Shortspine thornyhead − *Sebastolobus alascanus*

Overall Vulnerability Rank = Moderate

Biological Sensitivity = High

Climate Exposure = Moderate

Sensitivity Data Quality = 33% of scores ≥ 2

Exposure Data Quality = 56% of scores ≥ 2

	Sebastolobus alascanus	Expert Scores	Data Quality	Expert Scores Plots (Portion by Category)
Sensitivity attributes	Habitat Specificity	1.9	1.9	
	Prey Specificity	1.8	1.9	
	Adult Mobility	2.4	2.5	
	Dispersal of Early Life Stages	1.7	1.6	
	Early Life History Survival and Settlement Requirements	2.5	1.4	
	Complexity in Reproductive Strategy	1.9	1.5	
	Spawning Cycle	3.1	1.2	
	Sensitivity to Temperature	2.4	2.1	
	Sensitivity to Ocean Acidification	1.8	1.6	
	Population Growth Rate	3.8	2.1	
	Stock Size/Status	1.5	1.4	
	Other Stressors	1.1	2.6	
	Sensitivity Score	High		
Exposure factors	Sea Surface Temperature	2.0	2.0	
	Sea Surface Temperature (variance)	1.8	2.0	
	Bottom Temperature	2.2	2.0	
	Bottom Temperature (variance)	2.8	2.0	
	Salinity	1.3	2.0	
	Salinity (variance)	2.6	2.0	
	Ocean Acidification	4.0	2.0	
	Ocean Acidification (variance)	1.3	2.0	
	Phytoplankton Biomass	1.1	1.2	
	Phytoplankton Biomass (variance)	1.2	1.2	
	Plankton Bloom Timing	1.7	1.0	
	Plankton Bloom Timing (variance)	2.3	1.0	
	Large Zooplankton Biomass	1.1	1.0	
	Large Zooplanton Biomass (variance)	1.5	1.0	
	Mixed Layer Depth	1.9	1.0	
	Mixed Layer Depth (variance)	2.4	1.0	
	Currents	1.4	2.0	
	Currents (variance)	1.6	2.0	
	Air Temperature	NA	NA	
	Air Temperature (variance)	NA	NA	
	Precipitation	NA	NA	
	Precipitation (variance)	NA	NA	
	Sea Surface Height	NA	NA	
	Sea Surface Height (variance)	NA	NA	
	Exposure Score	Moderate		
	Overall Vulnerability Rank	Moderate		

Low
Moderate
High
Very High

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Shortspine Thornyhead (*Sebastolobus alascanus*)

Overall Climate Vulnerability Rank: **Moderate**. (93% certainty from bootstrap analysis).

Climate Exposure: **Moderate**. Exposure to ocean acidification (4.0) was ranked as "very high", and exposure to variability in bottom temperature (2.8) and variability in salinity (2.6) were ranked as "moderate".

Biological Sensitivity: **High**. Population growth rate (3.8) was ranked as "very high" sensitivity, and spawning cycle was ranked as "high" sensitivity.

Potential for distribution change: **High** (66% certainty from bootstrap analysis). Dispersal of early life stages and habitat specificity indicated high potential for distribution change, and adult mobility indicated moderate potential for distribution change.

Directional Effect in the Eastern Bering Sea: Projected climate change in the eastern Bering Sea is expected to have a neutral effect on shortspine thornyhead, with 57% certainty in expert scores.

Data Quality: 33% of the sensitivity attributes, and 56% of the exposure factors, had average data quality scores of 2 or greater (indicating at least "moderate" data quality).

Climate Effects on Abundance and Distribution:

Juveniles likely prey on euphausiids, which have a calcium carbonate exoskeleton. Euphausiids feed on copepods, which in turn are dependent on phytoplankton. Therefore, there is both a seasonality component of euphausiid abundance, which depend on the timing of spring ice melt in the Bering Sea, and interannual variation depending on environmental conditions (Hunt et al. 2011).

Life History Synopsis:

Shortspine thornyhead range from the Bering Sea to Baja, California, 51N to 60N latitude, and have been found in waters from 93-1,460 m. Adults inhabit the lower portion of the water column along the middle and outer eastern Bering Sea shelf (50 to 200 m) and upper to lower Bering Sea slope (200 to 1,000 m). They are most commonly found in sandy habitat, the predominant bottom type in the eastern Bering Sea, and they occur most commonly at 500-800m (Sigler et al. 2015).

Thornyheads spawn buoyant masses of eggs during April- July that resemble bilobate "balloons" which float to the surface (Pearcy 1962). Complete hatching time is unknown but is probably more than 10 days. Juvenile shortspine shornyheads have a pelagic period of about 14-15 months and settle out on the shelf (100 m) at about 22 to 27 mm (Moser 1974). Very little information is available regarding the habitats and biological associations of juvenile shortspine thornyheads. Juveniles inhabit the general distribution of adults; epipelagic waters along the outer shelf (100-200 m) and slope (200-3,000 m) throughout the BSAI. Adults reside in the lower portion of the water column but eggs are buoyant. Juveniles settle to the lower region of the water column; therefore, throughout their life history they utilize the entire water column.

Shortspine thornyheads share many life history traits with longspine thornyhead and the two species often co-occur. The primary prey species of longspine thornyhead pelagic juveniles is probably euphausiids. Studies have not examined the prey of shortspine thornyhead, but it can be inferred that shortspine and longspine thornyhead juvenile diets are similar (Ou, 2014). Shortspine thornyhead adults prey mainly on epibenthic shrimp and fish. Yang (1996, 2003) showed that shrimp were the top prey item for shortspine thornyheads in the Gulf of Alaska whereas cottids were the most important prey item in the Aleutian Islands region. Differences in abundance of the main prey between the two areas might be the main reason for the observed diet differences.

Shortspine thornyhead are managed in the eastern Bering Sea as a single stock within the Other Rockfish Species Complex. They are 50% mature at 21.5cm, and attain a maximum length of 80 cm (Pearson and Gunderson 2003). Their maximum age is unknown but may be as long as 100-200 years (Pearson and Gunderson 2003). Their rate of instantaneous natural mortality is estimated to be low, 0.013-0.017 year^{-1} (Pearson and Gunderson 2003). They are not currently experiencing overfishing or in an overfished condition.

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