

Scup – *Stenotomus chrysops*

Overall Vulnerability Rank = Moderate ■

Biological Sensitivity = Low ■

Climate Exposure = Very High ■

Data Quality = 88% of scores ≥ 2

<i>Stenotomus chrysops</i>		Expert Scores	Data Quality	Expert Scores Plots (Portion by Category)
Sensitivity attributes	Stock Status	1.0	3.0	
	Other Stressors	1.8	2.4	
	Population Growth Rate	2.5	2.6	
	Spawning Cycle	3.2	3.0	
	Complexity in Reproduction	1.3	3.0	
	Early Life History Requirements	2.5	1.8	
	Sensitivity to Ocean Acidification	1.3	3.0	
	Prey Specialization	1.3	3.0	
	Habitat Specialization	1.4	3.0	
	Sensitivity to Temperature	1.6	3.0	
	Adult Mobility	1.5	3.0	
	Dispersal & Early Life History	2.3	2.0	
	Sensitivity Score	Low		
	Exposure variables	Sea Surface Temperature	4.0	3.0
Variability in Sea Surface Temperature		1.0	3.0	
Salinity		2.5	3.0	
Variability Salinity		1.2	3.0	
Air Temperature		4.0	3.0	
Variability Air Temperature		1.0	3.0	
Precipitation		1.2	3.0	
Variability in Precipitation		1.3	3.0	
Ocean Acidification		4.0	2.0	
Variability in Ocean Acidification		1.0	2.2	
Currents		2.0	1.0	
Sea Level Rise		1.5	1.5	
Exposure Score		Very High		
Overall Vulnerability Rank		Moderate		

Scup (*Stenotomus chrysops*)

Overall Climate Vulnerability Rank: **Moderate** (30% certainty from bootstrap analysis).

Climate Exposure: **Very High**. Three exposure factors contributed to this score: Ocean Surface Temperature (4.0), Ocean Acidification (4.0) and Air Temperature (4.0). Exposure to all three factors occur during all life stages. Scup spawn in coastal waters and early life stages are typically found in nearshore waters. Adults make seasonal onshore-offshore migrations.

Biological Sensitivity: **Low**. Three sensitivity attributes scored at or above 2.5: Population Growth Rate (2.5), Spawning Cycle (3.2), and Early Life History Requirements (2.5). Scup are a temperate sparid and have relatively long life spans. Spawning occurs in late spring and early summer in nearshore areas. Early life stages occur in coastal waters and are noticeable rare in plankton collections suggesting early settlement or epi-benthic larvae.

Distributional Vulnerability Rank: **High** (100% certainty from bootstrap analysis). Two attributes indicated vulnerability to distribution shift. As adults, Scup are mobile and make seasonal onshore-offshore migrations. Scup are also habitat generalists, but are commonly found around structured habitats.

Directional Effect in the Northeast U.S. Shelf: The effect of climate change on Scup on the Northeast U.S. Shelf is estimated to be positive, but this estimate is uncertain (<66% certainty in expert scores). Scup overwinter offshore and to the south and move northwards and inshore in the summer. As warming continues, the availability of winter and summer habitat may increase. The effect of ocean acidification over the next 30 years is likely to be minimal.

Data Quality: 88% of the data quality scores were 2 or greater.

Climate Effects on Abundance and Distribution: Long-term surveys indicate an effect of climate on Scup in the Northeast U.S. Shelf Ecosystem. Howell and Auster (2012) and Collie et al. (2008) classified Scup as part of the warm-temperate fauna in Long Island Sound and Narragansett Bay; both studies found adult Scup abundance increasing in recent years. Bell et al. (2014) found that Scup distribution shifted northward in the spring on the Northeast U.S. shelf and that the shift was related to temperature, not population abundance.

Life History Synopsis: Scup is a migratory, schooling, coastal fish species that occurs from Nova Scotia to South Carolina, but is most common between Cape Cod, Massachusetts, and Cape Hatteras, North Carolina (Able and Fahay, 2010). Scup mature at age 2-3 years (Able and Fahay, 2010). Spawning occurs annually from May to August with a peak in June in deep parts of large bays and coastal areas between New Jersey and Massachusetts (Klein-MacPhee, 2002; Able and Fahay, 2010). Eggs are pelagic, small, and hatch after 2-4 days (Klein-MacPhee, 2002; Able and Fahay, 2010). Larvae are pelagic in coastal waters and begin active feeding on small zooplankton 2-3 days after hatching (Steimle et al., 1999; Klein-MacPhee, 2002; Able and Fahay, 2010). Planktivores such as medusa, crustaceans, and fish consume larval Scup (Steimle et al., 1999). Scup settle to inshore bottom habitat during the late larval stage (15-30 mm) starting in early July (Steimle et al., 1999; Able and Fahay, 2010). Transition to the juvenile stage occurs at 40-60 mm total length in estuaries and coastal areas, where the juveniles reside in high salinity waters until egress in the early fall (Able and Fahay, 2010). Juveniles consume polychaetes, small benthic crustaceans, molluscs, small fishes, fish eggs, and larvae (Klein-MacPhee, 2002; Able and

Fahay, 2010). Growth is slow during the juvenile stage (Steimle et al., 1999). Juveniles and adults overwinter on the mid- and outer shelf between New Jersey and Cape Hatteras during which time, little is known about habitat preferences (Able and Fahay, 2010). During spring, juveniles and adults migrate north and inshore to coastal and estuarine areas where they use a variety of bottom types from open sandy areas to structured rocky or reef areas (Steimle et al., 1999). Scup school by size, and larger fish tend to stay outside of estuaries while younger fish move into estuaries (Klein-MacPhee, 2002; Able and Fahay, 2010). Adults are bottom feeders that consume cnidarians, squid, polychaetes, crustaceans, and small fishes (Klein-MacPhee, 2002; Able and Fahay, 2010). Several species of bony fish and elasmobranchs prey on Scup, but the dominant predators are Spiny Dogfish, Smooth Dogfish, and Bluefish (Klein-MacPhee, 2002; Able and Fahay, 2010). The Atlantic States Marine Fisheries Commission and the Mid-Atlantic Fishery Management Council jointly manage Scup under Amendments 8, 12, and 14 of the Summer Flounder, Scup, and Black Sea Bass Fishery management Plan (Terceiro, 2012). Scup are neither overfished nor experiencing overfishing (Terceiro, 2012).

Literature Cited:

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