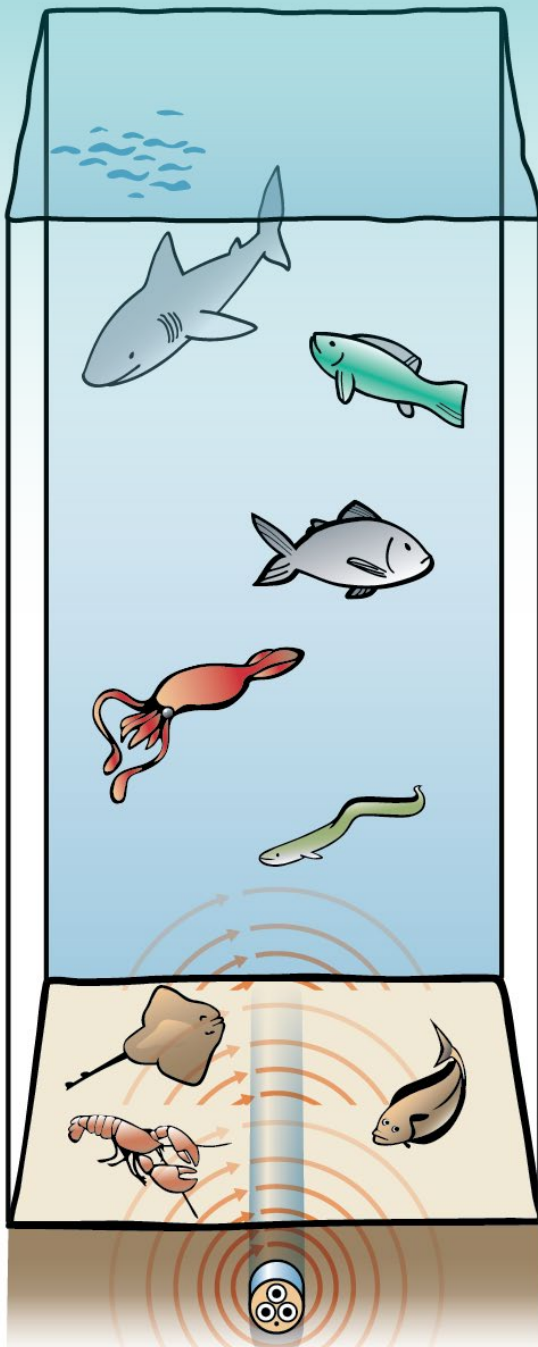


## ENVIRONMENTAL STUDIES

# Electromagnetic Fields (EMF)

## & Marine Life



Naturally occurring EMF are present everywhere in the oceans. Undersea cables used for power transfer are known sources of EMF. Telecommunication cables and undersea communication cables also generate alternating current (AC) and direct current (DC) EMF.

### Impacts to Marine Life

Three major factors determine the exposure of marine organisms to magnetic and induced electric fields from undersea power cables: 1) the amount of electrical current being carried by the cable, 2) the design of the cable, and 3) the distance of marine organisms from the cable.

The sensitivity of fish to EMF is based on the basic functions of their sensory organs. While some fish have the ability to detect water motion with their lateral lines, some species can also detect magnetic and sometimes electric fields with specialized sensory organs.

### Electrosensitive and Magnetosensitive Fish

Electrosensitive fish have specialized organs that perceive naturally occurring electric fields and use them to locate prey or detect the presence of predators.

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*The range over which these species can detect electric fields is limited to **centimeters**, not meters, around these species.*




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An animal's ability to detect and respond to the Earth's natural magnetic field is called magnetosensitivity. Many fish species, including bony fishes and sharks, use the Earth's natural magnetic field for guidance during migration and to navigate in the oceans.

AC undersea power cables associated with offshore wind energy projects within the southern New England area will generate weak EMF at frequencies outside the known range of detection by electrosensitive and magnetosensitive fishes.

# Fish species in the southern New England area and their reported abilities to detect EMF

## PELAGIC


Bony Fish 		Sharks 		Invertebrates 	
Albacore tuna (H)	Atlantic salmon (N)	Basking shark (H)	Longfin inshore squid (M)		
American eel (A)	Atlantic skipjack tuna (H)	Blue shark (H)	Northern shortfin squid (M)		
Atlantic bluefin tuna (H)	Atlantic yellowfin tuna (H)	Common thresher shark (H)			
Atlantic butterfish (M)	Bluefish (M)	Dusky shark (H)			
Atlantic herring (N)	Cobia (A)	Porbeagle shark (H)			
Atlantic mackerel (M)	King mackerel (A)	Sandbar shark (H)			
Striped bass (A)	Spanish mackerel (A)	Sand tiger shark (H)			
		Shortfin mako shark (H)			
		Smooth dogfish (H)			
		Spiny dogfish (M)			
		Tiger shark (H)			
		White shark (H)			


**A** Atlantic States Marine Fisheries Commission

**H** Highly Migratory Species




**M** Mid-Atlantic Fishery Management Council

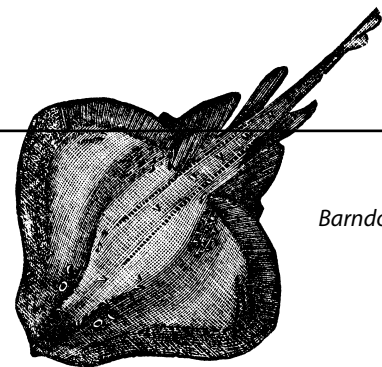
**N** New England Fishery Management Council

 Magnetic Sense

 Electric Sense

## DEMERSAL

Bony Fish 		Skates 		Invertebrates 	
Acadian redfish (N)	Pollock (N)	Barndoor skate (N)	Atlantic sea scallop (N)		
American plaice (N)	Red hake (N)	Clearnose skate (N)	Deep-sea red crab (N)		
Atlantic cod (N)	Scup (M)	Little skate (N)	Atlantic surfclam (M)		
Atlantic halibut (N)	Silver hake (N)	Smooth skate (N)	Ocean quahog (M)		
Atlantic wolffish (N)	Summer flounder (M)	Thorny skate (N)	American lobster (A)		
Black seabass (M)	Tautog (A)	Rosette skate (N)	Jonah crab (A)		
Haddock (N)	Weakfish (A)	Winter skate (N)			
Monkfish (N)	White hake (N)				
Ocean pout (N)	Windowpane (N)				
Offshore hake (N)	Winter flounder (N)				
Yellowtail flounder (N)	Witch flounder (N)				



Barndoor skate

Pelagic fishes such as striped bass, bluefish, weakfish, and Atlantic mackerel have habitat preferences above the seafloor and away from the EMF field, while bottom-dwelling fishes are most likely to encounter EMF from undersea power cables associated with offshore wind energy projects.

Skates (Family Rajidae) have the greatest potential effects from EMF from undersea power cables because they combine electrosensitivity with a bottom-dwelling life history. David Bigger, David.Bigger@boem.gov



### For More Information:

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