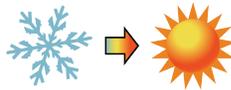


# STRESSED OUT SEAS: Environmental stresses that may promote jellyfish swarms

Jellyfish represent an ecological “perfect storm”—able to prosper from various types of environmental stresses that are currently proliferating in many parts of the world.

Type of Environmental Stress	How Environmental Stress May Increase Jellyfish Populations	Example Locations
<p>Invasions of non-native jellyfish</p> 	<p>Ships transport jellyfish around the world in two ways:</p> <ol style="list-style-type: none"> <li>1. Juvenile jellyfish (called polyps) cling to ship hulls and therefore travel with ships.</li> <li>2. Ships take on ballast water, needed for stability, in originating harbors. In destination harbors, ships may dump their ballast water along with accompanying organisms, including jellyfish. (Billions of gallons of ballast water are transported around the world annually.)</li> </ol> <p>Jellyfish that are released into non-native habitats may colonize them—particularly if they face few or no predators in these habitats. Underscoring the importance of shipping to global jellyfish movements is a recent study of moon jellyfish, which currently live in many worldwide locations. Conducted by Michael Dawson of the University of California at Merced and others, the study incorporates computer simulations of the global distributions of populations of moon jellyfish over the last 7,000 years, based on ocean currents and other factors. Results show that “it is very unlikely that the current global distribution of moon jellyfish is natural,” says Dawson. “Shipping is the most viable mechanism responsible for the current global distribution of jellyfish.”</p>	<ul style="list-style-type: none"> <li>• The Black Sea</li> <li>• The Gulf of Mexico</li> <li>• Hawaii</li> <li>• The Mediterranean</li> </ul>
<p>Pollution</p> 	<p>Jellyfish are among the only creatures that can adapt to ultra-polluted, oxygen starved waters known as Dead. Lacking competitors and predators in Dead Zones, jellyfish may thrive in such waters.</p> <p>The Earth currently has more than 400 Dead Zones affecting a total area of more than 245,000 square kilometers. The worldwide count of Dead Zones has doubled every 10 years since the 1960s.</p>	<ul style="list-style-type: none"> <li>• The Gulf of Mexico</li> <li>• The Chesapeake Bay</li> </ul>
<p>Climate Change</p> 	<ul style="list-style-type: none"> <li>• Increasing water temperatures may expand the geographic and seasonal ranges of jellyfish.</li> <li>• When droughts reduce river flows into coastal waters, coastal waters become saltier. Under such conditions, coastal waters may provide habitat to jellyfish that usually avoid coastal waters in favor of saltier waters.</li> </ul>	<ul style="list-style-type: none"> <li>• Narragansett Bay</li> <li>• The Bering Sea</li> <li>• Australia</li> <li>• The Gulf of Mexico</li> <li>• The Mediterranean</li> </ul>
<p>The Over-harvesting of fish</p> 	<p>The over-harvesting of fish removes jellyfish predators and fish that eat the same food as jellyfish. Fewer predators and more food for jellyfish means more jellyfish.</p>	<ul style="list-style-type: none"> <li>• The Black Sea</li> <li>• The Gulf of Mexico</li> <li>• Namibia</li> <li>• The Mediterranean</li> </ul>
<p>Oil rigs, harbor structures, docks and other artificial structures</p>	<p>Oil rigs, harbor structures, docks and other artificial structures</p> <p>Artificial structures create habitat for young jellyfish that live as immobile polyps attached to hard surfaces.</p>	<ul style="list-style-type: none"> <li>• The Gulf of Mexico</li> <li>• Harbors</li> </ul>
<p>Dams</p> 	<p>By reducing the flow of fresh water and nutrients into coastal waters, dams may—together with other environmental stresses and under some circumstances—promote conditions favoring jellyfish.</p>	<ul style="list-style-type: none"> <li>• Scientists suspect that swarms of giant jellyfish that drift into the Sea of Japan originate in China’s coastal waters, which have been impacted by the gigantic Three Gorges Dam and many other environmental stresses.</li> <li>• Dams on the Danube River may have been one of many factors that set the stage for population explosions of comb jellies in the Black Sea.</li> </ul>

Credit: Images - Zina Deretsky, National Science Foundation  
 Writing - Lily Whiteman, National Science Foundation  
 For more information on Jellyfish see:  
[http://nsf.gov/news/special\\_reports/jellyfish/index.jsp](http://nsf.gov/news/special_reports/jellyfish/index.jsp)

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