

# Offshore Hake – *Merluccius albidus*

Overall Vulnerability Rank = Low ■

Biological Sensitivity = Low ■

Climate Exposure = High ■

Data Quality = 58% of scores  $\geq 2$

<i>Merluccius albidus</i>		Expert Scores	Data Quality	Expert Scores Plots (Portion by Category)	
Sensitivity attributes	Stock Status	2.4	0.2		
	Other Stressors	1.7	0.6		
	Population Growth Rate	2.3	1.4		
	Spawning Cycle	1.4	2.7		
	Complexity in Reproduction	2.0	0.9		
	Early Life History Requirements	2.4	1.2		
	Sensitivity to Ocean Acidification	1.4	2.0		
	Prey Specialization	1.4	3.0		
	Habitat Specialization	1.5	1.9		
	Sensitivity to Temperature	1.7	2.2		
	Adult Mobility	1.6	1.2		
	Dispersal & Early Life History	1.9	1.3		
	<b>Sensitivity Score</b>		<b>Low</b>		
	Exposure variables	Sea Surface Temperature	3.9	3.0	
Variability in Sea Surface Temperature		1.0	3.0		
Salinity		1.6	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		
<b>Exposure Score</b>		<b>High</b>			
<b>Overall Vulnerability Rank</b>		<b>Low</b>			

## **Offshore Hake (*Merluccius albidus*)**

Overall Climate Vulnerability Rank: **Low** (92% 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 Offshore Hake use marine habitats.

Biological Sensitivity: **Low**. No sensitivity attributes scored above 2.5.

Distributional Vulnerability Rank: **High** (100% certainty from bootstrap analysis). Offshore Hake are habitat generalists, with moderate mobility, and dispersive early life history stages (Chang et al., 1999).

Directional Effect in the Northeast U.S. Shelf: The effect of climate change on Offshore Hake on the Northeast U.S. Shelf is estimated to be negative, but this estimate is highly uncertain (<66% certainty in expert scores). Offshore Hake 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 Offshore Hake productivity and distribution, which contributes to the uncertainty.

Data Quality: 58% 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 as to the effect of climate factors on Offshore Hake. Factors effecting variability in population are relatively unknown (Chang et al., 1999) and Offshore Hake were not included in regional studies of population distribution (Murawski, 1993; Nye et al., 2009).

Life History Synopsis: Offshore Hake is a marine species found along the outer continental shelf and upper slope from the southern edge of the Grand Banks to the Caribbean and Gulf of Mexico (Klein-MacPhee, 2002). The mean length at maturity for this sexually dimorphic species is 23 cm for males and 28 cm for females, who tend to grow faster and live longer than males (NEFSC, 2011). The spawning season is long, peaking between April and July, but may continue year round (Chang et al., 1999; NEFSC, 2011). Spawning occurs on the outer continental shelf and presumably also on the slope at or near the sea floor, but produces pelagic eggs (Chang et al., 1999). After 6-8 days, pelagic larvae hatch out of the eggs (Chang et al., 1999). Larvae transform at approximately 20 mm total length, but juveniles may not settle to benthic habitats until 30 mm TL (Chang et al., 1999). Juveniles and adults are demersal, occurring between 80 – 1170 m, but primarily occur around 200 m (Chang et al., 1999). Juveniles consume small fish, shrimp, and crustaceans (Chang et al., 1999). Monkfish (Goosefish), larger hakes, and likely other fishes prey on juvenile Offshore Hake (Chang et al., 1999). Adult Offshore Hake may make vertical migrations at night and mature females may congregate on deeper parts of the slope than the males and juveniles (Chang et al., 1999; Klein-MacPhee, 2002). Adult hakes consume mostly fish, such as Lanternfish, sardines, anchovies, and juvenile conspecifics, but occasionally also include crustaceans and squids in their diet (Chang et al., 1999). The only documented predator of adult Offshore Hake is Monkfish (Goosefish); however other predators likely consume the species but are not identified due to difficulty separating Offshore Hake from Silver Hake (Klein-MacPhee, 2002). Offshore Hake is treated as one stock in the northwest Atlantic and is managed through the New England Fishery Management Council's small mesh multi-species fishery management plan (NEFSC, 2011). The species is not overfished, but no determination could be made on the overfishing status for this data-poor stock (NEFSC, 2011).

Literature Cited:

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