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Wreckage from Japanese Tsunami Reaching Western United States

SHIRLEY GRIFFITH: This is SCIENCE IN THE NEWS, in VOA Special English. I'm Shirley Griffith.

MARIO RITTER: And I'm Mario Ritter. This week, we tell about tsunamis - the deadly sea waves often caused by earthquakes.

(MUSIC)

SHIRLEY GRIFFITH: Tsunami is a two-character Japanese word. "Tsu" means "harbor," and "nami" means "wave." So, the Japanese call tsunamis, "harbor waves." Tsunamis happen after an earthquake strikes, either near or under the ocean floor. The earthquake displaces a large amount of water. Waves then move inland quickly and powerfully, often causing death and destruction.

Scientists say strong earthquakes under the sea are responsible for eighty to ninety percent of all tsunamis. Volcanic explosions can also cause a tsunami, as can a large piece of land sliding into the water. Tsunamis might also happen when a rock from space strikes the ocean. There have been three major tsunamis worldwide in the past eight years. A major tsunami usually happens only once every ten years.

A tsunami is not just one wave, but a series of waves. Some of the waves can be huge. Scientists say the first wave is often not the largest. That is usually the third or fourth wave. The waves can be from five minutes to one hour apart.

(MUSIC)

MARIO RITTER: Let us look now at what causes a tsunami wave. The land underneath the ocean is made up of "tectonic plates." These large areas are always moving. Usually the plates just rub up against each other on a crack, called a "fault line." Sometimes, one plate slides under another plate. This is called "subduction."

Over time, a large amount of pressure builds up on the plate that has slid under the other. It then suddenly "springs up," resulting in an earthquake. These large "subduction zone" earthquakes are responsible for most of the ocean-wide

tsunamis, such as the tsunami in Japan last year.

SHIRLEY GRIFFITH: Scientists can measure the strength and position of earthquakes because there are hundreds of seismic monitoring stations around the world. If it is a strong quake and it happens in or near the ocean, computers quickly measure the length, depth and location of a quake. These measurements help to show how strong a resulting tsunami might be.

When a tsunami forms, the wave can spread out quickly. As it gets close to land, the force of the water builds. People near the ocean may hear a loud “sucking” sound, or a noise similar to a train or airplane. Then, a “drawback” may happen: Suddenly, a large area of coastline has very little water because the water is quickly being pulled away from land. But sometimes there is no drawback, and waves as high as thirty meters come speeding toward the land.

MARIO RITTER: Tsunamis cause damage to coastal areas in two ways. First, buildings and trees are crushed by the force of so much water moving so quickly. Then, the water moves over the land and washes away anything in its path. The tsunami that hit northeastern Japan destroyed homes, office buildings, cars, trucks, and even large boats. Thousands of people were killed. But many more would have died if not for a tsunami warning from the Japanese Meteorological Agency. That warning came just three minutes after the nine-point-zero magnitude earthquake struck. It was the strongest to hit the country and the fourth-most powerful earthquake ever measured worldwide.

The tsunami waves that followed the earthquake came almost immediately, and were reported to have reached as high as nine meters in some areas. Japan has concrete sea walls that wrap around forty percent of its coastline. But those walls were not built for such high waves. In fact, in some areas the sea walls were as low as three meters.

SHIRLEY GRIFFITH: Japan has one of the best tsunami early warning systems in the world. There are more than four thousand Seismic Intensity Meters in place across the country to measure earthquakes. These meters provide information within two minutes of an earthquake striking. Information about the strength and the epicenter of the earthquake can be learned in less than three minutes.

Earthquakes often strike Japan. Some of those earthquakes cause tsunamis. Japan has suffered hundreds of tsunamis over the years. But few were as powerful as the tsunami that struck on March eleventh, twenty eleven.

(MUSIC)

MARIO RITTER: Last month, pieces of wreckage from the Japanese tsunami

began reaching the western United States. A concrete and metal dock was found along the Oregon coast, about one hundred seventy kilometers southwest of Portland. It had taken almost fifteen months for the twenty-meter long object to make the eight thousand kilometer trip across the ocean.

Experts say they expect more wreckage -- scientists call it marine debris -- to wash up on American coastlines over the next few years. Nancy Wallace directs the Marine Debris Program at NOAA --America's National Oceanic and Atmospheric Administration.

NANCY WALLACE: "There's a lot of uncertainties. I think that's what we're learning throughout this process, is that it's very hard to determine how much debris is still floating in the water, what type of debris that is and where it will be coming ashore. But we are concerned, absolutely, it could have a big impact in terms of we want to make sure that we're protecting our habitat, we're protecting folks who are out at sea and not getting engaged in any lines or nets that could be out there or debris."

Japan's government estimates the tsunami last year created twenty-five million tons of debris. Experts believe most of the debris is not radioactive because it came from a wide area along Japan's northeast coast. Only a small amount came from the area near the damaged Fukushima power station. Radiation began leaking from the nuclear reactor into the sea days or weeks after the tsunami. This leads experts to believe that little of the wreckage is radioactive.

SHIRLEY GRIFFITH: The National Oceanic and Atmospheric Administration is watching the marine debris as part of its efforts to protect America's coastlines and natural resources. It predicts more debris will reach the west coast next year and circle back to the Hawaiian Islands, arriving between twenty-fourteen through twenty-sixteen.

NOAA spends forty million dollars a year in an effort to protect the United States from tsunamis. The country has two tsunami warning centers -- one on the Hawaiian island of Oahu and another in Palmer, Alaska. NOAA officials use equipment on the seafloor and on the ocean's surface to measure tsunamis.

MARIO RITTER: NOAA officials say tsunamis can move much faster than anyone can run. They say people in coastal areas need to recognize signs of a possible tsunami.

Officials say the safest thing you can do is move to higher ground at once, or go to the top of a tall, strong building. You should not wait to hear a tsunami warning. And, once a tsunami wave has reached land, you should not return to the coast until local officials say it is safe. That is because tsunamis are often

made up of many waves, and later waves can be higher than the first one. There can be as much as an hour between waves.

(MUSIC)

SHIRLEY GRIFFITH: On December twenty-sixth, two thousand four, a powerful earthquake and tsunami struck the Indian Ocean. Two hundred thirty thousand people were killed on two continents, most of them in Indonesia. After the tsunami, NOAA and the United States Geological Survey were given more money to help release tsunami warnings more quickly. NOAA has reduced the time to provide tsunami warnings from an average of fifteen minutes to six. In some areas, NOAA can provide these warnings in less than three minutes. That can help save many lives.

MARIO RITTER: But such information is of little use without a way to provide it to people who could be affected by a tsunami. So, local officials need to have a warning system in place. They also should have a plan for removing people from threatened areas. Officials are responsible for broadcasting warnings as fast as they can, by any method they can.

The Indian Ocean tsunami of two thousand four was among the worst ever reported. But the Pacific Ocean has experienced more of the deadly waves than other oceans. Experts estimate sixty percent of tsunamis take place there. NOAA says a tsunami cannot be prevented. But the harm that a tsunami causes can be lessened by people being prepared, by timely warnings and by an effective plan of action.

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SHIRLEY GRIFFITH: This SCIENCE IN THE NEWS was written by Christopher Cruise. Our producer was June Simms. I'm Shirley Griffith.

MARIO RITTER: And I'm Mario Ritter. Join us again next week for more news about science in Special English on the Voice of America.