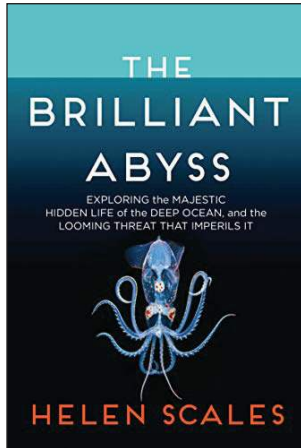


Editor's Note: The Newton Conservators should care about the ocean and global warming because both have significant impacts on the natural resources and ecosystems that our organization is responsible for protecting. Preserving and protecting coastal and marine ecosystems can help to mitigate the effects of climate change by storing carbon and reducing greenhouse gas emissions. By addressing these issues, we can help to ensure the long-term health and resilience of the land and waters under our care.

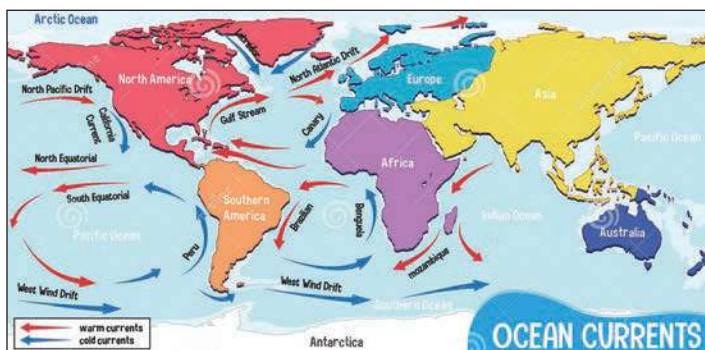
The Brilliant Abyss



Helen Scales has written a beautiful and compelling book about the deepest areas in the world's oceans. She describes the many newly discovered life forms that populate these far-flung frontiers of human knowledge and the recent technology that makes the exploration of the deep possible.

Ms. Scales introduces us to the carbon pump, the massive sequestration of carbon into the depths of the oceans. She

writes with concern about the climactic effects of planned deep-sea mining. If the Gulf Stream fails to circulate up the coast of North America and down the coast of Europe, our climate, as well as that of Europe, would change drastically. Our weather patterns would change as would our own ambient flora and fauna. Ms. Scales' book provides a view of the world that many of us do not see.



First, let us review the dynamics of the circulation in the oceans. When sea ice forms in the Arctic, the nearby water becomes saltier, colder, and denser so this water sinks. It then flows south near the floor of the Atlantic to the Antarctic, where more of this denser water is introduced. These waters then circulate back into the Atlantic and the Pacific and are warmed as they approach the equator. In the Pacific area, the water circulates west past Southeast Asia, the Indian Ocean, and farther westward towards the Atlantic. The Atlantic water also warms and rises near the equator. Here it flows north, crossing the equator and up the eastern coast of North America as the Gulf Stream.

The melting of arctic ice and the ice sheet in Greenland dilutes the salinity of the waters that sink in the Arctic. The deep water in the Antarctic is measurably warming. These and other factors have slowed the circulation of the Gulf Stream by 15%. What goes on in the deep oceans should be of concern to us.

The upwelling of these colder waters mentioned above provides rich nutrients from the bottom of the oceans, supporting blooms of plankton and the resulting web of life, including major fisheries. Less well known are the effects of dying plankton and waste elimination from the whole range of creatures that build on the plankton. This sends a continual rain of carbon to the ocean's floor. Estimates vary from 5 to 15 gigatons of carbon each year, producing the carbon pump. Disruption of the global circulation in the oceans will have large effects on the marine food chain as well as the climate: much more carbon would stay up in the atmosphere rather than rain down to a secure tomb bed at the bottom of the oceans.

In describing the life of the abyssal ocean waters, we enter relatively unknown territory. Scientists continue to discover new species in the deep oceans. Even less known to us are the relationships between these species and their relationship to global processes, such as the carbon pump.



Orange roughies

As an example, consider just one species, a fish called "orange roughy," widely distributed in southern Australian waters and commonly found on seafood menus during the 80's and 90's. It was originally named the "slimehead" due to its gooey body. The slime is a necessary defense mechanism that helps roughies to detect predators as well as to find food. However, its name was changed to make the fish a more attractive choice for diners.

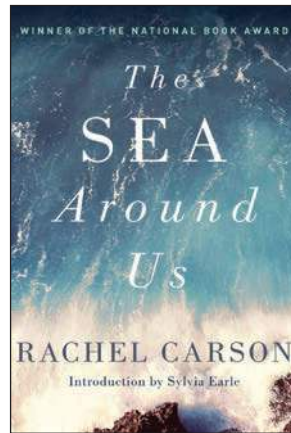
The flesh of orange roughies is firm and not fishy. They used to be very common, congregating around seamounts, undersea mountains made by volcanic activity that support an incredible assortment of marine life. As it became a more popular choice for diners, large scale trawling for this fish became increasingly more lucrative for large deep-sea fisheries.

Orange roughies can live for 100 years but breed only every two years; they produce many fewer eggs than a surface fish like cod. The roughies are not now extinct, but their population is quite diminished; the orange roughie boom has gone bust. A once abundant species has been decimated by human greed. The seamounts where the roughies congregated in large numbers have been scraped clean of life. It is not understood yet why some seamounts are recovering while many others are not.

The life cycle of many deep-sea creatures has a much longer time span than life near, and on, the surface. Human greed seems unstoppable once in motion. Viewing orange roughies as a commercial resource to exploit was even more devastating than our exploits with whales and surface fish. Global fishery organizations are on the prowl for other deep-sea food resources.

In addition, nodules of stone that form on ancient sharks' teeth and small bones of sea life are scattered across the ocean floor. Large mining organizations apply for permits to trawl vast areas of the ocean floor to gather these nodules. They contain valuable metals in small amounts,

so the scale of the trawling is huge; there also are minerals in the seamounts. The sort of mining that took off tops of mountains and dumped the slag into the next valley in Appalachia is now a proposed reality for seamounts; underwater life will be locally devastated. This would also be true for the hydrothermal vents that have minerals around them, but that are also extremely fertile for the start of underwater food chains. The environmental results of all this mining are unknown.



Helen Scales quotes from the introduction to Rachel Carson's 1961 book, *The Sea Around Us*. This quote refers to dumping in, and polluting the oceans but would serve us more broadly here. "The truth is that disposal proceeded far more rapidly than our knowledge justifies. To dispose first and investigate later is an invitation to disaster." We now have much more knowledge about throwing plastic into the oceans and about possible climactic results of exploitative human greed. We, the public, need to raise our awareness concerning the threats to the deep oceans and support the science that can chart the effects of human activity in the deep sea. ♦

🌿 Review by Pete Gilmore, Newton Conservator board member

Get Involved with the Conservators - Volunteers Needed

The Newton Conservators needs volunteers to help with various activities, including annual monitoring of the conservation restrictions we hold on City of Newton properties, pulling invasive plants, updating our inventory of plants and animals on Newton's public lands, and collecting new signups from interested Newton residents on our walks or at community events such as Village Days, the Harvest Fest, and others. You'll work alongside and be trained as needed by experienced Conservators' board members. If you're willing to volunteer for a couple hours, it would be most appreciated. To learn more about volunteer opportunities and contact us about them, go to newtonconservators.org/volunteer/

Thank you.