**Earthquake Preparedness Video Narrative**

**Slide 1**

If an earthquake occurred now, what would you do? This presentation is designed to provide answers to this question

Most of western Oregon is seismically active. It has several major fault zones including the Cascadia subduction zone. It is the latter which causes scientists the most concern. Earthquakes that have occurred along a similar type of fault have been some of the most powerful and devastating ever recorded.

According to historic records, we are overdue. We need to familiarize ourselves with information about earthquakes and tsunamis: how to prepare, and what to do when the event occurs.

**Slide 2**

This presentation has been developed by the Diocesan Disaster Preparedness team working with the Bishop’s staff, national church, and several scientists.

The mission of the Preparedness Program is to assist with planning for disasters and emergencies, to help with longer term response, and coordinate with local, state, church, and national agencies, such as the Federal Emergency Management Agency.

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These are members of the current team from throughout the Diocese. Those watching this video are encouraged to join this team. The national church can assist with training.

**Slide 4**

Our major concern is the Cascadia Subduction Zone

* It is where the Juan de Fuca Plate, part of the Pacific Plate, is pushing under the North American Plate
* Currently, it is stuck
* When a subduction zone plate releases, such as happened in Japan with Tohoku in April 2011, it can result in a major earthquake. In addition to earthquake damage, there is likely to be a tsunami

This presentation covers:

* A description of earthquakes and tsunamis, and the potential for damage and longer-term effects.
* How to prepare for such an event
* And, what to do during and after an earthquake

The latter two topics reflect the ministry of the church, serving others. For this we bring to bear our assets in helping plan how to respond, and subsequently responding

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[5-second pause]

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An earthquake is the sudden movement of the ground causing shaking. This movement occurs at the junction of two plates. When the plates stick, they release in a series of jerks, some of which can be quite severe.

There are two types of earthquakes

* First is transform or strike-slip: Here, one plate moves sideways or horizontally in relation to the other.
* Second, convergent: Generally, one part of the earth’s crust rides under another with the top plate collapsing

Note: A more recent discovery is that active faults have arisen from fracking

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The best know transform fault is the San Andreas in California.

Two well know transform faults in Oregon are the Klamath Falls and Mt Angel, the latter responsible for the 1993 Scotts Mills earthquake

Additionally, a fault runs from Alair Village southwest past Philomath right under the Oregon State campus.

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Convergent faults normally occur along the Pacific Coasts in an arc known as ”The Ring of Fire”. These typically are subduction zones. The Ring of Fire has produced some of the most devastating earthquakes ever recorded.

The Cascadia fault is best known to Northwest residents. The Juan de Fuca Plate is riding under the North American Plate. This fault stretches between north of Vancouver Island to California. The last known major earthquake here occurred more than 300 years ago.

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Measurement of earthquake is done with a seismometer. It uses a Moment Magnitude Scale which originally was called a “Richter Scale”.

MMS implies damage. But, many factors affect the amount of damage including depth, distance from epicenter, building construction, and nature of soils and rocks.

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Here are the most severe earthquakes since 2000. The ones highlighted in yellow occurred along transform faults. The rest occurred at convergent faults and generally have had an MMS of 8.0 or higher. All are major earthquakes.

**Slide 11**

The most recent earthquakes in the northwest have been a mixture of those along convergent and transform faults.

**Slide 12**

A tsunami occurs when the stuck upper plate, which has been uplifted, collapses on the subducting plate. This causes a wave similar to what happens when one slaps the water or in a cannonball into a pool.

In open water, a tsunami is a small wave moving at speeds up to 500 miles per hour. It can be detected only by sensitive instruments..

When it reaches shallower water the wave begins to increase in height, and it slows down. While we say wave, what occurs is a wall of water. With Oregon’s relatively shallow coast, the wave will build higher than places where the coast drops off more sharply.

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Along the coast, an earthquake is a signal that a tsunami may occur. However, not all earthquakes produce tsunamis. Absent shaking, a load roar and the ocean receding far out are warning signs.

For the Oregon coast, the tsunami may hit between 15 and 30 minutes after the earthquake. Fortunately, there is reasonably ample warning if the earthquake is felt.

Based on the Tohuku experience expect a wave height of 20 meters (65 feet) with total depth of the water reaching upwards of 40 meters (130 feet). That is why a refuge zone at least 130 feet of elevation over sea level is suggested.

Tsunamis can come in multiple waves, with possible addition tsunamis following aftershocks.

**Slide 14**

These pictures show typical earthquake dames and that done by a tsunami. Note the collapse of infrastructure.

**Slide 15**

How do we know about the last Cascadia tsunami?

There are two supporting facts. There is the Copalis, Washington ghost forest in which carbon dating shows tree destruction around 1700. Additionally, layers of ocean sediment are buried.

In Japan, their stone markers show the elevation below which construction should not take place. One of the markers is dated January 26, 1700 (Pacific time). The water reached 39 meters (128 feet)

**Slide 16**

Here are two examples of areas with better earthquake preparedness. Notice the speed with which power, communications, and even transportation was restored. This should be kept in mind when viewing the next slide showing recovery for Oregon.

**Slide 17**

The values in this slide are contrasted with those in the previous slide. These recovery values are significant. They have come from geophysicists and earthquake experts and are likely to represent “worst case” scenarios. But, even if the timetables are 50% too high, people will be without many basic needs for extended periods. Recall how long power restoration often teaks after a major storm.

Of special concern is the availability of fuel in northwestern Oregon. 97% of the fuel is stored in tank farms along the Willamette River. They are built on sands which are likely to liquefy. None are seismically strengthened. In addition, because of expected infrastructure damage, even if tanks are immediately replaced, getting fuel there may be lengthy.

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For yourself and family, identify hazards, especially items that can fall and injure or kill.

* Bolt water heater to a concrete wall
* Know how to shut off water, gas, and electricity

Prepare a disaster plan which includes:

* Personal out-of- area contacts
* How to evacuate and where family members can meet

Have adequate supplies to cover living up to several days regardless of whether evacuation is needed. Food and water especially may not be available.

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Churches are important in emergencies:

* Their mission and ministry is to provide for others. More importantly, there are members of the community who may be unable to provide adequately for themselves. Here the churches can play a critical role.
* Facilities may represent places of safe refuge for the community. Their structural integrity is important.

Parishes need to assume that an earthquake occurs when the buildings are occupied. Have published and available:

1. Safe areas in buildings and outside
2. Meet-up locations
3. Up-to-date parish list of names for roll call
4. Responsibility for the welfare of more vulnerable members
5. Suggest someone have access to satellite phone
6. Have names of ham radio operators – This latter group may be the only people who have communications because cell towers may be destroyed or without electricity, or overloaded

All parishes should have completed emergency preparedness plans. The Diocese on its emergency preparedness link has templates to help guide the planning.

**Slide 20**

Each community should have information available regarding:

* refuges
* resources – who what, where, how
* availability of tools for debris removal

Neighborhoods can prepare to assist each other including

* sources of drinking water and food
* tools that can assist with rescues
* meet-up locations and where possible, shelter

The Red Cross has specific programs available including one for neighborhoods; contact the American Red Cross, Cascade Chapter. Parishes can host such programs.

Communities have available CERTs and COADs organized for the individual community. They are to be the center of action after an emergency. Also, as noted previously, Ham radio operators may be the only source for contact outside the community.

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A number of steps can be taken to help make houses seismically more stable. These include bolting the structure to the foundation, plywood shear walls, and reinforced soft first stories. Some of these tasks can be done by individuals who are handy with construction. Leave installing automatic shutoff valves to a licensed plumber or heating contractor.

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If one must evacuate:

* Have a GO bag which should contain 72 hours of supplies(on the Diocesan Disaster Preparedness site)
* Keep fuel in at least one automobile

If the home can remain occupied have available:

* Refer to the Personal Preparedness Checklist which also is on the Diocesan Preparedness site
* NOAA weather radio with Public Alert feature – hand crank if possible
* Copies of important documents in a waterproof bag

Finally, suggest tying to the bed a flashlight, sturdy shoes, leather gloves, and a crowbar

While “tying sounds strange”, this will prevent these items from being buried or otherwise unavailable should the earthquake happen while we are in bed.

**Slide 23**

During an earthquake, drop and take cover, preferably under a table. Hold the table legs because the shaking will cause furniture to move. Shaking may last a long time. During the 2011 Japanese earthquake, my daughter and some students remained under her desk for more than 5 minutes until the shaking ceased.

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When an earthquake occurs, if inside, try to remain there under cover until the shaking stops. Unlike with tornados, doorways are not safe. Best to drop to knees and protect one’s head. Even a chair can be used to protect the head.

If one must leave, walk or crawl along the wall to the nearest available exit. Then promptly exit.

If outside, try to move away from any building up to 1 ½ times its height. Protect head and body.

Note: in an earthquake of magnitude 8 and higher, walking usually is not possible. Crawl.

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Churches often are large open structures and have unsupported high walls and roofs supported only by these walls. Because most buildings are older, they have not been upgrade to be earthquake resistant. Finally, there is limited area to take shelter.

Parishes should conduct earthquake drills, especially when events, including services are taking place.

When exiting, move away from structures. Remember, during a severe earthquake, people may need to crawl.

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(5 –second pause)

**Slide 27**

Protect yourself during the earthquake and, if in a tsunami zone, prepare for a tsunami. Be aware of evacuation routes. Try to go at least 130 feet above sea level.

Many communities have marked tsunami safe zones in their evacuation areas.

Remember, tsunamis can come in multiple waves which can last up to 12 hours. Aftershocks can produce additional waves. An important hazard is debris carried by the water, especially hazardous materials and burning buildings.

**Slide 28**

All communities along the coast have evacuation signs and location of assembly areas. In addition each has an evacuation map.

When visiting the coast, even if we do not know the map, can always find the evacuation route signs.

If one is fortunate, he or she will have up to 20 minutes to evacuate. Follow the signs; otherwise, head for higher ground.

Driving is not recommended. Roads may be clogged, and in places like Seaside, bridges over the rivers destroyed. Walk rapidly. If needed, assist others who are less ambulatory.

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After the earthquake or tsunami has occurred, first ensure your own further safety, then check on the condition of others. For injuries, try to note who, where, and extent of injuries.

Where possible reduce fire risk by turning off gas and electricity. In the latter case, because many communities are served by overhead wires, be careful around downed wires. They should be considered live.

With earthquakes; there will be aftershocks. Many of these are almost as strong as the original one. In the Tohuku earthquake, aftershocks, many in the 6.0 magnitude range, continued for hours. These shocks can collapse already weakened structures.

Help may be 72 hours or more away. Do not, unless trained or so directed, attempt to rescue trapped people. Debris can easily collapse injuring, trapping or even killing the rescuer.

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Access to food and water is possible. Potable water is available in water heaters and toilet tanks. There also is water in canned foods. Invest in a $30 water purifying straw, such as “Lifestraw”, which can be found in outdoor stores, and Target or Walmart.

For food, many fresh foods can keep days without refrigeration. Frozen foods can be kept in their state for up to 3 days in an unopened freezer. Most meats, once unfrozen, will spoil quickly. Cook if possible; they will then keep a few days longer.

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People should attempt to go to meet-up areas and learn what they can do. Everyone should have some basic first-aid training, often available from local Red Cross chapters or other public organizations. Can also help provide communications, food and shelter. In other words, assume responsibilities.

Should know the community response agencies and how to contact them. Follow instructions from these agencies and follow through. This may seem trivial, but the response agencies are following a plan.

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First, verify the safety and condition of parishioners. This is especially important for those who are more vulnerable. Then assess damage to the facilities.

As soon as possible, communicate what is known to the Diocese. There are several channels, but any will get information to the central communication point who may the bishop or a designated staff member.

Now make available the assets and skills that were provided to local emergency responders. These skills and assets should have been shown in the Asset Map for the parish.

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All parishes should form an emergency response team. Activate that team. Determine from the community responders what is needed and where volunteers should report. You may be asked to assist with evacuation. Do not spontaneously deploy. It can only have negative effects on the response.

Communications, except where contacting family, parish, or the diocese, needs to follow the chain of command. Short circuiting that chain can interrupt the supply of aid.

**Slide 34**

Finally, there are many excellent resources. These can be found on the Diocesan Disaster Preparedness pages which is part of the Oregon Episcopal Diocese Website under the title, resources.

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14-second pause.

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Thank you.

If there are questions, please contact the Diocesan Disaster Coordinator at DDCOregon@gmail.com.