

# Channeled Whelk – *Busycotypus canaliculatus*

Overall Vulnerability Rank = Very High ■

Biological Sensitivity = High ■

Climate Exposure = Very High ■

Data Quality = 75% of scores  $\geq 2$

<i>Busycotypus canaliculatus</i>		Expert Scores	Data Quality	Expert Scores Plots (Portion by Category)	
Sensitivity attributes	Stock Status	2.3	0.4		
	Other Stressors	1.8	1.1		
	Population Growth Rate	2.9	2.3		
	Spawning Cycle	3.0	2.4		
	Complexity in Reproduction	1.6	2.1		
	Early Life History Requirements	2.1	1.8		
	Sensitivity to Ocean Acidification	3.9	2.6		
	Prey Specialization	1.4	2.1		
	Habitat Specialization	1.4	2.1		
	Sensitivity to Temperature	1.8	2.6		
	Adult Mobility	2.8	1.8		
	Dispersal & Early Life History	3.5	2.5		
	<b>Sensitivity Score</b>		<b>High</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		3.5	3.0		
Variability Air Temperature		1.0	3.0		
Precipitation		1.3	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		1.6	1.5		
<b>Exposure Score</b>		<b>Very High</b>			
<b>Overall Vulnerability Rank</b>		<b>Very High</b>			

## **Channeled Whelk (*Busycotypus canaliculatus*)**

Overall Climate Vulnerability Rank: **Very High** (58% certainty from bootstrap analysis).

Climate Exposure: **Very High**. Three exposure factors contributed to this score: Ocean Surface Temperature (3.9), Air Temperature (3.5) and Ocean Acidification (4.0). Channeled Whelk are found in inner shelf and nearshore waters.

Biological Sensitivity: **High**. Three sensitivity attributes scored above 3.0: Sensitivity to Ocean Acidification (3.9), Spawning Cycle (3.0), and Dispersal and Early Life History (3.5). Adults have a calcium carbonate shell. Eggs are attached to the bottom in a gelatinous egg sack in the fall. Eggs hatch the following spring and dispersal of larvae is believed to be limited.

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

Directional Effect in the Northeast U.S. Shelf: The effect of climate change on Channeled Whelk on the Northeast U.S. Shelf is very likely to be negative (>95% certainty in expert scores). Ocean acidification will likely negatively impact molluscs, including Channeled Whelk. Although there is relatively little information, warming has the potential to cause northward distribution shifts and may reduce productivity in the southern part of the ecosystem.

Data Quality: 75% 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 population dynamics and climate effects on productivity and distribution of Channeled Whelk. Ries et al. (2009) found that calcification rate of other gastropods decreased with decreasing aragonite saturation state. Thus ocean acidification may reduce population productivity, but specific experiments on Channeled Whelk are needed.

Life History Synopsis: Channeled Whelk is a coastal shellfish species found from Cape Cod, Massachusetts to Cape Canaveral, Florida (Peemoeller and Stevens, 2013). Female Whelks grow larger and tend to be older than males (Peemoeller and Stevens, 2013). Sexual maturity is reached around 6.9 years for males and 8.6 years for females (Peemoeller and Stevens, 2013). Eggs are fertilized internally, and then the females produce a string of egg capsules attached to the sand on intertidal and shallow subtidal mudflats during fall (Harding, 2011). Eggs hatch the following spring (Harding, 2011). Hatchlings look like small, immature adults and likely remain in nearshore, infaunal nursery habitats before moving to deeper, nearshore and coastal waters, but this stage of development is rarely observed in the wild (Harding, 2011). Juvenile Channeled Whelks move by crawling with the foot or inflating the foot and floating at the surface (Harding, 2011). Channeled Whelks are known to eat bivalves, but the true extent of their diet is unknown. Channeled Whelks likely enter the fishery before (females) or just after (males) adults have a chance to reproduce and the fishery selects for the larger females (Peemoeller and Stevens, 2013), so overfishing is a concern. Whelks are fished and managed on a state-by-state basis throughout their range.

### Literature Cited:

Harding JM. Observations on the early life history and growth rates of juvenile channel whelks *Busycotypus canaliculatus* (Linnaeus, 1758). J Shell Res. 2011; 30(3): 901–903. DOI: <http://dx.doi.org/10.2983/035.030.0331>

Peemoeller B-J. Stevens B. Age, size, and sexual maturity of *Busycotypus canaliculatus* in Buzzards Bay, Massachusetts. Fish Bull. 2013; 11(3): 265-278. Accessed online: <http://fishbull.noaa.gov/1113/peemoeller.pdf>