. A. 2000. Personal commun. Iowa State Univ., Ames, IA 50014.

[5] Gray, A. 2000. Personal commun. Fisheries Division, School of Fisheries and Ocean Sciences, Univ. Alaska Fairbanks, 11120 Glacier Highway, Juneau, AK 99801.

In this study, we provide morphological evidence from examination of about 400 specimens collected throughout the geographic and bathymetric range of the species to correlate color differences with meristic and shape differences. In thus recognizing two species, *S. ciliatus* and *S. variabilis*, previously referred to the name *S. ciliatus* (Tilesius, 1813), we discuss the nomenclatural consequences of this decision. Both species were originally described (as *Epinephelus ciliatus* Tilesius and *Perca variabilis* Pallas) on the basis of early Russian collections from along the Aleutian Islands (Svetovidov, 1978, 1981). The type series of one species is now represented by a single extant specimen (Fig. 2A) and the other by the illustration of a single, now lost, specimen (Svetovidov, 1978, 1981; Fig. 2B). Although workers since the turn of the century have associated the name *S. ciliatus* with the variably light-colored species (Jordan, 1896; Jordan and Evermann, 1898; Barsukov, 1964; Orr et al., 1998, 2000; Mecklenburg et al., 2002), the original description and accompanying illustration (Fig. 2B) appear to describe the uniformly dark species. We have also identified the remaining syntype (Fig. 2A) of *Perca variabilis* as the light species. Therefore, we refer the dark, shallow-water species (the dark rockfish) to *Sebastes ciliatus* (Tilesius, 1813) and resurrect the name *Sebastes variabilis* (Pallas, 1814) for the typically light, deeper-water species (the dusky rockfish).

Methods and materials

Counts and measurements follow Hubbs and Lagler (1958), except as noted below. Unless indicated otherwise, standard length (SL) is used throughout and was always measured from the tip of the snout. Depth at pelvic-fin base was measured from the origin of the dorsal fin to the base of the pelvic fins (at the articulation of the pelvic-fin spine); depth at anal-fin origin, from the base of the last dorsal-fin spine to the anal-fin origin; depth at anal-fin insertion, from dorsal-fin insertion to anal-fin insertion; body thickness, at pectoral-fin base; head thickness, at the posterior orbital rim; prepelvic- and preanal-fin length, from pelvic-fin base or anal-fin origin to the tip of the snout; pelvic-fin to anal-fin length from pelvic-fin base to anal-fin origin; caudal peduncle dorsal length from dorsal-fin insertion to caudal-fin base; caudal peduncle ventral length from anal-fin insertion to caudal-fin base. The small anterior notch in the orbit between the frontal bone and lateral ethmoid was excluded from orbit length and snout length measurements. Accessory scales are small scales located beyond the posterior field of major scales. The swimbladder musculature was examined after dissection according to the methods of Hallacher (1974). Institutional abbreviations follow Leviton et al. (1985) and Leviton and Gibbs (1988), as modified by Poss and Collette (1995).

Individuals were identified by body and peritoneum color (see species descriptions below) for grouping in ANOVA and ANCOVA, as well as for labeling individuals in graphs of principal components analysis scores. Univariate and multivariate analyses were conducted by using Statgraphics Plus 4.1 (Manugistics, Rockville, MD) and Splus 2000 (Mathsoft, Inc., Seattle, WA). Differences were considered significant at $P < 0.05$.

Arcsine-transformed morphometric ratios (with SL or head length as denominator) and meristic characters were tested to meet the assumptions of normality required for ANOVA. The following characters exhibited normal distributions and did not differ significantly in variance between species and were subjected to ANOVA: head length, orbit length, snout length, interorbital width, suborbital depth, gill-raker length, body thickness, pectoral-fin base width, pectoral-fin ray length, caudal peduncle ventral length, predorsal length, spinous dorsal-fin base, soft dorsal-fin base, and counts of lateral-line pores and gill rakers.

For morphometric characters, significant differences were also identified by using an analysis of covariance (ANCOVA) of log-10-transformed measurements with SL or head length (HL) as covariates when assumptions of normality and the homogeneity of slopes were satisfied. The ANCOVA model included species as a factor, SL or HL as a covariate, and a species/(SL or HL) interaction (e.g., $HL=C+Species+SL+(Species\times SL)$). A residual analysis was done for each model to determine the appropriateness of the model. Whenever the interaction was not significant (at the 5% level), a reduced model was used by dropping the interaction and forcing the slopes to be the same ($BD=C+Species+SL$). This removed the effect of SL and HL and allowed testing for significant differences between species. The following morphometric characters met the assumptions required for ANCOVA: head length, snout length, interorbital width, gill-raker length, pectoral-fin base width, pectoral-fin ray length, caudal peduncle ventral length, predorsal length, spinous dorsal-fin-base length, and soft dorsal-fin-base length.

On a dataset of specimens with all characters, sheared principal components analysis (SPCA) for a size-free analysis (Bookstein et al., 1985) was conducted by using morphometric characters, and a standard principal components analysis (PCA) was conducted by using all meristic characters. Raw morphometric data were log-transformed and the covariance matrix was subjected to SPCA, as was the correlation matrix of raw meristics. Differences between species were illustrated by plotting scores of sheared PC2 against sheared PC3 and sheared morphometric PC2 against the standard meristic PC1. Separate analyses were also conducted on three groupings: 1) each species by depth, 2) each species by sex, and 3) shallow-water populations of *S. ciliatus* and *S. variabilis* primarily collected in the vicinity of the Triplet Islands and Monashka Bay, on the northeast side of the Kodiak Island Archipelago, and the vicinity of Lynn Canal, Alaska. Shallow collections were defined as those made at less than 50 m depth, and deep collections were taken at depths greater than 50 m.

These plots were also examined for groupings indicative of geographic differences in body shape and meristics. Geographic areas were defined as follows: British Columbia, from the Straits of Juan de Fuca to Dixon Entrance; southeast Alaska, from Dixon Entrance to Chatham Strait; Gulf of Alaska, from Chatham Strait to the tip of the Alaska Pennisula; Aleutian Islands and Bering Sea,

Table 1

Proportional morphometrics and meristics of *Sebastes ciliatus* and *S. variabilis* from all depths and regions. Morphometric data are in %SL or %HL. X = statistically significant difference at 0.05 level, as evaluated by ANOVA and ANCOVA, when appropriate; ns = not statistically significant at 0.05 level. *n* = number of fish in sample.

	S. ciliatus			*S. variabilis*				
	n	Range	Mean ±SD	*n*	Range	Mean ±SD	ANOVA	ANCOVA
Meristics								
Dorsal-fin spines	138	12–14	13.0 ±0.2	194	13–14	13.0 ±0.1		
Dorsal-fin rays	138	13–17	15.0 ±0.5	194	13–16	15.0 ±0.4		
Anal-fin rays	139	7–9	7.9 ±0.4	195	7–9	7.9 ±0.4		
Pectoral-fin rays (left)	138	17–19	18.2 ±0.5	194	17–19	18.0 ±0.3		
Pectoral-fin rays (right)	137	16–19	18.2 ±0.4	195	16–19	18.0 ±0.4		
Unbranched pectoral-fin rays (left)	136	8–10	9.2 ±0.5	195	7–11	9.1 ±0.4		
Unbranched pectoral-fin rays (right)	108	8–11	9.2 ±0.5	188	7–11	9.1 ±0.5		
Lateral-line pores (left)	138	39–50	45.4 ±2.3	188	43–54	48.5 ±1.9	X	
Lateral-line pores (right)	125	40–54	45.3 ±2.4	172	42–54	48.5 ±1.9	X	
Lateral-line scales	132	44–60	50.6 ±2.7	177	47–63	52.8 ±2.7		
Gill rakers	137	32–37	34.8 ±1.1	184	32–37	34.7 ±0.9	X	

continued

from the tip of the Alaska Peninsula west and north into the Bering Sea.

Results

Color

Body color in life and in preservation differs consistently between *S. ciliatus* and *S. variabilis* (Fig. 1; see detailed description below). In life, *S. ciliatus* is uniformly bluish-black to gray, with slight gradual lightening on the belly; the peritoneum is invariably jet black. In contrast, *S. variabilis* varies in background color from golden yellow to greenish brown to dark gray, with a distinct break between the darker dorsum and the invariably white to pink ventrum, particularly at the base of the anal fin; the peritoneum is gray to black. In *S. variabilis* preserved for up to 30 years, the distinct break along the ventrum is retained and differs from the uniformly dark preserved color of *S. ciliatus*. This combination of characteristic body and peritoneum color was used initially to identify individuals as either *S. ciliatus* or *S. variabilis* as the basis for univariate statistical analyses.

Meristic characters

Lateral-line pore and gill-raker counts differed significantly between *S. ciliatus* and *S. variabilis* from all depths and regions, *S. ciliatus* having a lower range and mode of counts (Tables 1–3). In shallow water, only lateral-line pore counts showed significant differences (Table 4). Slight clinal variation was evident for lateral-line pores in *S. ciliatus* between southeast Alaska collections and northern Gulf of Alaska material (Table 2). In the PCA, counts of lateral-line pores, gill rakers, and pectoral-fin rays were most heavily loaded along the first PC axis, confirming that *S. ciliatus* has typically lower lateral-line pore and gill-raker counts and tends to have a higher pectoral-fin ray count (Tables 1–3, 5; Fig. 3B).

Morphometric characters

Among morphometric characters meeting statistical assumptions for ANOVA or ANCOVA, head length, interorbital width, suborbital depth, lower-jaw length, gill-raker length, body thickness, pectoral-fin base width, predorsal length, and soft-dorsal-fin-base length differed significantly between *S. ciliatus* and *S. variabilis* across all depths and regions (Table 1). Between shallow-water *S. ciliatus* and *S. variabilis*, all the above characters, except head length, interorbital width, and predorsal length, differed significantly (Table 4). No significant differences were found in analyses within species by depth or sex.

In the PCA for specimens collected across all regions and depths, clusters of *S. ciliatus* and *S. variabilis* showed broad overlap and only slight discrimination among individuals along the PC2 axis (Fig. 3A). Principal component 2, the primary shape component, described 1.8% of the total variation, and PC1, the size component having all loadings positive, described 96.4% of the variation. Characters loading most heavily along the PC2 axis included suborbital depth, gill-raker length, orbit length, body

Table 1 (continued)

	S. ciliatus			*S. variabilis*				
	n	Range	Mean ±SD	*n*	Range	Mean ±SD	ANOVA	ANCOVA
Morphometrics								
Standard length	132	83.8–340.0		192	77.7–430.8			
Head length/SL	113	28.7–35.5	32.9 ±1.2	129	28.1–36.2	32.5 ±1.2	X	ns
Orbit length/HL	111	21.5–30.6	25.6 ±2.0	121	20.6–33.5	25.6 ±2.1	ns	
Snout length/HL	111	18.2–26.0	21.4 ±1.6	121	17.1–27.1	21.4 ±1.8	ns	ns
Interorbital width/HL	111	22.9–29.3	25.9 ±1.3	121	22.5–30.4	26.4 ±1.4	X	X
Suborbital depth/HL	111	4.1–7.8	6.0 ±0.8	121	4.3–8.1	6.2 ±0.7	X	
Upper jaw length/HL	111	43.6–51.1	47.4 ±1.5	121	42.7–54.0	47.8 ±2.0		
Lower jaw length/HL	105	53.4–60.5	56.5 ±1.7	108	52.8–62.7	58.3 ±2.2	X	
Gill raker length/HL	98	11.3–20.7	15.0 ±1.6	110	11.6–19.9	15.5 ±1.7	ns	X
Depth at pelvic-fin base/SL	111	32.5–42.7	37.0 ±1.9	121	29.2–40.9	36.2 ±1.7		
Depth at anal-fin origin/SL	111	27.4–35.8	31.2 ±1.7	121	26.7–35.4	30.5 ±1.6		
Depth at anal-fin insertion/SL	109	13.8–18.5	15.9 ±1.0	116	13.1–18.0	15.4 ±0.9		
Body thickness/SL	111	14.9–22.3	18.0 ±1.2	120	12.9–20.9	17.3 ±1.5	X	
Pectoral-fin base width/SL	111	9.5–11.9	10.7 ±0.5	121	9.4–11.2	10.2 ±0.4	X	X
Pectoral-fin ray length/SL	111	24.6–31.8	28.5 ±1.3	121	23.5–31.0	28.2 ±1.4	ns	ns
Pectoral-fin length/SL	111	25.5–33.6	29.8 ±1.5	117	24.2–35.1	29.2 ±1.7		
Pelvic-fin ray length/SL	111	20.5–26.0	22.7 ±1.1	119	19.2–29.2	22.0 ±1.5		
Pelvic-fin ray/Pelvic-fin spine length	111	52.4–67.4	59.9 ±4.3	121	44.9–70.7	59.9 ±5.5		
Anal-fin spine I length/SL	83	3.6–9.1	5.2 ±0.9	107	3.3–8.8	5.3 ±1.0		
Anal-fin spine II length/SL	84	7.5–14.2	10.6 ±1.2	106	5.8–13.6	10.5 ±1.5		
Anal-fin spine III length/SL	84	10.0–14.6	12.4 ±1.1	107	9.5–15.6	12.2 ±1.3		
Anal-fin ray 1 length/SL	83	15.6–22.5	19.0 ±1.2	97	15.1–21.0	18.2 ±1.3		
Anal-fin ray 2 length/SL	84	14.5–23.4	20.2 ±1.2	97	15.3–23.1	19.5 ±1.3		
Caudal-fin length/SL	60	10.2–29.4	21.7 ±2.7	74	15.4–26.9	21.2 ±2.3		
Caudal peduncle depth/SL	111	9.3–13.7	11.4 ±0.7	121	9.5–12.2	10.9 ±0.5		
Caudal peduncle dorsal length/SL	111	11.9–16.2	13.8 ±0.8	121	12.6–16.4	14.1 ±0.8		
Caudal peduncle ventral length/SL	111	17.6–22.9	20.5 ±1.0	121	17.1–24.3	21.1 ±1.3	ns	ns
Preanal length/SL	111	60.0–77.4	68.7 ±2.5	121	59.4–77.9	68.1 ±2.6		
Pelvic- to anal-fin length/SL	105	26.1–43.2	32.5 ±3.1	111	25.9–41.7	31.6 ±2.9		
Predorsal length/SL	111	28.5–35.4	32.1 ±1.3	121	28.1–35.2	31.8 ±1.3	X	ns
Spinous dorsal-fin-base length/SL	111	32.1–43.6	37.2 ±2.1	121	31.6–41.9	37.0 ±2.1	ns	ns
Soft dorsal-fin-base length/SL	111	21.9–30.8	26.0 ±1.6	121	21.4–28.7	24.8 ±1.6	X	X
Anal-fin-base length/SL	111	13.9–18.9	16.5 ±1.0	121	13.1–18.4	16.3 ±1.0		
Prepelvic-fin length/SL	111	33.5–49.5	39.7 ±2.6	121	34.0–46.5	39.7 ±2.4		

thickness, caudal-peduncle dorsal length, and upper-jaw length (Table 6). No significant regional variation was observed within the overall PCA.

In the sheared PCA of differences in shape by depth, both species showed negligible differences within broadly overlapping clusters of individuals. In the depth analysis, loadings along the PC2 axis were strongest for suborbital depth, gill-raker length, and orbit length, and shallower individuals tended to have a greater suborbital depth, longer gill rakers, and longer orbit. In the combined morphometric and meristic shallow-water analysis, slight differences along the morphometric PC2 axis and the meristic PC1 axis reflected longer gill rakers and higher lateral-line pore counts in *S. variabilis*. No differences were found in the PCA comparing sex within species (Tables 7–8).

Table 2

Counts of lateral-line pores and gill rakers for *Sebastes ciliatus* and *S. variabilis* by region. AI or BS = Aleutian Islands or Bering Sea; GOA = Gulf of Alaska; SEAK = Southeast Alaska; BC = British Columbia.

		Lateral-line pores																		
Species	Region	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	*n*	Mean	SD
Sebastes ciliatus	AI or BS				2	3	8	4	8				1					26	44.73	1.66
	GOA	1		1	6	7	4	11	8	5	5	3	1					52	45.20	2.22
	SEAK					3	3	2	2	4	2	5	3					24	46.75	2.40
Sebastes variabilis	AI or BS							3	4	5	1	7	4	3				27	48.04	1.87
	GOA							5	4	14	11	15	13	8	3		1	74	48.68	1.95
	SEAK					1	1		3	5	9	5	14	4	2			44	48.75	1.94
	BC							1	3	1	2	3	4		1	1		16	48.63	2.25

		Gill rakers																		
Region		32	33	34	35	36	37											*n*	Mean	SD
Sebastes ciliatus	AI or BS	1	9	5	10	1												26	34.04	1.04
	GOA	2	17	23	7	2												51	33.80	0.87
	SEAK	1	1	6	13	3	1											25	34.77	0.92
Sebastes variabilis	AI or BS	3	1	10	8	2	1											25	34.22	1.13
	GOA	1	5	24	35	5												70	34.52	0.80
	SEAK		4	18	15	8	1											46	34.61	0.89
	BC		1	2	8	6												17	35.12	0.86

Systematics

Sebastes ciliatus (Tilesius, 1813)

Dark rockfish

Figs. 1–4; Tables 1–8

Epinephelus ciliatus Tilesius, 1813:406, pl. 16, figs. 1–4 (original description, one specimen: holotype apparently lost, sex unknown, approximately 413 mm TL, "Oceano orientali Camtschatcam et Americam alluenti").

Sebastichthys ciliatus: Jordan and Jouy, 1881:8 (in part, new combination).

Sebastodes ciliatus: Jordan and Gilbert, 1883:658 (in part, new combination).

Sebastostomus ciliatus: Eigenmann and Beeson, 1894:388 (in part, new combination).

Sebastes ciliatus: Westrheim, 1973:1230 (in part, new combination).

Sebastes sp. cf. *ciliatus*: Orr et al., 1998:26, 2000:26.

Neotype

UW 43493, 1(266.4 mm), Lynn Canal, north of Funter Bay, 58.2467°N, 134.899°W, 25 m depth, 13 July 1998.

Material examined

A total of 140 specimens, 83.8–340.0 mm, were examined, including the neotype above. See Appendix for catalog numbers and locality data.

Diagnosis

A species of *Sebastes* with the following combination of character states: body uniformly black to dark blue or gray, particularly at anal-fin base and ventral pectoral-fin rays; peritoneum jet black; symphyseal knob moderate to strong; extrinsic swimbladder muscle with anterior fascia separating sections of striated muscles, otherwise of type I (a–z) of Hallacher (1974); lateral-line pores 39–50, lateral-line scales 44–60; pectoral-fin (P1) rays 16–19; anal-fin (A) rays 7–9; dorsal-fin (D) rays 13–17; vertebrae 28 (11–12 + 16–17).

Description

D XII–XIV, 13–17; A III, 7–9; P1 16–19, 8–11 simple; lateral-line pores 39–50(54), scales 44–60; gill rakers 32–37 (10–11 + 22–27); vertebrae 28 (11–12 + 16–17). Meristic frequency and statistical data are presented in Tables 2–4.

Morphometric data and statistics are presented in Tables 1 and 4. Body relatively deep, especially at nape, depth at pelvic-fin base 32.5–42.7% SL; profile of dorsal margin of head steep from snout to nape above anterodorsal margin of gill slit, flattening to dorsal-fin origin; mouth large, with posterior end of maxilla extending between pupil and posterior rim of orbit, maxilla length 43.6–51.1% HL; symphyseal knob moderate to strong and having blunt tip, lower jaw length 53.4–60.5% HL; mandibular pores of moderate size. Cranial spines weak, in large adults covered by flesh, head smooth. Nasal spine invariably present; parietal ridge invariably present and small spine typically

Table 3

Counts of soft-dorsal-, anal-, and pectoral-fin rays for *Sebastes ciliatus* and *S. variabilis* by region. AI or BS = Aleutian Islands or Bering Sea; GOA = Gulf of Alaska; SEAK = Southeast Alaska; BC = British Columbia. *n* = number of fish in sample.

		Dorsal-fin rays							
Species	Region	13	14	15	16	17	*n*	Mean	SD
Sebastes ciliatus	AI or BS		2	21	3		26	15.04	0.45
	GOA	1	4	45	2		52	14.94	0.42
	SEAK		5	14	4	1	24	15.04	0.75
Sebastes variabilis	AI or BS			25	3		28	15.12	0.33
	GOA		7	54	9		70	15.03	0.49
	SEAK		4	40	3		47	14.98	0.39
	BC		1	16			17	14.94	0.24
		Pectoral-fin rays							
	Region	17	18	19			*n*	Mean	SD
Sebastes ciliatus	AI or BS	1	19	6			26	18.19	0.49
	GOA		44	8			52	18.16	0.37
	SEAK	2	16	6			24	18.17	0.56
Sebastes variabilis	AI or BS		23	4			27	18.17	0.38
	GOA	6	65				71	17.93	0.26
	SEAK	1	44	2			47	18.02	0.25
	BC		15	2			17	18.12	0.33
		Anal-fin rays							
	Region	7	8	9			*n*	Mean	SD
Sebastes ciliatus	AI or BS	4	21	1			26	7.88	0.43
	GOA	4	47				51	7.92	0.27
	SEAK	1	20	3			24	8.08	0.41
Sebastes variabilis	AI or BS	4	19	3			27	8.00	0.50
	GOA	8	63				71	7.88	0.32
	SEAK	5	41				46	7.89	0.31
	BC	1	15	1			17	8.00	0.35

present; postocular and tympanic spines absent or obsolete in adults (postocular present on at least one side in 23.2% and tympanic present on at least one side of 37.7% of specimens examined), most often present in juveniles. Interorbital region wide, 22.9–29.3% HL, strongly convex; parietal ridges weak, and area between ridges slightly convex; preopercular spines 5, directed posteroventrally; two opercular spines, upper spine directed posteriorly, lower spine directed posteroventrally; posttemporal and supracleithral spines present; lachrymal spines rounded, small; dorsal margin of opercle nearly horizontal; lower margin of gill cover with small spines: posteroventral tip of subopercle and anteroventral tip of interopercle rugose or with 1–2 small spines.

Dorsal-fin origin above anterodorsal portion of gill slit; dorsal fin continuous, gradually increasing in height to spine IV and decreasing in height to spine XII; spine XIII much larger, forming anterior support of soft dorsal fin; membranes of spinous dorsal fin moderately incised, less so posteriorly; soft dorsal fin with anterior rays longest, posterior rays gradually shortening. Anal-fin spine II shorter than III (7.5–14.2 vs. 10.0–14.6% SL), anterior rays longest on soft rayed portion of anal fin, posterior rays gradually shortening, posterior margin perpendicular to body axis or with slight posterior slant, anterior ray tips directly ventral to or forward of posterior tips, anterior tip of anal fin typically rounded. Pectoral fins with ray 10 longest, extending to or slightly anterior to vent, fin-ray length 24.6–31.8% SL, fin-base to ray-tip length 24.6–31.8% SL; fin-base width 9.5–11.9% SL. Pelvic fins extend about 60% of distance from pelvic-fin base to anal-fin origin, falling well short of vent, ray length 20.5–26.0% SL, spine length 52.4–67.4% ray length. Caudal fin shallowly emarginate, length 10.2–29.4% SL. Vent positioned below dorsal-fin spine 10, 1.6–5.8% SL from anal-fin origin.

Table 4

Selected proportional morphometrics and meristics of *Sebastes ciliatus* and *S. variabilis* from shallow-water collections. Morphometric data are in percent standard length (SL) or head length (HL). X = statistically significant difference at 0.05 level, as evaluated by ANOVA and ANCOVA, when appropriate; ns = not statistically significant at 0.05 level.

	S. ciliatus			*S. variabilis*				
	n	Range	Mean ±SD	*n*	Range	Mean ±SD	ANOVA	ANCOVA
Meristics	68			49				
Dorsal-fin rays		13–16	15.0 ±0.5		14–16	15.0 ±0.4	ns	
Anal-fin rays		7–9	7.9 ±0.4		7–9	8.0 ±0.3	ns	
Pectoral-fin rays (left)		17–19	18.1 ±0.5		17–19	18.0 ±0.2	ns	
Lateral-line pores (left)		40–50	45.2 ±2.1		42–51	47.9 ±2.0	X	
Gill rakers		32–37	34.3 ±1.1		32–36	34.6 ±1.0	ns	
Morphometrics								
Standard length		83.8–331.0			83.3–363.0			
Head length/SL		30.5–35.5	32.9 ±1.1		30.2–35.4	32.7 ±1.0	ns	ns
Orbit length/HL		21.5–30.6	25.6 ±2.1		23.6–30.0	26.4 ±1.6	ns	ns
Snout length/HL		18.2–26.0	21.3 ±1.6		18.2–24.0	20.9 ±1.4	ns	ns
Interorbital width/HL		22.9–28.2	25.6 ±1.2		23.0–28.8	25.8 ±1.1	ns	ns
Suborbital depth/HL		4.1–7.6	5.9 ±0.7		4.5–7.4	6.0 ±0.6	ns	ns
Upper jaw length/HL		43.6–50.4	47.3 ±1.5		43.9–54.0	47.3 ±2.0	ns	ns
Lower jaw length/HL		53.4–60.5	56.4 ±1.6		52.8–60.4	56.6 ±1.8	ns	X
Gill raker length/HL		11.8–20.7	15.2 ±1.5		13.3–19.9	16.1 ±1.6	X	X
Depth at pelvic–fin base/SL		34.0–40.8	36.7 ±1.5		33.7–38.6	36.2 ±1.2	ns	ns
Depth at anal–fin origin/SL		27.4–35.8	31.2 ±1.7		27.0–31.7	30.0 ±1.1	ns	ns
Body thickness/SL		14.9–21.3	17.9 ±1.2		12.9–20.9	17.1 ±1.8	X	ns
Pectoral-fin base width/SL		9.7–11.8	10.6 ±0.5		9.4–11.1	10.2 ±0.4	X	ns
Pectoral-fin ray length/SL		25.1–31.3	28.6 ±1.2		24.8–31.0	28.4 ±1.2	ns	ns
Caudal peduncle depth/SL		9.8–13.7	11.5 ±0.7		9.7–11.8	10.8 ±0.5	ns	ns
Caudal peduncle dorsal length/SL		11.9–16.2	14.0 ±0.8		12.6–15.3	13.9 ±0.7	ns	ns
Caudal peduncle ventral length/SL		18.2–22.5	20.6 ±1.0		17.1–24.3	21.3 ±1.5	X	X
Preanal length/SL		62.5–77.4	68.3 ±2.3		64.6–73.5	68.2 ±2.1	ns	ns
Predorsal length/SL		29.3–35.4	32.2 ±1.2		28.6–35.2	31.8 ±1.4	ns	ns
Spinous dorsal-fin-base length/SL		32.5–41.8	37.0 ±2.0		33.2–41.6	36.6 ±1.8	ns	ns
Soft dorsal-fin-base length/SL		22.1–29.6	26.2 ±1.4		21.4–28.7	25.0 ±1.6	X	X
Anal-fin-base length/SL		14.5–18.9	16.5 ±0.9		13.6–18.4	16.4 ±1.0	ns	ns
Prepelvic-fin length/SL		36.4–49.5	39.4 ±2.3		36.3–46.5	40.3 ±2.6	ns	ns

Table 5

Factor loadings for principal component (PC) analysis of meristic characters for *Sebastes ciliatus* and *S. variabilis* collected in all depths and regions.

	PC1	PC2	PC3
Lateral-line pores	–0.6139	–0.1000	–0.4151
Gill raker	–0.5993	0.1360	0.5217
Dorsal-fin rays	–0.2731	–0.5625	0.4739
Anal-fin rays	–0.0138	–0.7389	–0.3954
Pectoral-fin rays	0.4349	–0.3304	0.4180

Lateral body scales with many (ca. 5–7) accessory scales in posterior field. Maxilla and underside of mandible completely scaled; suborbital region scaled; branchiostegal rays scaled.

Gill rakers long, 11.3–20.7% HL, and slender on first arch, longest raker in joint between cerato- and hypobranchials, length of preceding and succeeding rakers progressively shorter; rudiments absent. Pseudobranchs 37–38.

Body color in life and after preservation dark, black to gray, lighter in deeper water, lightening ventrally on belly and occasional reddening from base of pectoral fin to base of anal fin, uniformly dark from soft dorsal fin to anal-fin base; vague darker mottling tapering from origin of soft

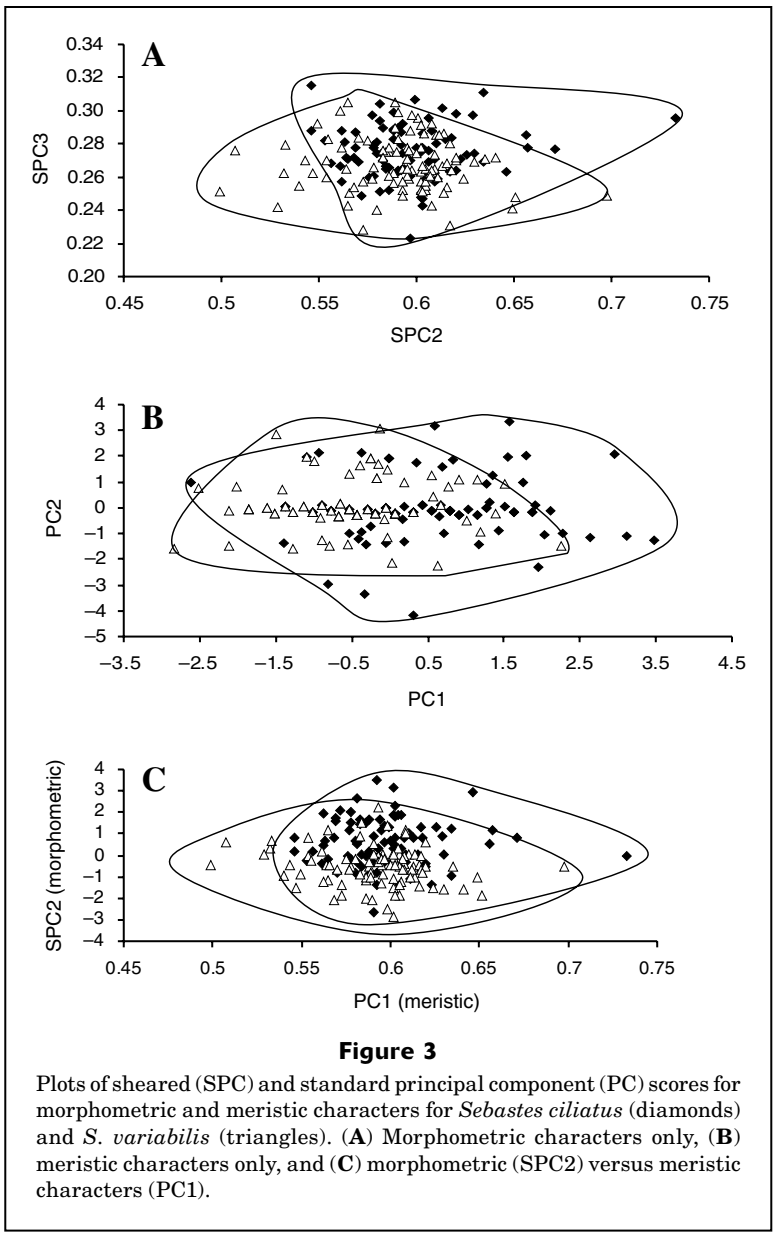

Figure 3

Plots of sheared (SPC) and standard principal component (PC) scores for morphometric and meristic characters for *Sebastes ciliatus* (diamonds) and *S. variabilis* (triangles). (**A**) Morphometric characters only, (**B**) meristic characters only, and (**C**) morphometric (SPC2) versus meristic characters (PC1).

dorsal fin ventrally and forward narrowing across lateral line, faint darker mottling also present farther posterior at soft dorsal-fin base. Head nearly uniformly dark, two faint bars extending from orbit to preopercle, a faint bar along anterior margin of maxilla. Median fins uniformly dark gray to black. Pectoral fins, including lower rays, gray to black. Pelvic fins dark. Peritoneum jet black; stomach, pyloric caeca, and intestines pale. See Figure 1 (A–C, E), and previously published color figures of Kessler (1985, "*S. ciliatus*, dark dusky rockfish"), Kramer and O'Connell (1986; "*S. ciliatus,* dark"), Kramer and O'Connell (1988, 1995; "*S. ciliatus*, Kodiak specimen," and "shallow water specimen"), Orr et al. (1998, 2000; "*S.* sp. cf. *ciliatus*, dark dusky rockfish"), Orr and Reuter (2002; "*S. ciliatus*, dark dusky"), and Mecklenburg et al. (2002; "*S. ciliatus*, dark phase"). Juveniles in life (Fig. 1C) similar to adults in general body color, often brassy on breast and head.

Largest specimen examined 340.0 mm (425 mm TL, 412 mm fork length; UW 46068). Maximum size confirmed 470 mm fork length (RACE Division[6]; Orr, personal observ.).

Distribution and natural history

The range of *Sebastes ciliatus* based on material examined extends from the western Aleutian Islands and east-

[6] RACE (Resource Assessment and Conservation Engineering) Division. 2002. Unpubl. data from RACE database. Alaska Fisheries Science Center, Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way NE, Seattle, WA 98115.

Table 6

Factor loadings for sheared principal component (SPC) analysis of morphometric characters for specimens examined across all depths and regions for *Sebastes ciliatus* and *S. variabili*s.

	PC1	SPC2	SPC3
Head length	0.1526	0.1131	0.0416
Orbit length	0.1853	0.2090	0.0988
Depth at anal-fin origin	0.2564	0.1335	−0.0136
Snout length	0.2452	0.1109	0.0240
Interorbital width	0.5753	−0.8081	−0.0485
Suborbital depth	0.1905	0.1481	0.0675
Upper jaw length	0.1837	0.1394	0.0713
Lower jaw length	0.2332	0.2321	−0.9231
Gill raker length	0.1635	0.0768	0.0840
Body thickness	0.2045	0.1692	0.1404
Pectoral-fin base	0.2119	0.1146	0.1139
Pectoral-fin ray length	0.1551	0.0848	0.0105
Caudal peduncle depth	0.2113	0.1436	0.1757
Caudal peduncle dorsal length	0.1885	0.1561	0.0262
Caudal peduncle ventral length	0.1601	0.0829	0.0773
Pre-anal-fin length	0.1313	0.0732	0.0800
Predorsal-fin length	0.1516	0.1063	0.0456
Spinous dorsal-fin base length	0.1549	0.0976	0.0504
Soft dorsal-fin base length	0.1602	0.1271	0.1493
Anal-fin base length	0.1671	0.1266	0.1140

Table 7

Factor loadings for sheared principal component (SPC) analysis of morphometric characters for shallow water *Sebastes ciliatus* and *S. variabilis*.

	PC1	SPC2	SPC3
Head length	0.1149	0.0855	0.0497
Orbit length	0.1504	0.1223	0.0408
Depth at anal-fin origin	0.1876	0.1908	0.1111
Snout length	0.1586	0.0886	0.0687
Interorbital width	0.2465	0.1636	−0.0394
Suborbital depth	0.2428	0.1156	0.0024
Upper jaw length	0.5843	−0.8015	0.0042
Lower jaw length	0.1876	0.1565	0.0745
Gill raker length	0.2431	0.1866	−0.9189
Body thickness	0.1782	0.1386	0.0734
Pectoral-fin base	0.2103	0.1889	0.1819
Pectoral-fin ray length	0.2108	0.1308	0.1165
Caudal peduncle depth	0.1550	0.1033	0.0162
Caudal peduncle dorsal length	0.2126	0.1552	0.1930
Caudal peduncle ventral length	0.1854	0.1426	−0.0224
Pre-anal-fin length	0.1520	0.1098	0.0381
Predorsal-fin length	0.1499	0.1124	0.0603
Spinous dorsal-fin base length	0.1516	0.0953	0.0358
Soft dorsal-fin base length	0.1642	0.1395	0.1171
Anal-fin base length	0.1697	0.1061	0.1310

ern Bering Sea, through the Gulf of Alaska, to southeast Alaska. Other documented records extend its range south to Johnstone Strait, British Columbia (Peden and Wilson, 1976; Fig. 4). It is common throughout its range in shallow rocky habitats, and our material was collected at depths from 5 to 160 m, its total recorded depth range.

Sebastes ciliatus is commonly collected with *S. melanops* by trawl and hook-and-line gear in shallow waters, where *S. ciliatus* is commercially fished as part of the "black rockfish" fishery and has been often misidentified as *S. melanops*. In deeper (>100 m) trawls in Aleutian and Gulf of Alaska waters, *S. ciliatus* is commonly found in association with *S. alutus* (Pacific ocean perch), *S. polyspinis* (northern rockfish), and *S. variabilis* (dusky rockfish). Less frequently, *S. variegatus* (harlequin rockfish), *S. zacentrus* (sharpchin rockfish), and *S. proriger* (redstripe rockfish) are also captured with *S. ciliatus*. A large (320 mm; UW 47417) *S. ciliatus* was found in the stomach of a Pacific cod (*Gadus macrocephalus*) collected in the Aleutian Islands.

Females captured in summer (May–July) trawl surveys are most often ripe with eyed larvae. Near-term females and males were observed in July in shallow waters off southeast Alaska in contrast to individuals of *S. variabilis,* which were all immature at this time (Orr, personal observ.).

Table 8

Factor loadings for principal component (PC) analysis of meristic characters for shallow water *Sebastes ciliatus* and *S. variabilis*.

	PC1	PC2
Lateral-line pores	−0.5933	0.1677
Gill rakers	−0.4274	−0.6851
Dorsal-fin rays	−0.5742	−0.0777
Anal-fin rays	−0.3667	0.6191
Pectoral-fin rays	0.0325	−0.3364

Etymology

The specific name *ciliatus* is derived from the Latin word "cilium" for "eyelid" or "eyelash" and alludes to the numer-

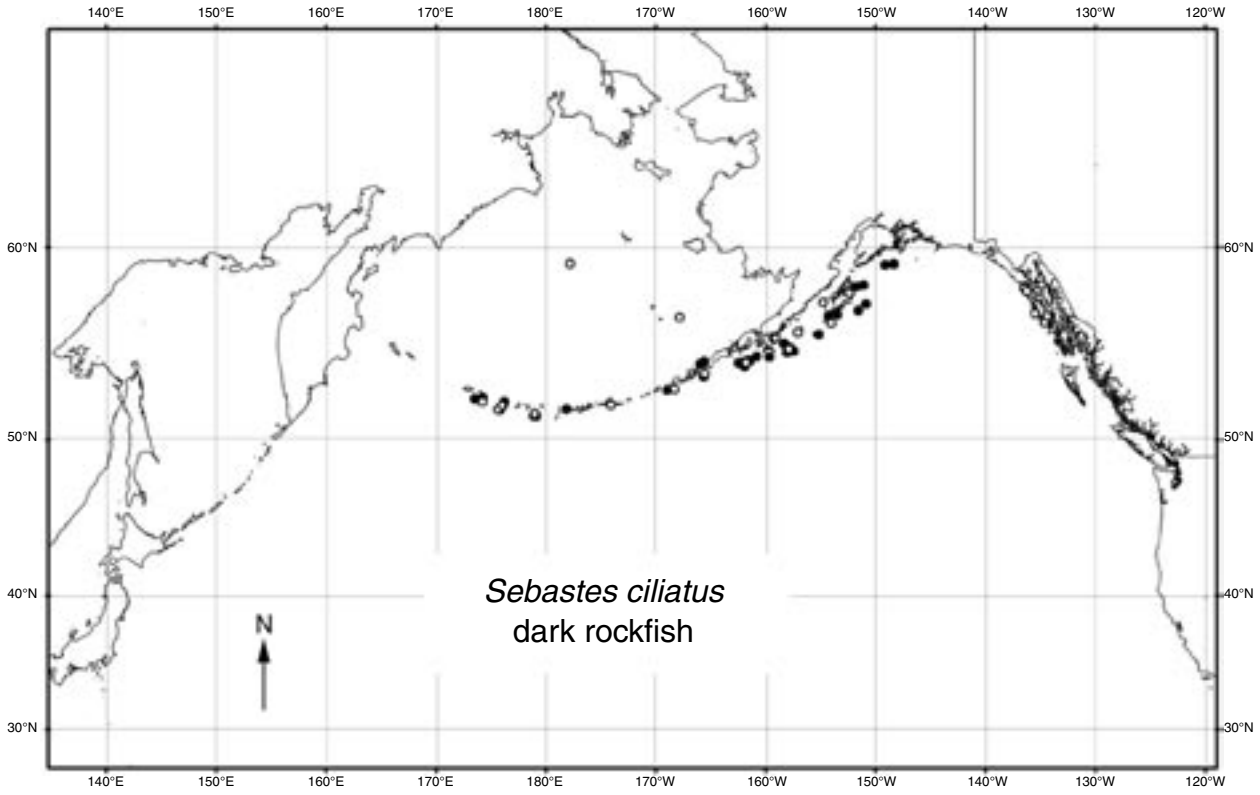

Figure 4

Distribution of *Sebastes ciliatus* based on material examined (open circles) and recent National Marine Fisheries Service survey data (closed circles) for the years 1999 to 2002. Each symbol may represent more than one capture.

ous accessory scales (similar to fringing eyelashes) that are found on the posterior field of the larger scales in most species of *Sebastes* (Tilesius, 1813).

Remarks

Tilesius (1813) based his description of *Epinephelus ciliatus* on a single specimen collected in the North Pacific "bordering Kamchatka and America," probably during the Krusenstern expedition of 1803–06 (Bauchot et al., 1997; Svetovidov, 1978, 1981; Pietsch, 1995). Although the illustration of the specimen was published (Tilesius, 1813; Fig. 2B), the specimen itself has since been lost, probably before the transfer of the Kunstkammer collection to the Zoological Museum of the Academy of Sciences, St. Petersburg (Svetovidov, 1978, 1981). Because *S. ciliatus* may easily be confused with other dark-colored *Sebastes* and *S. variabilis*, we have herein designated UW 43493, collected in Lynn Canal of southeast Alaska, as the neotype of *S. ciliatus*.

The illustration of the holotype of *E. ciliatus* Tilesius (1813) depicts a uniformly dark individual of *Sebastes*, and most of its reported meristics and other characters are consistent with both *S. ciliatus* and *S. variabilis*. However, its lateral-line pore count is low at 43, and although falling well within the range found in the material examined of *S. ciliatus*, the count is represented in only one individual of *S. variabilis* examined. Along with its low lateral-line pore count, a moderate symphyseal knob is illustrated, similar to that of *S. ciliatus*, excluding its identification as *S. melanops*, a common and similarly colored *Sebastes* found within the geographic range of *S. ciliatus*.

The anal-fin posterior margin of the specimen illustrated shows a moderate posterior slant, and tips of the posteriormost rays extend well past those of the anterior rays. *Sebastes ciliatus* may have an anal fin with a slight posterior slant, unlike *S. variabilis*, but it is never as pronounced as the illustration indicates. However, this character is not found in any other dark-colored species of *Sebastes* presently known from the Aleutian Islands and northern Gulf of Alaska west of Kodiak Island. *Sebastes entomelas* has an anal fin with a strong posterior slant to its posterior margin, but the northernmost record of this species is Kodiak Island (Allen and Smith, 1988; Love, 2002; Mecklenburg et al., 2002) where it is rare (RACE Division[6]). *Sebastes entomelas* also has a much higher count of lateral-line pores (50–60; Love et al., 2002).

One syntype of *Perca variabilis* was sent by Martin H. K. Lichtenstein (1780–1857), the director of the Berlin Zoological Museum in 1813, to Georges Cuvier at the Muséum National d'Histoire Naturelle in Paris, and has been preserved as MNHN 8670 (Svetovidov, 1981; Fig. 2A). Although originally from the collections of Carl Heinrich Merck (1761–1799; Svetovidov, 1981; Blanc and Hureau, 1968; Bauchot and Desoutter, 1986) and thus contempora-

neous with Tilesius's material, this specimen probably did not serve as the example for Tilesius's (1813) illustration. The illustration is of the left side of a whole fish, whereas MNHN 8670 is the dried skin and head of the right side. Counts and measurements taken from the original description and compared with the specimen indicate that it is improbable that the left side of this individual was the subject of the illustration. The counts provided by Tilesius (1813) include D XIII, (soft rays not given); A III, 8; P1 18; lateral-line pores 43. MNHN 8670 differs in counts of anal-fin rays (9) and in lateral-line pores (49). Although the symphyseal knob is reduced and the anal-fin margin is strongly slanted posteriorly in the Tilesius illustration, MNHN 8670 has a strong symphyseal knob and a perpendicular anal-fin margin with a distinctly pointed tip (Fig. 2, A and B).

Sebastes variabilis (Pallas, 1814)

Dusky rockfish

Figs. 1–3, 5; Tables 1–8

Perca variabilis Pallas, 1814:241 (original description, three? specimens; lectotype hereby designated, MNHN 8670, dried skin, sex unknown, 343.7 mm, "mari Americam borealum"; other syntypes apparently lost).

Sebastes variabilis: Cuvier, in Cuvier and Valenciennes, 1829:547 (new combination).

Sebastichthys ciliatus: Jordan and Jouy, 1881:8 (in part, new combination).

Sebastodes ciliatus: Jordan and Gilbert, 1883:658 (in part, new combination).

Sebastostomus ciliatus: Eigenmann and Beeson, 1894:388 (in part, new combination).

Sebastes ciliatus: Westrheim, 1973:1230 (in part, new combination).

Material examined

A total of 253 specimens, 48.0–430.8 mm, including the lectotype listed above, were examined. See Appendix for additional catalog numbers and locality data.

Diagnosis

A species of *Sebastes* with the following combination of character states: body light yellow to greenish brown to gray, typically greenish brown, with orange flecks variously present on sides, particularly light ventrally above anal-fin base and on ventral pectoral-fin rays; peritoneum light gray to jet black; symphyseal knob strong; extrinsic swimbladder muscle with a single section of striated muscle, lacking anterior fascia, otherwise of type I (a–z) of Hallacher (1974); lateral-line pores 43–54, lateral-line scales 47–63; pectoral-fin rays 16–19; anal-fin rays 7–9; dorsal-fin rays 13–16; vertebrae 28–29 (11–12 + 16–18).

Description

D XIII–XIV, 13–16; A III, 7–9; P1 16–19, 7–11 simple; lateral-line pores 43–54, scales 47–63; gill rakers 32–37 (10–11 + 22–26); vertebrae 28–29 (11–12 + 16–18) (one of ten specimens with 27 vertebrae, with one caudal vertebra bearing two neural and two haemal spines). Meristic frequency and statistical data are presented in Tables 2–4.

Morphometric data and statistics are presented in Tables 1 and 4. Body relatively deep, especially at nape, depth at pelvic-fin base 29.2–40.9% SL; profile of dorsal margin of head steep to nape above anterodorsal margin of gill slit, flattening to dorsal-fin origin. Mouth large, with posterior end of maxilla extending beyond pupil to or beyond posterior rim of orbit, maxilla length 42.7–54.0% HL; symphyseal knob strong with blunt tip, lower-jaw length 52.8–62.7% HL; mandibular pores of moderate size. Cranial spines weak, in large adults covered by flesh, head smooth. Nasal spines invariably present; parietal ridge invariably present and small spine typically present; postocular and tympanic spines typically absent or obsolete in adults (weak postocular spines present on at least one side in 29.7% and weak tympanic spines present on at least one side in 50.6% of specimens examined) are typically present in juveniles. Interorbital region wide, 22.5–30.4% HL, strongly convex; parietal ridges weak, and area between ridges slightly convex; preopercular spines 5, directed posteroventrally; two opercular spines, upper spine directed posteriorly, lower spine directed posteroventrally; posttemporal and supracleithral spines present; lachrymal spines rounded, small; dorsal margin of opercle nearly horizontal; lower margin of gill cover with small spines: posteroventral tip of subopercle and anteroventral tip of interopercle rugose or with 1 or 2 small spines.

Dorsal-fin origin above anterodorsal portion of gill slit; dorsal fin continuous, gradually increasing in height to spine IV or V and decreasing in height to spine XII; spine XIII much larger, forming anterior support of soft dorsal fin; membranes of spinous dorsal fin moderately incised, less so posteriorly; soft dorsal fin with anterior rays longest, posterior rays gradually shortening. Anal-fin spine II shorter than III (5.8–13.6 vs. 9.5–15.6% SL), anterior rays longest on soft rayed portion of anal fin, posterior rays gradually shortening, posterior margin perpendicular to body axis or with slight posterior slant, anterior ray tips directly ventral to posterior tips, anterior tip of anal fin typically pointed. Pectoral fins with ray 10 longest, extending to or slightly anterior to vent, fin-ray length 23.5–31.0% SL, fin base to ray tip length 24.2–35.1% SL; fin-base width 9.4–11.2% SL. Pelvic fins extend about 60% of distance from pelvic-fin base to anal-fin origin, falling well short of vent, ray length 19.2–29.2% SL, spine length 44.9–70.7% ray length. Caudal fin slightly emarginate, length 15.4–26.9% SL. Vent positioned below dorsal-fin spine 10, 2.2–7.0% SL from anal-fin origin.

Lateral body scales with many (ca. 5–7) accessory scales in posterior field. Maxilla and underside of mandible completely scaled; suborbital region scaled; branchiostegal rays scaled.

Gill rakers long, 11.6–19.9% HL, and slender on first arch, longest raker in joint between cerato- and hypobranchials, length of preceding and succeeding rakers progressively shorter; rudiments absent. Pseudobranchs 36–38.

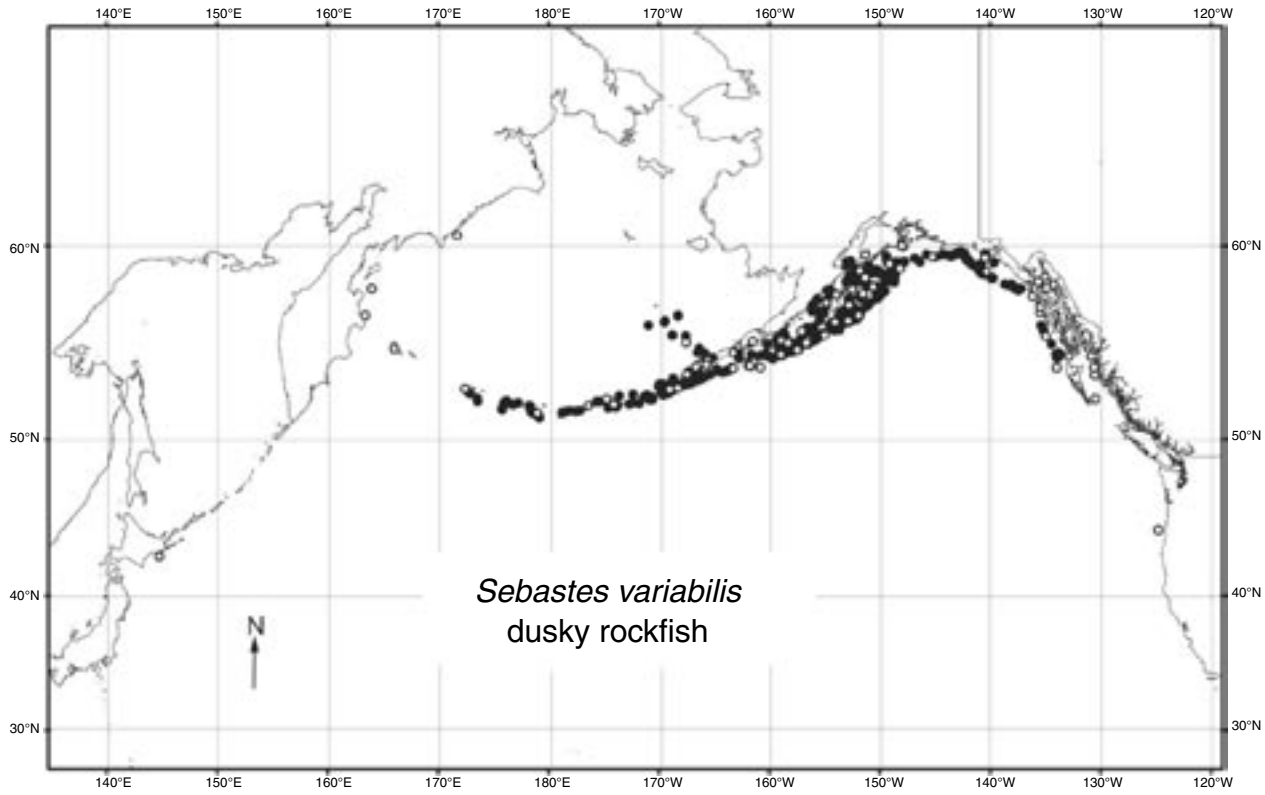

Figure 5

Distribution of *Sebastes variabilis* based on material examined (open circles) and recent National Marine Fisheries Service survey data (closed circles) for the years 1999 to 2002. Each symbol may represent more than one capture.

Body color in life variable (Fig. 1D); adults typically light, greenish-tan (Fig. 1B), often darker gray dorsally (Fig. 1D), rarely lighter yellow overall (Fig. 1D); invariably lightening ventrally to pinkish-white on head, belly, anal-fin base, and caudal peduncle; a clear demarcation between darker dorsum and light ventrum above anal-fin base; vague darker mottling tapering from origin of soft dorsal-fin ventrally and forward narrowing across lateral line, faint darker mottling also present farther posterior at soft dorsal-fin base, mottling most evident in tan individuals; brown to orange "flecks" present on sides of body on posterior fields of scales, appearing as darker speckling in juveniles. Head similar in background color to body, two prominent bars extending from orbit to preopercle, a prominent bar along anterior margin of maxilla in darker individuals (these bars obsolete in light individuals). Median fins and pelvic fins uniformly gray, lighter in light-bodied individuals. Pectoral fins brown to grayish pink; lower rays pink. Peritoneum light gray to jet black, typically dark gray; stomach, pyloric caeca, and intestines pale. See Figure 1 (A–D) and previously published color figures of Kessler (1985; "*Sebastes* sp., light dusky rockfish"), Kramer and O'Connell (1986; "*S. ciliatus,* light"), Kramer and O'Connell (1988, 1995; "*S. ciliatus,* light specimen"), Orr et al. (1998, 2000; "*S. ciliatus*, light dusky rockfish"), Orr and Reuter (2002; "light dusky"), Mecklenburg et al. (2002; "light phase").

Juveniles in life (Fig. 1C) lighter than adults, with dorsum light-brown to tan, background covered with orange-brown speckles, often with distinct dark band at base of soft dorsal fin; head brassy; ventrum pink on lower jaw, breast, and base of anal fin, lightening to white on belly.

Largest specimen examined 430.8 mm (527.7 mm fork length [FL], 541.3 mm TL; UW 44253). Maximum size reported 590 mm FL (RACE Division[6]).

Distribution and natural history

Sebastes variabilis is recorded from a single specimen off Hokkaido, Japan (Shinohara et al., 1994), and from other specimens collected from the east coast of Kamchatka to Cape Ol'utorskii (at 60°N) in the western Bering Sea, along the Aleutian Islands to 60°N in the eastern Bering Sea, through the Gulf of Alaska south to Johnstone Strait, British Columbia (Peden and Wilson, 1976; Richards and Westrheim, 1988; Fig. 5), and to central Oregon (based on a recently collected single specimen [UW 46575]). The earlier record of Schultz (1936) and Alverson and Welander (1952) from Washington at Neah Bay was reidentified by Westrheim (1968) as *S. entomelas*.

Although the depth of collection for material examined ranges from 6 to 370 m, and the species is recorded at depths to 675 m, large adults are commonly found along the edge of the continental shelf at depths of 100–300 m,

where the species is the target of commercial fisheries in the Gulf of Alaska. During trawl surveys, it is most commonly associated with *S. alutus* and *S. polyspinis*, and at greater depths with *S. aleutianus* (rougheye rockfish) throughout its range in Alaskan waters (Reuter, 1999; Ackley and Heifetz, 2001).

Females and males captured during summer (May–July) trawl surveys ranged widely in maturity state. Occasional ripe females were observed, although most females were maturing (Orr, personal observ.). A high percentage of females caught in trawl surveys during early April off southeast Alaska were releasing larvae, indicating that parturition occurs in the spring (Lunsford[7]). During July in shallower waters (ca. 40 m) of southeast Alaska, all *S. variabilis* collected were immature.

Etymology

The specific name *variabilis* is presumed to be a reference by Pallas (1814) to the wide range of body color in the species.

Remarks

Pallas (1814) described *Perca variabilis* from at least three specimens probably collected by Merck during the 1786–94 Billings expedition to the Russian Far East, including the Aleutian Islands, eastern Bering Sea, and northern Gulf of Alaska (Schmidt, 1950; Svetovidov, 1978, 1981; Pierce, 1990). One specimen was more completely described and used by him to obtain a set of counts and measurements. The other specimens were used to describe variation in the species, as in the following excerpt translated by the authors from the Latin text of Pallas (1814): "Body colored according to life and sex, varied, sometimes dark blue, belly white, fins blackish; female red below; those older wholly red or even purplish.…" Pallas (1814) ultimately based the name *P. variabilis* on the supposed variability in color in this species.

Jordan and Evermann (1898) examined an individual from the Pallas collection, recognized by him as the "summer variety" of *P. variabilis* (ZMB 8145). They identified this "summer variety" as *Sebastes aleutianus* Jordan and Evermann (Jordan, 1884, 1885; Jordan and Evermann, 1898), a species easily distinguished from both *S. variabilis* and *S. ciliatus* by its full complement of eight pairs of strong cranial spines. These specimens have since been lost, probably during the destruction of the Berlin Zoological Museum during World War II (Paepke and Fricke, 1992). Although Jordan and Gilbert (1883) wrote that *S. proriger* was also confounded with *S. ciliatus*, Jordan (1885) and Jordan and Evermann (1898) corrected this statement, noting that only *S. ciliatus* and *S. aleutianus* were included within the material described as *E. ciliatus* and *P. variabilis* by Tilesius and Pallas.

[7] Lunsford, C. 2002. Personal commun. National Marine Fisheries Service, Auke Bay Laboratory, Alaska Fisheries Science Center, 11305 Glacier Highway, Juneau, AK 99801-8626.

Although MNHN 8670 (Fig. 2A) is from the Pallas collection (Svetovidov, 1978, 1981), it is apparently not the specimen used for the complete description. In his original account, Pallas (1814) listed the following meristic data (modified to standard notation): D XIII, 15; A III, 7; P1 17 (8 simple). Although the dorsal-fin ray count is identical with that of the MNHN 8670 specimen, both anal- and pectoral-fin ray counts differ. All elements are well preserved and easily counted.

Comparisons of proportions are more difficult to interpret because measurements had not been standardized at the time of the original description. However, of those measurements that can be readily compared, the following significant differences were found, providing additional evidence that this individual was not the specimen used for the primary description: total length (391.6 mm in Pallas [1814; "longitudo majoris speciminis"] vs. 414.0 mm taken from MNHN 8670), head length (101.6 mm ["capitis a summa maxilla ad operculum angulum"] vs. either 96.6 mm [standard head length] or 110.2 mm [head length to tip of lower jaw]). The specimen used by Pallas for the detailed meristics and morphometrics is presumed lost (Svetovidov, 1978).

Ayres (1854) misidentified *S. melanops* from the vicinity of San Francisco Bay as *S. variabilis*. Günther (1860) and Ayres (1862, 1863) placed *S. variabilis* of Ayres into the synonymy of *S. melanops*.

Comparisons

Sebastes variabilis is most similar to *S. ciliatus*; the latter is distinguished by its uniformly dark-blue to black color. *Sebastes ciliatus* is invariably dark at the base of the anal fin and on the lower pectoral rays, areas of lighter color in *S. variabilis* even in those individuals that have an overall dark body. The peritoneum of *S. ciliatus* is always jet black, unlike the usual gray peritoneum of *S. variabilis*, which however may often be dark or occasionally jet black. In combination with these color differences, a low count of 39–42 lateral-line pores will distinguish *S. ciliatus* from *S. variabilis*, although the total range of counts overlaps considerably.

The extrinsic morphological features of the swimbladder of both *S. ciliatus* and *S. variabilis* are of type I (a–z) of Hallacher (1974) in which the anterior muscle mass originates from the occipital region of the neurocranium, attaches to the pectoral girdle near the insertion of Baudelot's ligament, passes between the epineural and pleural ribs of vertebrae 3 and 4, passes ventral to the pleural rib of vertebrae 5, and continues posteriorly as three tendons that insert on the pleural ribs of vertebrae 8, 9, and 10. In *S. ciliatus* and not *S. variabilis*, the anterior striated muscle mass is separated into two sections by a thin fascia, similar to the condition reported in *S. paucispinis* alone among species of *Sebastes* (Hallacher, 1974). The morphological features of the complex differ significantly in *S. paucispinis*, however, in that the striated muscle does not attach to the pectoral girdle but bypasses it to insert by a single tendon into the posterior portion of the swimbladder. Only five specimens each of *S. ciliatus* and *S. varia-*

bilis were dissected in the present study to examine these muscles. Additional material should be examined to assess the intraspecific variability and systematic significance of this character complex.

Typical habitats of these two species also differ. Adult *S. ciliatus* are found in nearshore shallow habitats at maximum depths of 160 m and are abundant in protected coves on the outer coast of Alaska. *Sebastes variabilis*, in contrast, is found along the continental shelf margin at depths to 675 m. However, adult *S. variabilis* have also been collected in nearshore waters as shallow as 40 m (UW 43494). In areas of sympatry, such as the inside waters in Lynn Canal of southeast Alaska and Monashka Bay of Kodiak Island, *S. variabilis* is found at greater depths in stronger current, whereas *S. ciliatus* is found, often with *S. melanops*, among kelp (*Macrocystis*) on rocky ledges (Blackburn and Orr, personal observ.).

Other uniformly dark colored species of *Sebastes,* such as *S. melanops* and *S. mystinus,* may also be confused with *S. ciliatus* and darker individuals of *S. variabilis*, although both may be distinguished on the basis of color and morphological features. The body of *S. melanops* is dark bluish-black, has black speckling on the dorsum and lateral surfaces, and a distinctly white ventrum (in contrast with the slightly lighter ventrum of *S. ciliatus* [Fig. 1E]). Unlike *S. ciliatus*, in which the peritoneum is jet black, *S. melanops* has a white peritoneum. In *S. melanops*, five or six faint light blotches slightly larger than the orbit are present on the dorsum about midway between the lateral line and the dorsal-fin base. These blotches are especially prominent underwater, and in Alaska easily distinguish *S. melanops* from both *S. variabilis* and *S. ciliatus*, which lack blotches (Lauth[8]; see color figures of Love, 2002, and Stewart and Love, 2002). The symphyseal knob in *S. melanops* is obsolete, consisting only of a fleshy pad at the tip of the mandible, unlike the distinct bony knob of *S. ciliatus* and *S. variabilis*. Mandibular pores of *S. melanops* are obsolete, as compared with the larger, readily apparent pores of *S. ciliatus* and *S. variabilis.* Vertebral counts also differ, from 28–29 in *S. ciliatus* and *S. variabilis* to 26 in *S. melanops*. *Sebastes melanops* ranges from southern California to Atka Island in the Aleutian Islands (Mecklenburg et al., 2002) and the southern Bering Sea, where its presence is documented by a single recent collection (UW 47037). Most previous reports from the Bering Sea may be of *S. ciliatus*.

Sebastes mystinus is also similar to *S. ciliatus* but may be distinguished by the four distinct dark bars across its head and nape contrasting with its general body color of light mottled bluish-gray. The mouth of *S. mystinus* is smaller than that of *S. ciliatus*, and the maxilla extends only to the middle of the pupil rather than to the posterior portion of the orbit as in *S. ciliatus*. Like *S. melanops* and most Pacific *Sebastes*, *S. mystinus* has 26–27 vertebrae, compared to the 28–29 vertebrae of *S. ciliatus* and *S. variabilis*. *Sebastes mystinus* has been recorded from Sitka Harbor, Alaska (Kramer and O'Connell, 1995), to Punta Santo Tomas, northern Baja California (Hobson, 2002). Earlier reports from Kodiak Island, the Aleutian Islands, and Bering Sea are undocumented (Quast and Hall, 1972; Kramer and O'Connell, 1995; Mecklenburg et al., 2002) and probably refer to *S. ciliatus*.

Sebastes polyspinis is commonly caught in trawls and may be confused with *S. variabilis*, especially when preserved. It can be distinguished from *S. variabilis* by its modal count of 14 dorsal-fin spines and light (pink or white when live) oblique band across the lower rays of the pectoral fin, which remains prominent when recently preserved. In life, the overall color of *S. polyspinis* is reddish-orange to pink, overlaid with gray-green mottling and fine green spots. Evermann and Goldsborough (1907) considered the then undescribed *S. polyspinis* within the range of variation of "*S. ciliatus*," because at least one lot (USNM 6243) was misidentified by them as "*S. ciliatus*." They probably also confused *S. melanops* with *S. variabilis*, or possibly *S. polyspinis*, describing the color in life of *S. melanops* from Alaska as "olive-brown, blotched with dirty red." *Sebastes melanops* never has a trace of red, whereas the most common color pattern of *S. variabilis* could be adequately described by this phrase.

In the western Pacific, two species, the dark-colored *S. taczanowskii* and the light-colored *S. schlegelii*, may be confused with *S. ciliatus* and *S. variabilis*, respectively. Both may be distinguished from *S. ciliatus* and *S. variabilis* by modal counts of pectoral-fin rays (15 in *S. taczanowskii* and 17 in *S. schlegelii* vs. 18 in both *S. ciliatus* and *S. variabilis*) and vertebrae (26 in both *S. taczanowskii* and *S. schlegelii* vs. 28–29 in *S. ciliatus* and *S. variabilis*). *Sebastes schlegelii* may also be distinguished by its typical dorsal-fin spine count of 12 (vs. 13 in *S. ciliatus* and *S. variabilis*).

Implications for fisheries management

The dusky rockfish (*S. variabilis*) and the dark rockfish (*S. ciliatus*) have been subjected to two distinct fisheries separately managed by U.S. federal and Alaska state agencies: *S. variabilis* is captured in the offshore trawl fishery; *S. ciliatus*, in the nearshore jig fishery. Although the offshore fisheries for dusky rockfish only incidentally catch the dark rockfish and are managed for dusky rockfish, the nearshore fishery is not managed for dark rockfish, and instead the species has been routinely misidentified as black rockfish (*S. melanops*). *Sebastes ciliatus* has been found to comprise up to 25% of the catch in the "black rockfish" jig fishery of the northern Gulf of Alaska (Clausen et al.[1]).

Several differences in biologically significant parameters were evident from specimens examined in our study and from observations in survey data. The two species are typically found in different habitats, attain different maximum sizes, and show differences in reproductive seasonality. Recognizing the two as distinct species is the first step towards establishing a biologically based, species-specific management scheme.

[8] Lauth, R. R. 1998. Personal commun. Resource Assessment and Conservation Engineering Division, Alaska Fisheries Science Center, Natl. Mar. Fish. Serv., NOAA, 7600 Sand Point Way NE, Seattle, WA 98115.

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Appendix

Material examined

Sebastes ciliatus Bering Sea: UW 45488, 1(329.7 mm), 56.65°N, 167.8167°W, 100 m depth, 5 February 2001; UW 22474, 1(221.7 mm), 59.25°N, 177.8167°W, 160 m depth, 1987. Aleutian Islands: UW 43447, 1(290 mm), 51.2534°N, 179.2689°E, 165 m depth, 26 July 1997; UW 45588, 2(240–380 mm), Aleutian Is., FV *Vesteraalen*, 1997; ABL 69-13, 2(228.8–250.9 mm), Amchitka I., Constantine Harbor, 51.4°N, 179.3667°E, 6 September 1968; UW 46489 (UK T002383), 1(279.7 mm), 51.2707°N, 179.2118°E, 98 m depth, 26 July 1997; UW 45498, 1(318.5 mm), 51.9921°N, 174.1031°W, 93 m depth, 6 July 1997; UW 43039, 4(83.8–206.5 mm), Amchitka I., Constantine Harbor, off Kirilof, 7 December 1961; UW 43423, 2(295.1–315.9 mm), Amchitka I., 51.3833°N, 178.9°E, 88 m depth, 20 April 1993; UW 43436, 12(272–315 mm), 51.7552°N, 175.6726°E, 94 m depth, 1 August 1997; UW 14416, 1(183 mm), Amchitka I., Constantine Harbor, 5 September 1955; UW 43458, 5(263.9–288.6 mm), 51.2707°N, 179.2118°E, 98 m depth, 26 July 1997; UW 4766, 1(189 mm), Atka I., Atka village, 18 August 1938; UW 46483, 2(230–253 mm), 51.9730°N, 176.0841°E, 78 m depth, 20 July 2000; UW 46484, 2(275–293 mm), 51.9638°N, 176.0288°E, 64 m depth, 20 July 2000; UW 47417, 1(320 mm), Aleutian Is., recovered from stomach of *Gadus macrocephalus*. Gulf of Alaska: UW 43242, 6(320–390 mm), 53.7345°N, 165.5425°W, 89 m depth, 25 June 1996; UW 43272, 5(274–325.5 mm), 55.093°N, 157.8048°W, 76 m depth, 10 June 1996; UW 43420, 1(334.7 mm), 55.9042°N, 157.0751°W, 101 m depth, 18 June 1996; UW 45508, 2(242.4–292.6 mm), 55.1056°N, 157.9594°W, 78 m depth, 2 June 1999; UW 45512, 1(235.2 mm), 57.3806°N, 154.8009°W, 67 m depth, 7 June 1999; UW 45509, 1(298 mm), 54.3215°N, 161.8107°W, 72 m depth, 23 May 1999; UW 47412, 1(323.7 mm), 52.8953°N, 168.297°W, 99 m depth, 21 May 2001; UW 46488, 1(270 mm), 56.3686°N, 154.0495°W, 69 m depth, 24 June 2001; UW 46584, 1(295 mm), 55.1056°N, 157.9594°W, 78 m depth, 2 June 1999; UW 46485, 1(320.1 mm), 55.01862°N, 157.882°W, 76 m depth, 8 June 2001. Kodiak Island area: UW 43059, 1(200.7 mm), Kodiak I., Monashka Bay, SW of Trenton Pt., 57.8367°N, 152.4°W, 28 July 1977; UW 47289, 2(169–203.7 mm), Kodiak I., Monashka Bay, 5 m depth, 57.8383°N, 152.4283°W, 5 m depth, 31 July 1982; UW 44035, 2(216.7–274.5 mm), Kodiak I., Monashka Bay, 57.8367°N, 152.4°W, 18 m depth, 2 August 1982; UW 44036, 11(178.2–263.7 mm), Kodiak I., Monashka Bay, 57.8383°N, 152.4283°W, 12 m depth, 3 August 1982; UW 44045, 19(140.6–307.8 mm), Kodiak I., Monashka Bay, 57.8383°N, 152.4283°W, 15 m depth, 12 August 1982; UW 44049, 1(291.6 mm), Kodiak I., Monashka Bay, 57.8383°N, 152.4283°W, 12 m depth, 11 September 1982; UW 44050, 1(331 mm), NE of Kodiak I., Triplets Is., 57.98°N, 152.48°W, 18 m depth, 1 July 1983; UW 44051, 1(319.7 mm), Kodiak I., Monashka Bay, 57.8367°N, 152.4°W, 6 m depth, 14 October 1982. Southeast Alaska: ABL 60-7, 1(164 mm), Kuiu I., Washington Bay, ca. 5 mi W of Petersburg, 2 June 1960; ABL 62-105, 1(224.5 mm), Little Port Walter, SE tip of Baranoff I.; ABL 68-295, 1(214.1 mm), NW tip of Lincoln I., ca. 5 mi N of Pt. Retreat, Lynn Canal, 7.5 m depth, 4 July 1968; ABL 87-15, 1(111.8 mm), Port Althorp, 58.1317°N, 136.3333°W, 126–146 m depth, 18 July 1982; UW 43484, 17(202.8–315 mm), Cross Sound, Chichagof I., Soapstone Cove, 58.1°N, 136.5°W, 25 m depth, 11 July 1998; UW 43485, 19(124.4–264.7 mm), Lisianski Strait, 57.925°N, 136.288°W, 10 m depth, 12 July 1998; UW 43492, 3(153.7–241.1 mm), Lynn Canal, Funter Bay, 58.2467°N, 134.8983°W, 25 m depth, 13 July 1998; UW 22426, 2(134.8–169.4 mm), Alexander Archipelago, Biorka Channel, S. of Sitka, 33 m depth, 21 February 1982.

Sebastes variabilis Japan: HUMZ 125816, 1(334.0 mm), Pacific coast off Kushiro, Hokkaido, 42.6833°N, 144.7667°E, 200 m depth, 2 March 1993. Bering Sea: KIE 1277, 1(320.3 mm), east coast of Kamchatka off Cape Ol'utorskii, 60.4667°N, 171.75°E, 370 m depth, 18 August 1994; KIE 1409, 2(334.5–344.7 mm), Commander Is., Bering I., 55°N, 166.05°E, 90–120 m depth, 30 April 1996; KIE uncat, 1(324.5 mm), Karaginskiy Bay, 1 August 1998; UW 43500, 1(314.5 mm), 55.3179°N, 167.5503°W, 147 m depth, 3 July 1998; UW 43499, 1(370 mm), 56.7°N, 163.4°W, 77 m depth, 18 June 1998; UW 43498, 3(330–340 mm), 54.4763°N, 159.6925°W, 4 June 1996; UW 40308, 1(180 mm), 55.36°N, 163.44°W, 84 m depth, 7 May 1990; UW 40311, 1(187 mm), 55.55°N, 163.75°W, 84 m depth, 3 May 1990; UW 44166, 1(339.3 mm), Alaska, "2-1-92" at 1800 hours; UW 44182, 2(258.2–266 mm), FV *Yukon Challenger*, haul 105, 8 March 1993; UW 44253, 1(430.8 mm), Aleutian Is., 52.3°N, 173.8–174.7°W, 106–113 m depth, 10 April 1991; UW 44255, 1(375.7 mm), 56.4192°N, 152.853°W, 182 m depth, 24 March 1990; UW 44261, 1(331.1 mm), 57.3333°N, 151.4167°W, 128 m depth; UW

47411, 1(360 mm), Bering Sea, winter 2001, P. J. Sullivan. Aleutian Islands: UW 43480, 1(370 mm), 51.2522°N, 179.199°E, 173 m depth, 20 July 1997; UW 43460, 1(340 mm), Aleutian Is., FV *Dominator*, summer 1997; UW 43438, 5(330–370 mm), 51.9252°N, 176.3817°W, 122 m depth, 23 July 1997; UW 43455 (KU T002038), 1(275 mm), 51.2707°N, 179.2118°E, 98 m depth, 26 July 1997; UW 45499, 2(327–330 mm), 51.9921°N, 174.1031°W, 93 m depth; UW 45632, 3(83.3–126.1 mm), Amchitka I., NE of Sand Beach Cove, 51.5°N, 179°E, 36 m depth, 20 August 1971; UW 45460, 1(98.7 mm), 54.0386°N, 166.6406°W, 85 m depth, 22 May 2000; UW 43441, 2(380–381 mm), 54.17902°N, 166.3255°W, 240 m depth, 12 June 1997; UW 43442, 1(355 mm), 54.0386°N, 166.6572°W, 90 m depth, 13 June 1997; UW 43445, 2(315–340 mm), 54.3773°N, 165.608°W, 90 m depth, 11 June 1997; UW 43459 (KU T002038), 1(264.2 mm), 51.2707°N, 179.2118°E, 98 m depth, 26 July 1997; UW 43461, 1(330 mm), 53.6905°N, 167.2648°W, 112 m depth, 13 June 1997; UW 43416, 1(290 mm), 54.796°N, 163.2772°W, 89 m depth, 1 June 1996; UW 43443, 1(230 mm), 52.8589°N, 172.4586°E, 146 m depth, 5 August 1997; UW 43444, 1(220 mm), 52.8589°N, 172.4586°E, 146 m depth, 5 August 1997; UW 45588, 2(350–350 mm), Aleutian Is., FV *Vesteraalen*, summer 1997; UW 46482, 4(175–225 mm), 52.8280°N, 168.9904°W, 44 m depth, 20 May 2001. Gulf of Alaska: UW 43204, 7(350–420 mm), 55.4327°N, 158.9439°W, 155 m depth, 8 June 1996; UW 43200, 6(320–390 mm), 55.2924°N, 156.6652°W, 114 m depth, 12 June 1996; UW 43214, 1(190 mm), 57.3175°N, 154.8356°W, 82 m depth, 21 June 1996; UW 43212, 1(300 mm), 54.9351°N, 157.4668°W, 153 m depth, 12 June 1996; UW 43201, 8(290–380 mm), 54.1125°N, 161.7306°W, 111 m depth, 1 June 1996; UW 43203, 8(305–405 mm), 54.1125°N, 161.7306°W, 111 m depth, 1 June 1996; UW 43211, 2(380–410 mm), 54.6806°N, 158.9407°W, 95 m depth, 8 June 1996; UW 43213, 1(345 mm), 53.9849°N, 163.2663°W, 108 m depth, 30 May 1996; UW 43416, 1(290 mm), 54.7960°N, 163.2772°W, 89 m depth, 1 June 1996; UW 43417, 1(241.4 mm), 55.2898°N, 158.3123°W, 130 m depth, 10 June 1996; UW 43377, 1(356.4 mm), 55.6441°N, 134.9706°W, 202 m depth, 26 July 1996; UW 45587, 4(325.3–376.2 mm), 55.4351°N, 156.5458°W, 167 m depth, 15 June 1996; UW 44123, 1(85.3 mm), 57.2128°N, 152.7898°W, 135 m depth, 24 October 1997; KU T3178, 1(348.7 mm), 58.8191°N, 140.3303°W, 185 m depth, 14 July 1999; KU T003215, 1(324.3 mm), 58.8191°N, 140.3303°W, 185 m depth, 14 July 1999; KU T003216, 1(373.9 mm), 58.8191°N, 140.3303°W, 185 m depth, 14 July 1999; USNM 32014, 1(240.1 mm), Tolstoi Bay, October 1882; UW 45477, 2(351.5–352.8 mm), 59.1787°N, 149.1194°W, 157 m depth, 29 June 1999; UW 45510, 4(335–370 mm), 58.9658°N, 148.1749°W, 251 m depth, 14 July 1996; UW 45511, 3(206.2–213.4 mm), 57.3806°N, 154.8009°W, 67 m depth, 7 June 1999; UW 46487, 1(333.1 mm), 52.8953°N, 168.297°W, 99 m depth, 21 May 2001; UW 43427, 1(350 mm), 54.2758°N, 161.4326°W, 122 m depth, 3 June 1996; UW 43428, 1(315 mm), 55.9042°N, 157.0751°W, 101 m depth, 18 June 1996; UW 43466, 1(380 mm), 59.4469°N, 140.4849°W, 226 m depth, 30 July 1993; UW 43471, 1(371.7 mm), 58.0895°N, 150.5977°W, 141 m depth, 5 August 1993; UW 43473, 1(342 mm), 59.4469°N, 140.4849°W, 226 m depth, 18 July 1996; UW 22475, 2(240–270 mm), 54.0167°N, 160.8°W, 170 m depth, 4 November 1981; UW 40912, 1(213.6 mm), Prince William Sound, 60.5658°N, 147.5866°W, 70 m depth, 2 October 1989; UW 43214, 1(187.9 mm), 57.3175°N, 154.8356°W, 82 m depth, 21 June 1996; UW 43251, 8(320–420 mm), 59.5045°N, 145.2262°W, 135 m depth, 17 July 1996. Kodiak Island area: ABL 66-890, 1(103 mm), Marmot Bay, Kodiak I., 57.9333°N, 152.1167°W, 1964; UW 44052, 1(215.5 mm), Kodiak; UW 44032, 1(93.4 mm), Cook Inlet, Kachemak Bay, 59.6°N, 151.3°W, "<50 m" depth, 8 September 1981; UW 44033, 2(95.7–112 mm), Cook Inlet, Kachemak Bay, 59.6°N, 151.3°W, "<50 m" depth, 10 October 1981; UW 47148, 5(95.5–112 mm), Cook Inlet, Kachemak Bay, 59.6°N, 151.3°W, 10 October 1981; UW 44034, 1(363 mm), NE of Kodiak I., Triplets Is., 57.98°N, 152.48°W, 20–24 m depth, 1 July 1982; UW 44037, 1(335 mm), E of Kodiak I., 57.72–57.87°N, 151.8–152.2°W, crab pot, 18 August 1982; UW 44038, 2(275.3–310 mm), 57.975°N, 151.8433°W, 144 m depth, 19 August 1982; UW 44039, 3(266.7–300.4 mm), Kodiak I., Monashka Bay, 57.8367°N, 152.4°W, 15 m depth, 31 August 1982; UW 44040, 5(269.7–303.7 mm), Kodiak I., Monashka Bay, 57.8367°N, 152.4°W, 20 m depth, 14 October 1982; UW 44041, 1(281.1 mm), NE of Kodiak I., Triplets Is., 57.98°N, 152.48°W, 20 m depth, 2 July 1983; UW 43381, 1(340 mm), Triplets Is., hook and line, 57.98°N, 152.48°W, 34 m depth, 15 July 1993; UW 44042, 2(199.5–215.8 mm), Shelikof Strait off mouth of Uyak Bay, 57.7°N, 153.92°W, 100 m depth, 2 April 1984; UW 44043, 12(231.3–271.3 mm), Shelikof Strait; UW 44044, 2(229.6–257.8 mm), Kodiak I., Monashka Bay, jig, 57.8367°N, 152.4°W, 15 m depth, 12 August 1982; UW 44046, 1(302 mm), E of Kodiak I., 58.5217°N, 151.3333°W, 154 m depth, 21 August 1982; UW 44047, 1(321.7 mm), E of Kodiak I., 58.85°N, 151.8167°W, 113 m depth, 21 August 1982; UW 44048, 1(318.3 mm), Kodiak I., Monashka Bay, 57.8367°N, 152.4°W, 18 m depth, 11 September 1982; UW 46486, 1(278.5 mm), 56.6941°N, 151.9115°W, 59 m depth, 27 June 2001; UW 47362, 3(122–219 mm), 56.3686°N, 154.0495°W, 69 m depth, 24 June 2001. Southeast Alaska: UW 43495, 1(262 mm), Lynn Canal, N of Funter Bay, 58.03°N, 134.8967°W, 40 m depth, 13 July 1998; ABL 66-156, 1(269.4 mm), Barlow Cove, 19 mi NW of Juneau, 58.3197°N, 134.8967°W, 12 February 1967; ABL 68-301, 1(249.8 mm), Lynn Canal, off reef at N end of Little I., ca. 9 mi N of Pt. Retreat, 58.5417°N, 135.0433°W, 3 August 1968; ABL 69-116, 2(77.7–136.3 mm), Chichagof I., Ogden Passage between Khaz Bay and Portlock Harbor, 57.6333°N, 136.1617°W, 10 September 1969; ABL 69-122, 2(82–82.1 mm), Chichagof I., Icy Strait off SE end of Pleasant I., 58.3333°N, 135.6333°W; ABL 70-103, 1(173.2 mm), Gastineau Channel, Marmion I., ca. 9 mi. S of Juneau, 58.2°N, 134.2533°W, 10 July 1970; UW 43494, 11 (150.7–225.2 mm), Lynn Canal, Funter Bay, 58.2467°N, 134.8988°W, 37 m depth, 13 July 1998; UW 44117, 26(153.8–272.7 mm), Funter Bay, 58.2467°N, 134.8983°N, 40 m depth, 13 July 1998; UW 44118, 5(151.9–190.0 mm),

Funter Bay, 58.2467°N, 134.8983°W, 40 m in depth, 13 July 1998; UW 46526, 12(48.0–93.5 mm), Sitka Sound, Middle I., 57.1°N, 135.45°W, 4 June 2001; UW 48866, 3(78.1–156.7 mm), Alexander Archipelago, Biorka Channel, S of Sitka, 33 m depth, 21 February 1982. British Columbia: BCPM 974-0623-001, 5(342–367 mm), Hecate Strait, Moresby Gully, RV *G. B. Reed*, 52.31°N, 130.4867°W, 185–199 m depth, 14 September 1974; BCPM 974-416, 1(154.7 mm), Dundas I., Brundige Inlet, reef at entrance to E arm, 1–5 m depth; BCPM 974-419, 1(124.8 mm), Dundas Is., Brundige Inlet, just N of island at entrance to E arm, 54.6043°N, 130.8612°W, 6–15 m depth, 19 June 1974; BCPM 974-434, 2(108.3–113.8 mm), mouth of Brundige Inlet E shore, 8–12 m depth; BCPM 974-447, 2(168.9–175.6 mm), Welcome Harbour channel, 54.0225°N, 130.6133°W, 6–12 m depth, 2 July 1974; BCPM 974-467, 2(127.9–162.1 mm), off Parkin Islets (E side), 54.6261°N, 130.4639°W, 6–8 m depth, 12 July 1974; BCPM 974-468, 1(120 mm), off N tip of Birnie Is., 54.6045°N, 130.4508°W, 6–12 m depth, 13 July 1974; BCPM 974-485, 1(129.9 mm), off island in Griffith Harbor, 53.6011°N, 130.5486°W, 5–8 m depth, 20 July 1974; BCPM 974-489, 2(145.8–151.5 mm), Safa Islets, 54.7733°N, 130.6067°W, 6–18 m depth, 28 July 1974. Oregon: UW 46575, 1(355 mm), 44.4°N, 124.783°W, 265 m depth, 17 May 2002.

Significant comparative material examined

Sebastes melanops USNM 342, syntypes, Cape Flattery, Washington, and Astoria, Oregon; UW 47037, 1(350 mm), Bering Sea, 55.2333°N, 164.65°W, 2 February 2002; UW 43490, 3(195–230 mm), Cross Sound, Chichagof I., Soapstone Cove, 58.1°N, 136.5°W, 25 m depth, 11 July 1998; UW 47288, 2(163–182 mm), Kodiak I., Monashka Bay, 5 m depth, 57.8383°N, 152.4283°W, 5 m depth, 2 August 1982.

Sebastes mystinus USNM 27031, syntype, 1(346 mm), Monterey, California; USNM 27085, syntype, 1(269 mm), Monterey, California; USNM 26971, syntype, 1(212 mm), Monterey, California.

Sebastes polyspinis USNM 60243, 2(75.3–141.3 mm), Alaska, Chignik Bay, 13.6 km S of Tuliumnit Point, 56°N, RV *Alabatross*, Sta. 4285, 57–108 m depth, 10 August 1903.