

Witch Flounder – *Glyptocephalus cynoglossus*

Overall Vulnerability Rank = High ■

Biological Sensitivity = High ■

Climate Exposure = High ■

Data Quality = 83% of scores ≥ 2

<i>Glyptocephalus cynoglossus</i>		Expert Scores	Data Quality	Expert Scores Plots (Portion by Category)
Sensitivity attributes	Stock Status	3.9	2.8	
	Other Stressors	1.5	1.8	
	Population Growth Rate	3.4	2.5	
	Spawning Cycle	2.1	3.0	
	Complexity in Reproduction	2.0	2.0	
	Early Life History Requirements	1.9	1.4	
	Sensitivity to Ocean Acidification	1.4	2.2	
	Prey Specialization	1.8	3.0	
	Habitat Specialization	1.2	3.0	
	Sensitivity to Temperature	1.7	2.8	
	Adult Mobility	2.5	2.8	
	Dispersal & Early Life History	1.2	2.6	
	Sensitivity Score	High		
	Exposure variables	Sea Surface Temperature	3.9	3.0
Variability in Sea Surface Temperature		1.0	3.0	
Salinity		1.4	3.0	
Variability Salinity		1.2	3.0	
Air Temperature		1.0	3.0	
Variability Air Temperature		1.0	3.0	
Precipitation		1.0	3.0	
Variability in Precipitation		1.0	3.0	
Ocean Acidification		4.0	2.0	
Variability in Ocean Acidification		1.0	2.2	
Currents		2.1	1.0	
Sea Level Rise		1.1	1.5	
Exposure Score		High		
Overall Vulnerability Rank		High		

Witch Flounder (*Glyptocephalus cynoglossus*)

Overall Climate Vulnerability Rank: **High** (100% certainty from bootstrap analysis).

Climate Exposure: **High**. Two exposure factors contributed to this score: Ocean Surface Temperature (3.9) and Ocean Acidification (4.0). All life stages of Witch Flounder use marine habitats.

Biological Sensitivity: **High**. Two sensitivity attributes scored above 3.0: Stock Status (3.9) and Population Growth Rate (3.4). Based on the recent assessment, witch flounder are overfished and overfishing is occurring (NEFSC, 2012). Witch Flounder are relatively slow growing, late maturing (4-8 years) and long-lived (30 years) (Pentilla and Dery, 1988).

Distributional Vulnerability Rank: **High** (100% certainty from bootstrap analysis).

Directional Effect of Climate Change: The effect of climate change on Witch Flounder on the Northeast U.S. Shelf is estimated to be negative, but this estimate is uncertain (66-90% certainty in expert scores). Witch Flounder is a cold-temperate species and warming will likely cause reductions in available habitat. However, there is little direct evidence of the effect of climate change on Witch Flounder productivity and distribution, which contributes to the uncertainty.

Data Quality: 83% of the data quality scores were 2 or greater indicate that data quality is moderate.

Climate Effects on Abundance and Distribution: There is relatively little information regarding the effect of climate on Witch Flounder productivity and distribution. Regional studies in the Northeast U.S. Shelf did not include Witch Flounder (Murawski, 1993; Nye et al., 2009). Studies in the Northeast Atlantic found little change in Witch Flounder distribution (Perry et al., 2005, Dulvy et al., 2008).

Life History Synopsis: Witch Flounder is a benthic, marine, flatfish species found on both sides of the Atlantic Ocean, but from Labrador, Canada, to Cape Hatteras, North Carolina in the western Atlantic (Cargnelli et al., 1999). Females mature at 5-8 years old and get larger and older than males (Cargnelli et al., 1999; NEFSC, 2012). Dense spawning aggregations on or near the sea floor form in areas of cold water from March to November (Cargnelli et al., 1999). Eggs and larvae are pelagic over deep water (Cargnelli et al., 1999). Eggs hatch after a week, but larvae remain pelagic for 4 – 12 months and settlement size varies from 20-68 mm (Cargnelli et al., 1999; Klein-MacPhee, 2002). Juvenile Witch Flounder occur in deep cold water over mud, clay, silt, or muddy-sand substrate, often on the shelf slope (Cargnelli et al., 1999). The proportion of prey shifts from crustacean dominated to polychaete dominated with age (Cargnelli et al., 1999). Although their habitat overlaps, adult Witch Flounder tend to be collected on shallower portions of the shelf than juveniles (Cargnelli et al., 1999; Klein-MacPhee, 2002). Soft mud, silt, muddy-sand, and clay substrate are preferred habitat by the species, possibly due to their preference for polychaete prey (Cargnelli et al., 1999). The dominant predators of Witch Flounder include Thorny Skates and Smooth Skates, Spiny Dogfish, Monkfish (Goosefish), White Hake, Atlantic Halibut, and harp seal (Klein-MacPhee, 2002). Witch Flounder are managed under the New England Fishery Management Council's Northeast Multispecies Fishery Management Plan. Based on the recent assessment, witch flounder are overfished and overfishing is occurring (NEFSC, 2012).

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