Tsunami – What is it? What may we expect?

The massive earthquake and subsequent tsunami which Japan experienced last year has been a wake-up call for northern California to Vancouver Island. That whole area is part of what is called the "ring of fire"; an area starting with South America (particularly Chile), over to New Zealand, the Philippines, Japan, over to Alaska and down to California – the world's most active area of volcanoes and earthquakes.

The earthquakes are caused by the attempt of one plate (here, the Pacific plate) to plunge underneath another (here, the North American plate). Friction stops the plates from moving, resulting in massive tension; when that friction is overcome, an earthquake occurs. The area where the two plates are locking up is called the Cascadian Subduction Zone, and runs about 60 to 75 miles off the coast starting at about Eureka, California and on up to the middle of Vancouver Island. This area ruptures along its length on an average of about every three hundred years, with the last rupture on January 26, 1700 (at about 9 p.m.)

When such a rupture occurs (as happened in Japan) there is an immediate earthquake. The movement of one plate under the other causes an immediate energy pulse through the water; in deep water that pulse travels at about 200 meters per second, or about 450 miles per hour. As the pulse reaches shallow water, it changes speed for height; near the shore it will be traveling about 15 mph, but the water surge (not actually a wave) may reach 30 to 50 feet in height. So the resulting damage to land and buildings is a one-two punch.

How bad is the punch and what can we expect? Earthquakes are usually referred to on a scale which started as the Richter Scale. This scale is effectively a measure of the energy released. For example, the earthquake in Japan was about a 9; the earthquake in the San Francisco/Oakland area on October 17th, 1989 (referred to as the World Series Earthquake, or the Loma Prieta quake) was a 6.9. Each whole number increase on the scale indicates about 110 times more energy released than the previous number, so Japan's quake was in the range of 13,000 times as much energy as Loma Prieta. We are predicted to have a quake in the 9 range.

Damage, however, is on a different scale, called the Modified Mercalli Scale. Both the Loma Prieta and Japan quake were a 9. Jerry Rilette, who currently teaches Emergency Preparedness for the State of Oregon, commented that "This (the earthquake and tsunami) will make (Hurricane) Katrina look like a walk in the park". Out of approximately 700 to 750 bridges in western Oregon, for example, it is estimated that as many as 450 may be either destroyed or damaged to the point of being unusable.

Locally, it is hard to estimate what types of damage the quake might cause. Both fill (land which has had earth and rock brought in to prepare it for construction) and sand are known to liquefy when subjected to quakes. This was part of the cause of such significant damage during the Loma Prieta quake. Liquefaction can cause damage to structures which otherwise might make it through the shaking, and can greatly enhance damage otherwise occurring.

Flooding is the result of the tsunami generated by the quake. In southern Japan, water reached buildings which were 50 feet above sea level. In Northern Japan, due to off-shore and on-shore geography, the water reached as high as 140 feet above sea level. Flood maps of the Oregon coastal regions have either been updated or are in the process of being done and can be obtained from the Manager's Office.

The report is not meant to scare, but rather to alert you, the reader, to the impending event so that you can be prepared when it happens. This coming event is predicted to seriously impact all of western Oregon, Washington, Southern British Colombia and northern California. This is not a matter of an inconvenience lasting a few weeks; some of the repairs will take years to accomplish. Communications will be seriously disrupted for weeks if not months; transportation will be extremely difficult if not impossible for some time. Being prepared for the disaster will keep you safe and secure until Emergency Response has had time be implemented. Whether you are at the Coast or in the Valley, you will need to be prepared to provide for food, shelter and basic medical needs for yourself and your family.