

SUGGESTED REFERENCES

- *Christmas Island Red Crabs*
<http://www.christmas.net.au/parks/crabs/index.htm>
- *Christmas Island National Park*
<http://www.environment.gov.au/parks/christmas/index.html>
- *Ecology and Behavior of Gecarcoidea natalis, the Christmas Island Red Crab, During the Annual Breeding Migration*
<http://www.biolbull.org/cgi/content/full/200/3/305#F1>
- *The Australian Government*
Department of the Environment, Water, Heritage, and the Arts – information on Red Crabs
<http://www.environment.gov.au/parks/christmas/nature-science/fauna/red-crabs.html>

NATIONAL SCIENCE EDUCATION STANDARDS

Grades K - 4, 5 - 8

Life Science

Structure and function in living systems
Reproduction and heredity
Regulation and behavior
Populations and ecosystems
Diversity and adaptations of organisms

Grades 5 - 8

Personal and Social Perspectives

Populations, resources, and environments
Natural hazards
Risks and benefits
Science and technology in society

*Source: *National Science Education Standards, 1996, National Academy Press*

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VOLUME 21 ISSUE 7 ZOOLOGY - *Red Crab Migration*

SYNOPSIS

Christmas Island, at roughly 135 square kilometers, was named after the day of its discovery – December 25th, 1643 and is home to a large population of red crabs. Sixty three percent of the island is a protected National Park. The park offers the perfect forest ecosystem for the Christmas Island Red Crab, which is endemic to the Cocos Islands and Christmas Island, both in the Indian Ocean.

The Red Crabs rely on the rainy season that comes in November or December to initiate their migratory journey from the forests to the coasts. Their timing must be precise because the breeding sequence is also linked to the phases of the moon. Although the Red Crabs live inland, they require a certain level of moisture on their gills to survive.

The red crab's migratory journey is filled with many obstacles. The risk of dehydration, predators, and automobile traffic cut the migration short for many crabs. However, locals on Christmas Island have built fences and tunnels to corral the crabs and help funnel them safely under roads to their final breeding destinations on the coasts.



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CURRICULUM UNITS

- BIOLOGY
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- MARINE BIOLOGY

RUNNING TIME

12 minutes

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BACKGROUND

Christmas Island was formed by a series of geological uplifts. Surrounded by reefs and a number of cliffs and terraces descending to a rugged shore line with few beaches, the island was difficult for explorers to reach in the past. In the heart of the island, a central plateau rises up to 200 meters above sea level. This is where many of the protected National Parks are located and serve as a home to millions of red crabs.

The red crabs keep a low profile under the forest canopy for most of the year. Their burrows have a single entrance tunnel leading down to a chamber. They often block off the entrance with leaves and debris to hold moisture in. Living solitary lives, each burrow usually houses only one crab.

Once the rainy season arrives, the red crabs make a dash for the coasts to breed. As the most abundant of the fourteen species of land crabs on the island, there are an estimated 120 million inhabitants. As they make their way to the coasts, they are in danger from dehydration, predators, and human traffic.

The red crabs are members of the arthropod family, the same as insects and spiders. They have an exoskeleton and jointed limbs. Most crab legs are designed to move up and down rather than forwards, which is why they often walk sideways. Their shell can measure up to 12 centimeters and is a rounded shell that encloses their lungs and gills. They mature and reach full size in three to four years and can live over ten years.

Christmas Island is also home to the largest land crab in the world, the coconut crab. It is also referred to as the robber crab because it has an unusual attraction to shiny objects and has been known to sneak into houses and tents to steal pots, pans and silverware. The coconut crabs can grow up to a meter in length and weigh almost 4.5 kilograms or ten pounds. They are similar to the red crabs in their diets as they primarily eat fruits and leaves – but will also eat other carrion and sometimes they will even feast on their red crab neighbors and their shells, possibly for calcium.

The local residents have an affinity for the crabs. Unfortunately, some of the migratory routes come through the towns and across roads, making it very difficult for people to avoid them altogether. To round up and divert millions of these crustaceans, they started putting up fences. The fences divert them along the side of the road to places where the road is blocked off or underground tunnels have been built for them to cross underneath the roads safely.

Red crabs will gather on the shores for days. After mating, the males will return to their original forest homes, while the females will remain for several weeks to spawn. The female releases the eggs into the ocean and they hatch immediately on contact with the water. Waves and tides push and pull the clouds of larvae in all directions. A large percentage of their offspring will not survive. Sea conditions, ocean predators such as manta rays and huge whale sharks, and possible lack of rains will affect the chances that the larva will survive. However, it only takes two successful years in ten to keep their populations healthy.

CRITICAL THINKING EXERCISES

1. Design a graphic to explain the migratory cycle of the Christmas Island Crab from their homes in the forest to the coast. What factors can interfere with the cycle?
2. Compare and contrast the two main types of crabs living on Christmas Island, the Christmas Island Red Crab, and the Coconut Crab.
3. Discuss other conservation possibilities or ways to help the red crabs reach their destination on the coast unharmed.
4. Evaluate the statement in regard to successful breeding, “ it only takes two successful years in ten to keep their populations healthy”. How is the crab population able to maintain large numbers of healthy crabs?

CAREER POSSIBILITIES

- BIOLOGIST
- ENVIRONMENTALIST
- MARINE BIOLOGIST

ADVANCED ORGANIZERS

Prior to viewing this program, students should have some understanding of the following Benchmarks for Science Literacy, Oxford University Press which are excerpted and, in some cases, abbreviated below. Refer to the Benchmarks for more information.

Benchmark 5. The Living Environment

Section A: Diversity of Life, Grades 3-5

- A great variety of kinds of living things can be sorted into groups in many ways using various features to decide which things belong to which group.
- There are millions of different kinds of individual organisms that inhabit the earth at any one time—some very similar to each other, some very different.

Grade 6-8

- Animals and plants have a great variety of body plans and internal structures that contribute to their being able to make or find food and reproduce.
- Similarities among organisms are found in internal anatomical features, which can be used to infer the degree of relatedness among organisms.

Section D: Interdependence of Life, Grades 3-5

- For any particular environment, some kinds of plants and animals thrive, some do not live as well, and some do not survive at all.
- Changes in an organism's habitat are sometimes beneficial to it and sometimes harmful.

Grade 6-8

- In all environments, organisms with similar needs may compete with one another for limited resources, including food, space, water, air, and shelter.
- The world contains a wide diversity of physical conditions, which creates a wide variety of environments: freshwater, marine, forest, desert, grassland, mountain, and others. In any particular environment, the growth and survival of organisms depend on the physical conditions.

Section F: The Evolution of Life, Grades 6-8

- Individual organisms with certain traits are more likely than others to survive and have offspring.
- Changes in environmental conditions can affect the survival of individual organisms and entire species.

**Benchmarks can be found at www.project2061.org/tools/benchol/bolintr.htm*

VOCABULARY

- Arthropod** Any invertebrate of the phylum Arthropoda, having a segmented body, jointed limbs, and usually a chitinous exoskeleton that undergoes moltings, including insects, spiders and other arachnids, crustaceans, and myriapods.
- Endemic** Native to or confined to a certain region.
- Larva** Larva - Any animal in an analogous immature form.
- Megalopae** After growing through several larval stages, red crab larva develop into prawn-like animals, gathering in pools close to the shore for 1-2 days before changing into young crabs and leaving the water.
- Spawn** Depositing a mass of eggs directly into the water.