SUGGESTED REFERENCES

- *WADSIS*
  Transnational Wadden Sea Information Service
  http://www.waddenseamaps.net
- *Wadden Sea*
  Thinkquest
  http://bob.nap.edu/html/nses/html/6a.html
- *Trilateral Wadden Sea Plan*
  Common Wadden sea Secretariat
  http://www.waddensea-secretariat.org/management/Plan.html

NATIONAL SCIENCE EDUCATION STANDARDS

Grades K - 4

Life Science
Organisms and environments

Science in Personal and Social Perspectives
Changes in environments
Characteristics and changes in populations

Grades 5 - 8

Science in Personal and Social Perspectives
Populations, resources and environments

Life Science
Populations and ecosystems

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

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EXPLORING SHORELINE HABITATS

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SYNOPSIS

Our coasts are some of the most densely populated areas in the world and are also cradles of biodiversity. These narrow bands of shallow water and low-lying land are home to a wide variety of species. Coastlines are also some of the most productive places for organisms to live because of their high level of nutrients, shallow waters and warm temperatures. Many species make these shallow waters their breeding grounds and nursery for their babies to grow up safely.

As people moved to coastal areas, they displaced wildlife and sometimes destroyed habitats of other organisms. In some areas, entire ecosystems were wiped out by development. This issue of Science Screen Report for Kids demonstrates the steps taken to restore and preserve the natural habitat, and to balance the needs of people and the natural world.

CURRICULUM UNITS	RUNNING TIME
■ BIOLOGY ■ CHEMISTRY ■ EARTH SCIENCE ■ ECOLOGY ■ ENVIRONMENTAL SCIENCE ■ MARINE SCIENCE ■ PHYSICAL SCIENCE	18:36

BACKGROUND

Historically, people moved to coastal areas because the water offered abundant resources. However, as more people and industry arrived, wildlife was displaced and some ecosystems were wiped out.

The Wadden Sea area, in northern Europe, is the world's largest wetland and one of the richest sources of wildlife. It stretches over 450 kilometers off the coasts of Germany, Holland and Denmark. People have lived here for over six centuries. During that time, towns were built and industries formed, claiming space once exclusively the preserve of wildlife. This issue of Science Screen Report for Kids demonstrates the steps taken here to balance the needs of people and the natural world.

When gray seals appeared in 1980, scientists thought that they were new to the area. After study, they determined that, in past centuries, the seals had been hunted almost to extinction or driven out by a loss of habitat. When it was realized that the seals were trying to reestablish a new population, they were given protected species status, and biologists began to track the seal population and provide rescue and rehabilitation, all of which helped the seal population to thrive.

When farmers were encouraged to take a portion of their land out of production and let it return to its natural state, there was a return of native plant species that had not been seen in over fifty years, and a return of animals and other organisms whose existence was dependent on these plants. This serves as an example of the benefits of balancing the needs of people, developments, and the native species.

The program also demonstrates how engineers redesigned the harvester sleds with wheels to better control the height at which the dredge functioned. This allowed fishermen to harvest only larger, economically viable cockles, and reduced damage to the seabed.

The Eider ducks also rely on cockles for food. However, when some 20,000 ducks washed ashore in l999 there weren't enough cockles to eat. They resorted to eating shore crabs that had a parasitic infection. When thousands died, residents realized the importance of the cockles to the Eider ducks' survival.

Spoonbills are wading birds that migrate here from Africa to nest near their food sources, but much of their habitat had been taken over by humans. They were also threatened because their primary food sources, stickleback fish, were blocked from their movement pattern by dikes that were built to hold back water to create more farmland. When engineers designed a siphon system to pull the fish from one side of the dike to the other, they were allowed to reach their breeding grounds. Before this change, the Spoonbill young suffered up to a 50 percent mortality rate on the migration back to Africa because they lacked enough fat stores to make the trip. Now, both species are thriving.

The program also explains the variation in sea level caused by the tides, and how the tides wash out nutrients to organisms living farther out in the sea. The tides also create an intertidal zone, where unique organisms are submerged by water during high tide and exposed to the air at low tide, adding another layer to the ecosystem that needs to be preserved.

Taking steps to preserve our natural world benefits people as well as wildlife, this program highlights actions that can balance the needs of both to prevent damaged ecosystems, accelerated rates of extinction for some species, and loss of habitat.

CRITICAL THINKING EXERCISES

1. Explain what is meant by migratory birds. Why do birds migrate?
2. Discuss what would happen to the Wadden Sea ecosystem if the grey seals were removed from the food web.
3. Why do you think there are more species found near the coastlines in comparison to species found in the open sea? Have students work cooperatively with a partner.
4. List species in your area that are threatened by human development. Research one of the species.
5. What could be done to help these animals that are threatened by human development?

ADVANCED ORGANIZERS

Prior to showing 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

Know by the end of 2nd Grade

- Plants and animals have features that help them live in different environments.

Know by the end of 8th Grade

- All organisms, including the human species, are part of and depend on two main interconnected global food webs. One includes microscopic ocean plants, the animals that feed on them and finally the animals that feed on those animals. The other web includes land plants, the animals that feed on them, and so forth. The cycles continue indefinitely because organisms decompose after death to return food material to the environment.

Section D - Interdependence of Life

Know by the end of 5th Grade

- Changes in an organism's habitat are sometimes beneficial to it and sometimes harmful.

Section E - Flow and Matter of Energy

Know by the end of 5th Grade

- Almost all kinds of animals' food can be traced back to plants.
- Over the whole earth, organisms are growing, dying, and decaying, and new organisms are being produced by the old ones.

Know by the end of 8th Grade

- Over a long time, matter is transferred from one organism to another repeatedly and between organisms and their physical environment. As in all material systems, the total amount of matter remains constant, even though its form and location change.

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

VOCABULARY

Environment	The circumstances or conditions that surround one; surroundings.
Food chain	A succession of organisms in an ecological community that constitutes a continuation of food energy from one organism to another as each consumes a lower member and in turn is preyed upon by a higher member.
Habitat	The area or environment where an organism or ecological community normally lives or occurs: a marine habitat.
Intertidal zone	The area between the land and sea that is covered by water at high tide and uncovered at low tide.
Migrate	To change location periodically, especially by moving seasonally from one region to another.
Predators	1. An organism that lives by preying on other organisms. 2. One that victimizes, plunders, or destroys, especially for one's own gain.
Prey	An animal hunted or caught for food; quarry.
Rehabilitation	To restore to good health or useful life, as through therapy and education.
Sandbar	A ridge of sand formed in a river or along a shore by the action of waves or currents.

CAREER POSSIBILITIES

- ECOLOGIST
- MARINE BIOLOGIST
- WILDLIFE BIOLOGIST