Although the icy waters around Antarctica may seem an inhospitable environment, a complex food web is found there. The base of the food web consists of microscopic, photosynthetic algae present in vast numbers in the well-lit, nutrient-rich water. A huge population of herbivores—tiny shrimplike krill—eat these marine algae Krill, in turn, support a variety of larger animals. A major consumer of krill is the baleen whale, which filters krill out of the frigid water. Baleen whales include blue whales,humpback whales, and right whales. Squid and fishes also consume krill in great quantities.These, in turn, are eaten by other carnivores: toothed whales such as the sperm whale, elephant seals and leopard seals, king penguins and emperor penguins, and birds such as the albatross and the petrel. Humans have had an impact on the Antarctic food web as they have had on most other ecosystems. Before the advent of whaling, baleen whales consumed huge quantities of krill. Until a global ban on hunting large whales was enacted in 1986, whaling steadily reduced the number of large baleen whales in Antarctic waters. As a result of fewer whales eating krill, more krill became available for other krill-eating animals, whose populations increased. Now that commercial whaling is regulated, it is hoped that the number of large baleen whales will slowly increase, and that appears to be the case for some species. However, the populations of most baleen whales in the Southern Hemisphere are still a fraction of their pre-whaling levels. It is not known whether baleen whales will return to their former position of dominance in terms of krill consumption in the food web. Biologists will monitor changes in the Antarctic food web as the whale populations recover.Thinning of the ozone layer in the stratospheric region of the atmosphere over Antarctica has the potential to cause long-term effects on the entire Antarctic food web. Ozone thinning allows more of the sun’s ultraviolet radiation to penetrate to Earth’s surface. Ultraviolet radiation contains more energy than visible light and can break the chemical bonds of some biologically important molecules, such as deoxyribonucleic acid (DNA). Scientists are concerned that ozone thinning over Antarctica may damage the algae that form the base of the food web in the Southern Ocean. Increased ultraviolet radiation is penetrating the surface waters around Antarctica, and algal productivity has declined, probably as a result of increased exposure to ultraviolet radiation.

Another human-induced change that may be responsible for declines in certain Antarctic populations is global climate change. As the water has warmed in recent decades around Antarctica, less pack ice has formed during winter months. Large numbers of marine algae are found in and around the pack ice, providing a critical supply of food for the krill, which reproduce in the area. Years with below-average pack ice cover mean fewer algae, which mean fewer krill reproducing. Scientists have demonstrated that low krill abundance coincides with unsuccessful breeding seasons for penguins and fur seals, which struggle to find food during warmer winters. Scientists are concerned that climate change will continue to decrease the amount of pack ice, which will reverberate through the food web. To complicate matters, some commercial fishermen have started to harvest krill to make fishmeal for aquaculture industries Scientists worry that the human harvest of krill may endanger the many marine animals that depend on krill for food.