

Charles Darwin Research Station Fact Sheet

Sea cucumbers (*Isostichopus fuscus*, *Stichopus horrens*, and *Holothuria* species)

Sea cucumbers are found throughout Galapagos and play a major role in the marine ecosystems protected by the Galapagos Marine Reserve (GMR). Overfishing of one species has left it in a very vulnerable position. Charles Darwin Foundation (CDF) scientists are now studying the biology and distribution of different species to provide crucial data needed to manage this fishing resource.

Native to Galapagos

The sea cucumbers are marine animals that are related to starfish and sea urchins. A number of species can be found in Galapagos, including:

- *Isostichopus fuscus*
- *Stichopus horrens*
- Many *Holothuria* species

I. fuscus is a sausage shaped animal, dark brown to black in color, and covered in yellow-brown bumps. It grows up to 20 centimeters in length. They live on the sea bed, in shallow or deeper waters. Some species live buried in the sand and only expose their tentacles to attract food. Others, such as *I. fuscus* and *S. horrens*, live exposed in the water on rocks or sand. *S. horrens* is inactive and sleeps in cracks or caves during the day, but emerges at night to feed in large groups in the open.

Sea cucumbers feed upon algae, sand, and waste materials. They recycle nutrients for use by other marine species. They may also feed on small snails and other invertebrates, aided by their tentacles. Sea cucumbers can eject and abandon their lower intestine when disturbed; it grows back rapidly afterwards.

Sea cucumbers' reproduction occurs when eggs and sperm are released into the water where fertilization occurs. If the distance between males and females is too great fertilization will not happen.

After an egg is fertilized, a larva develops that floats in the ocean until it settles in an appropriate place. Larvae transform into juvenile sea cucumbers. Eggs, larvae, and juveniles provide food for other marine species, including fish, crustaceans, and molluscs.

I. fuscus is fished for human consumption in Asia, where they are considered delicacies. They are cooked and dried, and used in soups and other dishes.

Vulnerability

The commercial exploitation of *I. fuscus* since 1993 has caused numbers to decrease drastically. When sea cucumber fishing was legalized in 1999, quotas were exceeded and 6-10 million were taken in three months.

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Key Facts

Species: *Isostichopus fuscus*, *Stichopus horrens*, and *Holothuria* species

Common name:
Sea cucumber

Size: Up to 20cm in length

Habitat: Sea bed in shallow or deep waters

Diet: Algae, debris, small creatures

Range: Throughout Galapagos

Status: Numbers reduced drastically in Galapagos and elsewhere

Threatened by: Over fishing

Adults have been largely fished out, leaving juveniles that are not yet capable of breeding. The lack of breeding adults could affect the availability of larvae as a food source for other marine species. Fewer sea cucumbers results in less recycling of nutrients for other marine species to use. Overfishing sea cucumbers elsewhere in the world has caused hardening of the sea floor, damaging this habitat for other bottom-dwelling organisms. The recovery of *I. fuscus* will depend on the protection of juveniles until they can grow and reproduce successfully.

Some local fishers have turned their attention to *S. horrens*, which is less lucrative but present in much higher numbers so far. Little is known about this species.

CDRS research activities

The Galapagos National Park Service (GNPS) has intercepted a number of shipments of *S. horrens*, and has raided several illegal fishing camps. How much illegal fishing is happening is unknown. *S. horrens* has been suggested as a resource to be legally fished.

There is an urgent need to understand the basic biology and distribution of *S. horrens* within the GMR. This is a major focus for marine biologists working for the CDF. Information from these studies will be used to analyze if *S. horrens* might be exploited in a sustainable manner.

Scientists are performing surveys throughout Galapagos during both warm and cool seasons. Fieldwork is carried out by scuba divers working at night when *S. horrens* is active. At each research site, all *S. horrens* individuals are registered and measured. Studies aim to determine growth and mortality rates and to observe potential changes in populations. Scientists also want to determine how often reproduction occurs.

CDF scientists are also studying *I. fuscus* to determine the growth of juveniles over time. Sea cucumbers are grown in an aquarium with continuously circulating water and rocks that provide a food source. Individuals are weighed and measured. Water temperature and salt levels are also recorded. Data is compared to information collected from sea cucumbers in their natural environment.

By better understanding sea cucumbers, CDF will be able to provide data to assist the development of sustainable management policies by the authorities of the GMR.