Smithsonian | SCIENCE *for Computational Thinking*

UP CLOSE WITH A MARINE SCIENTIST

The Smithsonian Science Education Center (SSEC) (SSEC) is an education organization within the Smithsonian Institution. The SSEC's mission is to transform K-12 *Education Through Science*™ in collaboration with communities across the globe. The SSEC promotes authentic, interactive, inquiry-based K-12 STEM teaching and learning; ensures diversity, equity, accessibility, and inclusion in K-12 STEM education; and advances STEM education for sustainable development. The SSEC achieves its goals by developing exemplary curriculum materials and digital resources; supporting the professional growth of K-12 teachers and school leaders; and conducting outreach programs through LASER (Leadership and Assistance for Science Education Reform) to help schools, school districts, state education agencies, and ministries of education throughout the world implement inquiry based science education programs.

The Smithsonian Institution was created by an Act of Congress in 1846 "for the increase and diffusion of knowledge…" This independent federal establishment is the world's largest museum, education, and research complex and is responsible for public and scholarly activities, exhibitions, and research projects nationwide and overseas. Among the objectives of the Smithsonian is the application of its unique resources to enhance elementary and secondary education.

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UP CLOSE WITH A MARINE SCIENTIST

Most whales spend spring, summer, and fall in one part of the ocean.

These are the whales' feeding grounds.

Whales eat almost all their food for the year here.

Whales migrate to the calving ground for the winter.

The calving ground is where baby whales are born.

The winter calving grounds for North Atlantic humpback whales are in the Caribbean waters.

Their migration route sometimes overlaps with areas that have high ship traffic.

These humpback whales are swimming near the surface of the water.

When whales jump out of the water it is called breeching.

Humpback whales cannot breathe under the water.

They need to swim to the surface to breathe air.

However, there are ships on the surface!

Sometimes ships hit whales.

The number of ships traveling in the ocean is increasing.

The number of ships hitting whales is increasing too.

The mid-Atlantic Ocean is a high ship traffic area.

Whales die from ship strikes there.

The US Navy conducts research to help protect whales there.

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The Navy research project aims to understand the movements of humpback whales.

Researchers attach tags to the whales.

The tags enable researchers to know the location of the whale.

Researchers can see where the whales move over time.

They have learned that humpback whales spend a lot of time near Chesapeake Bay.

Unfortunately, this is a high ship traffic area.

During this project, several injured whales were observed.

Ship strikes can cause injury and death.

This humpback whale was hit by a ship.

This whale fluke has a unique pattern on it.

Researchers also take photos of whales in this project.

The whale's tail is called the fluke.

Each whale fluke is different.

Color patterns on the flukes can be used to identify whales.

Using the photos, 182 humpback whales have been identified.

The whales are added to a catalog.

Other researchers can use the catalog.

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Sarah Mallette is one of the researchers on this project.

Sarah had experiences that helped her choose this career.

Sarah did research at the Smithsonian Conservation Biology Institute when she was in college.

She worked with scientists all over the world.

This helped Sarah learn about research that scientists do to protect animals.

Sarah studies a whale skeleton.

Sarah searches for whales from the shore.

Sarah also worked in the Smithsonian Marine Station in Florida.

This helped her learn her specific interest within marine science.

She studied injured and dead whales.

Sarah's team collected specimens from the whales on the beaches.

They sent several specimens to the Smithsonian Museum of Natural History.

Then researchers from all over the world could study those specimens.

Back in the lab, Sarah uses a tool to study baleen. Humpback whales use baleen to catch their food.

Sarah studies a stranded whale in Virginia.

This researcher is looking for whales from a plane.

These experiences led Sarah to decide to do research to protect marine animals.

She observes the marine animals from airplanes and boats.

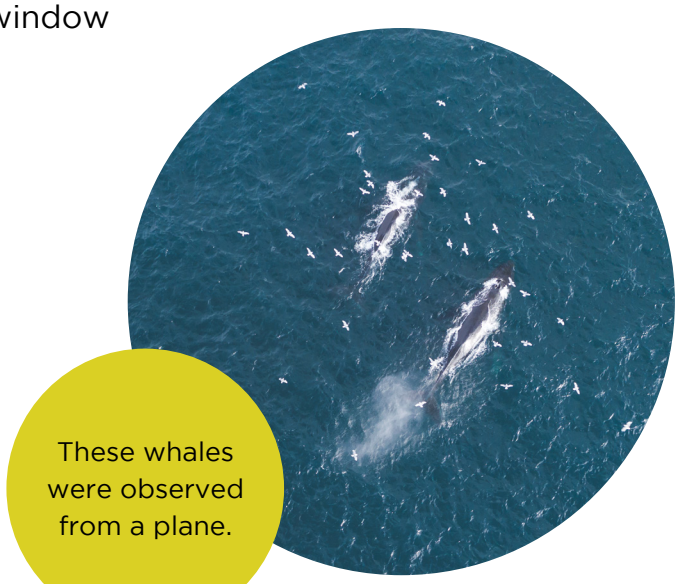
Sarah says that weather affects whether or not you see whales and dolphins.

Clear skies and calm oceans make it easier to find marine animals.

Pilots fly the airplanes.

Sarah and another teammate look out the window to try to find whales.

They take pictures of the whales.



These whales were observed from a plane.

They try to stay over the animal.

Then they document what they see.

They record if the animal is feeding and its direction of travel.

Sarah also searches for animals from boats.

They take pictures of whales' flukes.

Then they can identify which whales were there.

They use the observations to learn how whales move.

That can help us better protect the whales.

Sarah searches for animals from a boat.

Sarah plans to keep working to protect whales.

She hopes to help whales in other parts of the world.

Sarah has advice for students interested in marine science.

She says to get involved through internships and volunteer.

A career should fit people's interests and strengths.

Experiences help you learn what parts of marine science you would like to do and what parts you don't want to do.

Sarah is searching for whales from the shore in Brazil.