

October 8, 2011

Fishhawk Lake

Emergency Preparedness Plan

Adopted by the Board of Trustees of Fishhawk Lake Recreation Club, October 8, 2011

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We are not part of a large municipality, although most of us have lived in municipalities much of our lives. At Fishhawk Lake (FLRC) we must be much more self protecting and cooperative within our small community of about 250 lots, with houses on about 180 of them. We are fortunate in having a fire station in the community, the main Mist-Birkenfeld fire station about 6 miles away, and a helipad for emergency evacuation of the ill or injured. Despite our small population, we have many of the same emergencies as municipalities, plus the danger of wildfire in the surrounding forest spreading into our community (i.e. the Tillamook burn of 1934), the danger of floods of Fishhawk Creek and Fishhawk Lake (2007), the problems associated with heavy snows (2008) which cut off our communications and electrical power for extended time periods, and the potential danger of failure of the dam and the resulting danger that this causes downstream on Fishhawk Creek, including the FLRC houses immediately below the dam, and on downstream on the shores of the Nehalem River. For these reasons it is important that we prepare and maintain a plan that will prepare all of us in FLRC for meeting and defeating these potential disasters.

Floods

The flood of 2007 caused major damage to about 60 homes at FLRC, minor damage such as flooded footings and crawl spaces to many more, and a lot of flotsam to clean up at most of the lakefront properties. We also suffered the loss of exit routes when a “minor” (unnamed) creek overflowed and washed out Northshore Drive, leaving a large number of lots isolated.

To reduce flood damage we must be well informed of potentially damaging rains. Local area predictions are available on the internet; in particular a weather prediction, including warnings of dangerous conditions, for Mist that is available at

<http://forecast.weather.gov/MapClick.php?site=pqr&smap=1&textField1=45.99639&textField2=-123.25528>

(or more simply enter <http://forecast.weather.gov> then enter Mist, OR in the “City, ST” field and click Go). Alternatively, a more specific forecast for the Fishhawk basin could be obtained by contracting for the services of a weather forecaster. Also, the Mist-Birkenfeld Rural Fire Protection District is developing a system for issuing early warnings for the district, including FLRC.

If the weather forecast or warnings are hazardous, the lake should be lowered at least one foot below the rim of the surface drain (Glory Hole), by opening the bottom drain. However, this will be a slow process because the diameter of the bottom drain is 32 inches, and the diameter of the surface drain is 40 feet. The difference isn't as great as it seems because: (1) the bottom drain is about 25 ft. lower than the surface drain and therefore has about 12 pounds more pressure at its opening and (2) the surface drain is constricted to a 10 ft. high by 12 ft. wide, (almost) horizontal chute under the dam. This chute is also about 25 ft below the rim of the surface drain.

One possible solution to keeping the lake level low when inflow is heavy is building an additional bottom drain. However tunneling a new bottom drain through the dam would be difficult and expensive. Another approach would be to cut a window near the bottom of the upstream side of the surface drain, so that flow through the window would go through the existing chute. A steel gate over the window could then be raised to increase

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outflow from the from the lake. This would not be as effective as a new bottom drain after the lake level becomes a few feet above the rim of the surface drain because the flow through the surface drain would exceed the capacity of the chute. However, it would be very effective in advanced preparation.

Even this approach would not be simple because: (1) reinforcement would be required to avoid weakening the vertical cylinder of the surface drain, requiring the design by a registered engineer, (2) the lake would have to be lowered or a coffer dam built before a the hole could be cut, and (3) a gate and a means of raising and lowering it would have to be designed. However, even a 7 ft. by 8 ft. window would increase bottom outflow by a factor of more than ten over that of the existng bottom drain.

A contract has been established with MCMillan, LLC to engineer recommendations for controlling flood damage, and reducing the danger of the dam being breached by flood waters (reference 1).

In the 2007 flood, several boats and floating docks went down the surface drain, partially blocking the chute and probably significantly reducing the outflow of water from the lake. In this chute, the effect of a 16 ft. boat could be very significant, especially if it lodges across the opening of the duct. Therefore it is critical that all floating docks and boats be anchored to assure that they cannot get to the surface drain. The simplest way of assuring this is to move all boats to a storage place that is at least 8 ft. above normal lake surface level, and anchor floating docks *securely* to the shore. If a lot does not have any area that is more than 8 ft. above the normal lake surface, it may be tied to a large tree or a properly anchored dock. Floating docks should be secured ashore at least 8 ft. from the lake by a tree or an anchor. The anchoring rope or chain should be inspected at least once a year. The 8 ft length is needed to prevent the floating dock from pulling directly on the anchor with a force of several thousand pounds. Boats that are anchored to the bottom or a non-floating dock should also have a anchor chain or rope that allows 8 ft of rise in the water level without putting a direct lifting force on the anchor.

Another advanced preparation for flooding, that would be helpful, but perhaps not feasible, would be to remotely measure the depth of water in the creeks feeding Fishhawk Lake, especially Fishhawk Creek. There are two drawbacks to this: (1) none of the land sufficiently distant to offer a significantly early warning of high water belongs to FLRC, and (2) the area is too mountainous to support radio communications. Land lines in general are difficult to maintain because of the surrounding forest, so it may be worth investigating other communication approaches such as satellite communication, but they are probably not economically feasible.

With sufficient advanced notice of high waters sandbags can be used to protect homes. It would take a large amount of sand and lots of bags to protect all buildings from flooding, especially because as you prohibit water from entering one area, you increase the height of the water and make it harder to protect other places, and may cause the lake to overtop the dam. Limiting the sandbagging to a wall surrounding each home reduces this effect, but requires even more sandbags. Proper installation of sandbags is critical. Instructions for placing stand bags to protect a property are available online at: <http://www.ag.ndsu.edu/pubs/ageng/safety/ae626w.htm>

In general, we probably do not have sufficient warning of floods to haul in sufficient sand and bags to make sandbagging practical. However, a “flood control wall”, with the top at an elevation higher than the dam, surrounding each house would probably be effective and cause fewer problems than sandbags. Such walls would probably violate current covenants restricting the construction of fences, although for

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most lots a “flood control wall” would only need to be about four feet high, or even three feet high for protection with the addition of a smaller number of sandbags. We should seriously consider the merit of some reduction of view versus the protection offered by a wall, but the structure of the wall must be strong enough to withstand the pressure of the flood waters and the wall should be placed close enough to each house to avoid the dam overflow problems caused by significantly reducing the flooded area.

If sandbagging or a flood control wall prevent direct entry of flood water, there is still a possibility of flood water, mixed with sewage, entering a house by backflow from the sewer lines, which typically are closer to the lake than the house. During the 2007 flood there were no reports of this occurring, but that may be because it would be difficult to detect backflow flooding in a house directly flooded with several feet of water, or because sewer mains may be able to route all flood water directly to the sewage treatment plant. Backwater flooding of a house protected from direct flooding could be prevented by installing a backwater valve in the sewer lateral between the house and the sewer main. However, there are two problems with this approach: (1) under Oregon's building code an exception may be required for existing, multifloor houses, and (2) the backwater valves need regular maintenance or they may plug up.

Another possibility, more complicated than the “flood control wall”, but not significantly obstructing views, would be a “deck wall”, which would lie on the ground and serve as a deck, until a flood threatened, then pulled up to form a wall. It would require that permanent, well-buried posts be erected to support the deck in its upright position against the force of flood waters, and the deck must be strong enough to withstand the pressure and lifting from flood waters. However, it would not require changing the covenants. Such installations would probably require approval by FEMA.

Since flooding is likely to isolate FLRC or homes within it, the storage of sufficient food and water is to last for several days is necessary. In the 2007 flood, there was no potable water for 5 days, and the people living on the upper 2/3 of Northshore Dr. could not drive out for 9 days. Unless contaminated water has entered the fresh water system, it is safe to drain drinking water from the water heater after turning off the main water valve and the electric breakers for the water heater. By using lake water for flushing toilets and other uses not requiring potable water, the amount of water stored in the heater should last several days if the water heater is above flood level. An alternative is the use of water fillters carried by backpackers. For food, it is wise to keep a supply of dried food on hand. These come in buckets that are supposed to last up to 20 years, and contain a total of 275 servings of various foods. They are available from several stores and on the internet.

Another action to reduce flood damage is to move valuable equipment and memorabilia to upper floors or the attic space. If you are at Fishhawk Lake when a flood is approaching, you can probably wait until the flood water reaches the foundation of your home; if you are a part time resident, it is best whenever possible to store things you want to protect on upper floors or high shelves. Since flood waters higher than 6 feet above normal lake level will overtop the dam, they are very unlikely to reach a height over 8 feet above normal lake level.

If your house is on a concrete slab, when the flood water approaches the level of the house, make sure that all doors are closed, and seal them with a heavy rug or blanket. There is a danger in this, though,

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that the flood waters may lift the house, slab and all. If like most houses at FLRC, your house has a crawl space, sealing the door won't help much because the flood waters will still come up through holes in the floor, especially through the ducts for central heating, but even through the holes required for electricity and plumbing. However, even then it is worth trying; your floor, walls and trim will probably be damaged, but the water inside may stay lower and protect some equipment and memorabilia.

After a flood comes cleanup! After the 2007 flood, we were fortunate that Columbia County provided large disposal bins for use of FLRC residents. We can hope that will be repeated in the event of another flood. FLRC residents were generally very considerate in their use of the bins, and it appeared that on the appropriate materials from flooded houses were disposed of. The thing that is most likely to be missed in a post-flood cleanup is the insulation under the floor if it was in the flood waters, and it appeared that much of that was properly discarded.

Heavy snow storms

Since FLRC is isolated from other support agencies for snow removal, we must be sure that we have sufficient snow-removal equipment that is in good working order. Also, since FLRC lost telephone communications for about a week during the 2008 snow storm, we should prepare for communicating with either low-frequency amateur radio or satellite phone. We also lost electrical power for about a week after that storm, but FLRC recently purchased a generator which should provide power for our water preparation and sewage disposal needs.

When a warning of heavy snowfall is announced (the online federal forecasts and warnings are discussed under **Floods**) the FLRC staff should double check the snow-removal equipment is ready to go, including chains if needed. They should also make sure there is adequate fuel for the generator. FLRC residents should leave for lower and less isolated locations, or be prepared to not leave for several days. Those who stay should also have a electrical generator in good working order, adequate fuel, and enough food and water to last several days (see under **Floods**).

During a heavy snow, remain inside as much as possible, and in particular do not walk below the eaves of a building with a steep roof. A snow may not seem like much, but if several feet of wet snow collects on the roof, and suddenly slips loose, you be be flattened by several hundred pounds of snow. This is a major problem in really heavy snow areas, such as the Cascades where ten or more feet may accumulate, but it can be a danger here where our snowfall is usually much lower but wetter.

Priorities must be established for snow removal. The first and second priorities should always be the driveway for the fire station and the helipad. After that priorities should be established, but must be flexible. In general, the highest priorities should be the steepest hills, such as Lakeview Dr. and Ridgecrest Dr., and clearing driveways should be the responsibility of each homeowner. However, if there is an avalanche which closes a road used by several people, that should be assigned a higher priority, or if there is an injury requiring emergency medical care in a home, clearing a path to that house, including the house driveway, may become the highest priority. Or if there is a bad water leak up near the water tank, Northshore Dr to the water tank, may go from a low priority to the highest one.

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Each owner, especially those who live at FLRC full time, should prepare emergency supplies for cases when access to Fishhawk Lake may be limited for several days due to heavy snows. Frequently, heavy snows may cause extended power outages, which may limit access to processed water and disposal of sewage, although the recent installation of a power generator for the water processing and sewage plants should reduce the significance of an area power outage.

A heavy snowfall, especially a wet one, will cause the fall of large trees and branches. These may block roads or damage houses. Each homeowner should have tarp on hand to cover any area of the house damaged by falling trees or branches to prevent, or at least reduce, damage from snow and water when a roof is damaged. If you need to remove fallen trees, it is usually safest to call a tree service contractor unless you have sufficient experience in tree removal.

None of our trunk communication lines are buried, so communications frequently are lost after a snow storm and may not be restored for several days. Also, we seldom can reach anyone with a cell phone. Therefore, we should look into the cost of obtaining satellite communications for use in an emergency. Probably one satellite phone at the office would suffice, especially if there is a way that each home could reach that satellite phone using CB channel 10. An alternative would be the use of one or more low frequency amateur radios.

Landslides

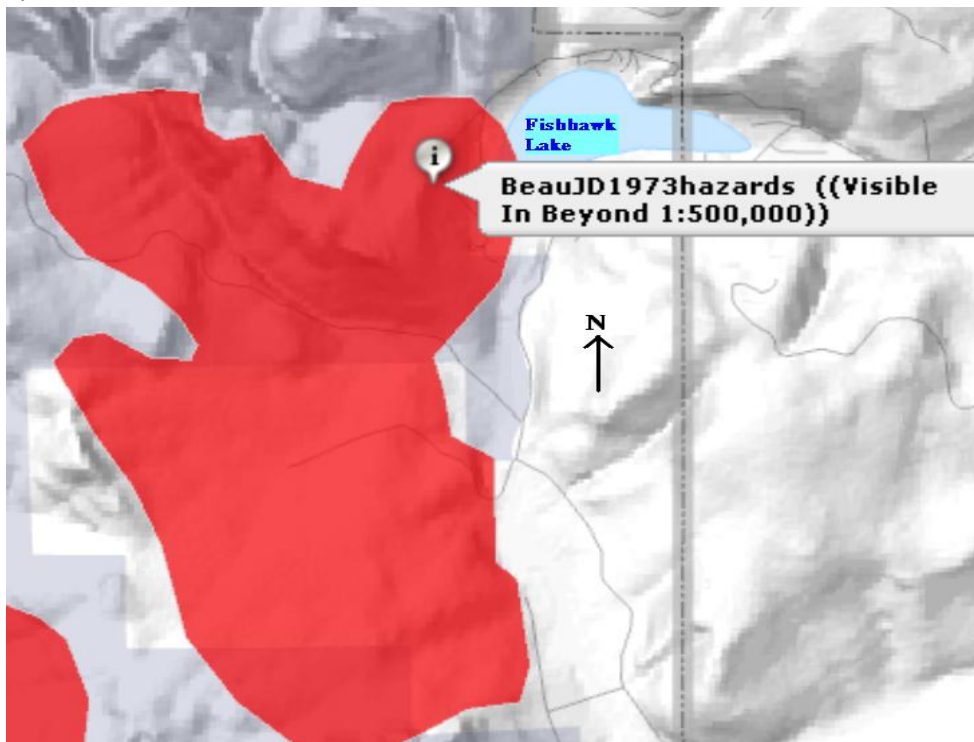
Our area is prone to landslides because the surface is mainly clay. A few feet below the surface, many places have a rock base, but even there the rocks are more like clay than granite. There are many scars of past landslides at Fishhawk Lake, especially along Northshore Drive. Also, rocks rolling down the hills frequently roll onto Northshore Drive. At the east end of the lake, there was recently a landslide just above Lakeview Drive. Other recent major landslides closed Greasy Spoon Road, and almost blocked Fishhawk Road a couple miles above Fishhawk Lake. Evidence of an earlier landslide on the west side of the dam caused the engineers to decide to locate the surface drain closer to the east side of the dam, although there is also some evidence of an another landslide on the east side of the dam.

Landslides, floods, and earthquakes are interrelated because an earthquake can cause a landslide, and a landslide can cause a flood by blocking a stream or river. A well-known example of this is “Quake Lake”, the result of an earthquake in Yellowstone National Park. Also, the heavy rains that cause a flood can also cause a landslide by eroding the lower part of a steep bank, causing the upper part to slide away.. Though there is no evidence that a flood or a heavy rain can cause an earthquake, rising water in wells is frequently observed just before an earthquake. However, this is more likely to be a precursor to an earthquake than the cause of one.

In the Fishhawk Lake area landslides are more frequent than floods, but less serious. However, we do live in an area where large landslides are possible. The Department of Oregon Geology and Mineral Industries (DOGAMI) has prepared a map of reported landslides in Oregon, called SLIDO. An enlargement of the Fishhawk Lake area is shown below, and the red area designates the area where landslides have been reported. This landslide is probably quite ancient because there is significant erosion to the area where the debris landed. It was first shown on a map (but not discussed) in a 1973

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report by J.D. Beaulieu, "Environmental Geology of inland Tillamook and Clatsop Counties, Oregon, Bulletin B-79".



Landslides are a frequent part of our life at Fishhawk Lake, but fortunately recent ones have not been serious, with little or no property damage and no injuries or deaths. However, we should take steps to reduce danger from landslides. The most likely causes of landslides are excavation of steep hillsides to build roads or build foundations for houses. If the building codes are followed there is little danger of damage caused by excavation for foundations. But don't take risks by building on slopes that are on or slightly beyond the borderlines established by the building codes because its your house that may be damaged.

Excavations for roads are harder to control because they are likely to lie outside of the area under the direct control of the landowner. Excavations for roads well above a lot can start landslides that extend into a lot and are more likely to cause significant damage because a long slide-line builds up both the speed and quantity of the sliding earth. Also, excavation below a lot can cause a slide that removes dirt supporting a house built on that lot. Road construction of logging, transportation, or recreational roads are not controlled by strict and detailed codes such as those for foundations for construction. So if you observe road construction starting either above or below your lot, don't hesitate to (politely) inquire about the extent of the excavation and determine if it has been approved by a **registered** professional civil engineer or geologist. If it has not, don't hesitate to notify the appropriate county engineer. It's your property and possibly your life that the construction is endangering.

Another potential cause of landslides is the removal of deep-rooted vegetation from a steep slope. Even though some tall trees may be blocking your view of the lake, removing them may give you a better

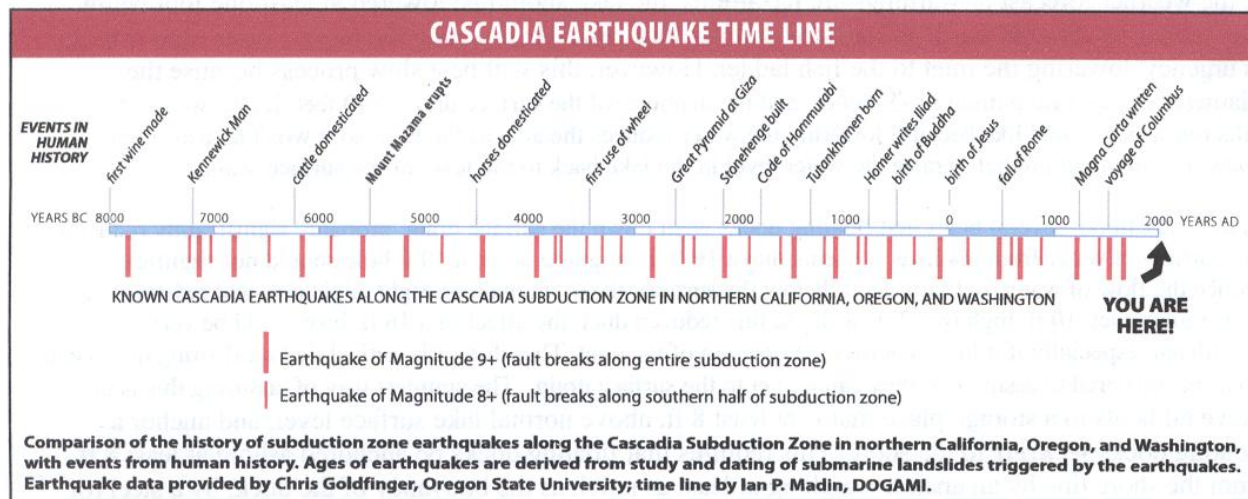
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view than you want as your house slides down hill into the lake! But also be aware that even very tall trees have been known to slide downhill along with the underlying soil. The recent slide above Lakeview Drive should serve as an example of that. In some cases, such as a slide in McLeay Park in Portland a few years ago, the trees even remained upright!

In summary, landslides in our area generally do not cause the damage or danger to lives that floods or earthquakes can, but they are a lot more frequent, so **handle with care**.

Earthquakes

Northwest Oregon is subject to earthquakes from three sources. The Cascadia Subduction Zone (CSZ) is the source of the longest and strongest earthquakes, even though it is about 75 miles off-shore. These are caused by the Juan de Fuca plate being forced under the North American Plate by the upwelling of the Gorda Ridge and other Pacific ridges. The Juan de Fuca plate is moving at a relatively constant rate of one to two inches per year. However, the plates stick together occasionally, causing stress to build up in the subduction zone. The sudden release of this stress causes an earthquake. These earthquakes are extremely powerful and can last up to 5 minutes, causing structural collapse, landslides, and disruption of services. It can also generate a large tsunami. Tsunamis will not cause any direct damage inland as far as Fishhawk Lake, but may destroy communications and services which originate in Astoria. The CSZ earthquakes are relatively rare in the human scale of time, the last one was in 1700. The figure below (presented by Ian P. Madin of the Oregon Department of Geology and Mineral Industries) compares events of human history compared to the history of these earthquakes. An earthquake of magnitude 9 is about 900 times stronger than the recent 7.0 magnitude earthquake in Haiti, and a magnitude 8 earthquake is about 30 times stronger.



The second type of earthquake that may hit Fishhawk Lake is the Intraplate. The 2001 quake in Nisqually, WA was an intraplate earthquake, and was felt in some places in northwest Oregon. These earthquakes are smaller and of shorter duration than the CSZ quakes, but can still do appreciable damage. The third type of earthquake that can be significant in our area is the volcanic eruption-related

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quakes, such as those that shook the area before the eruption of Mount St. Helen in 1980.

There are three major sources of damage to structures and possible loss of life: seismic waves, landslides, and liquefaction. The seismic waves propagate the quake-caused motion of the earth to distant areas, and cause the shaking that we commonly associate with earthquakes. These may cause houses to collapse, or trees to fall. The landslides caused by earthquakes were discussed in the planning for landslides more generally, and may simply be an accelerating factor to release a landslide that would have happened later. The shaking of the earthquake may cause water-saturated sediment to liquefy and collapse, either by sliding downhill or sinking. Probably the best known case of liquefaction was the sinking of a section of Anchorage, AK sinking into the sound during the Great Alaska earthquake of 1964. Since our water table is high at Fishhawk Lake, this might be a possible source of quake danger here, but it happens more frequently in deep sandy soils, while our soils are clay, and despite the high water table are relatively impermeable, and are only clay for a few feet of depth before reaching rock.

The following information about preparation for earthquakes and how to protect yourself during an earthquake are taken from the FEMA website: www.fema.gov/hazard/earthquake/

What to Do Before an Earthquake

Earthquakes strike suddenly, violently and without warning. Identifying potential hazards ahead of time and advance planning can reduce the dangers of serious injury or loss of life from an earthquake. Repairing deep plaster cracks in ceilings and foundations, anchoring overhead lighting fixtures to the ceiling, and following local seismic building standards, will help reduce the impact of earthquakes.

Six Ways to Plan Ahead

1. Check for Hazards in the Home

- Fasten shelves securely to walls.
- Place large or heavy objects on lower shelves.
- Store breakable items such as bottled foods, glass, and china in low, closed cabinets with latches.
- Hang heavy items such as pictures and mirrors away from beds, couches, and anywhere people sit.
- Brace overhead light fixtures.
- Repair defective electrical wiring and leaky gas connections. These are potential fire risks.
- Secure a water heater by strapping it to the wall studs and bolting it to the floor.
- Repair any deep cracks in ceilings or foundations. Get expert advice if there are signs of structural defects.
- Store weed killers, pesticides, and flammable products securely in closed cabinets with latches and on bottom shelves.

2. Identify Safe Places Indoors and Outdoors

- Under sturdy furniture such as a heavy desk or table.

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- Against an inside wall.
- Away from where glass could shatter around windows, mirrors, pictures, or where heavy bookcases or other heavy furniture could fall over.
- In the open, away from buildings, trees, telephone and electrical lines, overpasses, or elevated expressways.

3. Educate Yourself and Family Members

- Contact your local emergency management office or American Red Cross chapter for more information on earthquakes. Also read the "How-To Series" for information on how to protect your property from earthquakes.
- Teach children how and when to call 9-1-1, police, or fire department and which radio station to tune to for emergency information.
- Teach all family members how and when to turn off gas, electricity, and water.

4. Have Disaster Supplies on Hand

- Flashlight and extra batteries.
- Portable battery-operated radio and extra batteries.
- First aid kit and manual.
- Emergency food and water.
- Nonelectric can opener.
- Essential medicines.
- Cash and credit cards.
- Sturdy shoes.

5. Develop an Emergency Communication Plan

- In case family members are separated from one another during an earthquake (a real possibility during the day when adults are at work and children are at school), develop a plan for reuniting after the disaster.
- Ask an out-of-state relative or friend to serve as the "family contact." After a disaster, it's often easier to call long distance. Make sure everyone in the family knows the name, address, and phone number of the contact person.

6. Help Your Community Get Ready

- Publish a special section in your local newspaper with emergency information on earthquakes. Localize the information by printing the phone numbers of local emergency services offices, the American Red Cross, and hospitals.
- Conduct a week-long series on locating hazards in the home.
- Work with local emergency services and American Red Cross officials to prepare special reports for people with mobility impairments on what to do during an earthquake.
- Provide tips on conducting earthquake drills in the home.
- Interview representatives of the gas, electric, and water companies about shutting off utilities.
- Work together in your community to apply your knowledge to building codes, retrofitting programs, hazard hunts, and neighborhood and family emergency plans.

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During an Earthquake

FEMA's recommendations for protecting yourself during an earthquake, taken from the same website, are:

Stay as safe as possible during an earthquake. Be aware that some earthquakes are actually foreshocks and a larger earthquake might occur. Minimize your movements to a few steps to a nearby safe place and if you are indoors, stay there until the shaking has stopped and you are sure exiting is safe.

If indoors

- **DROP** to the ground; take **COVER** by getting under a sturdy table or other piece of furniture; and **HOLD ON** until the shaking stops. If there isn't a table or desk near you, cover your face and head with your arms and crouch in an inside corner of the building.
- Stay away from glass, windows, outside doors and walls, and anything that could fall, such as lighting fixtures or furniture.
- Stay in bed if you are there when the earthquake strikes. Hold on and protect your head with a pillow, unless you are under a heavy light fixture that could fall. In that case, move to the nearest safe place.
- Use a doorway for shelter only if it is in close proximity to you and if you know it is a strongly supported, loadbearing doorway.
- Stay inside until the shaking stops and it is safe to go outside. Research has shown that most injuries occur when people inside buildings attempt to move to a different location inside the building or try to leave.
- Be aware that the electricity may go out or the sprinkler systems or fire alarms may turn on.
- DO NOT use the elevators.

If outdoors

- Stay there.
- Move away from buildings, streetlights, and utility wires.
- Once in the open, stay there until the shaking stops. The greatest danger exists directly outside buildings, at exits and alongside exterior walls. Many of the 120 fatalities from the 1933 Long Beach earthquake occurred when people ran outside of buildings only to be killed by falling debris from collapsing walls. Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related casualties result from collapsing walls, flying glass, and falling objects.

If in a moving vehicle

- Stop as quickly as safety permits and stay in the vehicle. Avoid stopping near or under buildings, trees, overpasses, and utility wires.
- Proceed cautiously once the earthquake has stopped. Avoid roads, bridges, or ramps that might have been damaged by the earthquake.

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If trapped under debris

- Do not light a match.
- Do not move about or kick up dust.
- Cover your mouth with a handkerchief or clothing.
- Tap on a pipe or wall so rescuers can locate you. Use a whistle if one is available. Shout only as a last resort. Shouting can cause you to inhale dangerous amounts of dust.

After an earthquake

- Expect aftershocks.
- Listen to a battery-operated radio or television.
- Use the telephone only for emergency calls.
- Open cabinets cautiously.
- Stay away from damaged areas.
- Help injured or trapped persons. Remember to help your neighbors who may require special assistance such as infants, the elderly, and people with disabilities. Give first aid where appropriate. Do not move seriously injured persons unless they are in immediate danger of further injury. Call for help.
- Clean up spilled medicines, bleaches, gasoline or other flammable liquids immediately.
- Inspect the entire length of chimneys for damage.
- Check for gas leaks. If you smell gas or hear blowing or hissing noise, open a window and quickly leave the building. Turn off the gas at the outside main valve if you can and call the gas company from a neighbor's home. If you turn off the gas for any reason, it must be turned back on by a professional.
- Look for electrical system damage or turn off main breaker.
- If you suspect sewage lines are damaged, avoid using the toilets and call a plumber. If water pipes are damaged, contact the water company and avoid using water from the tap. You can obtain safe water by melting ice cubes.

Fire

It seems that fire should be impossible in a temperate rain forest like Fishhawk Lake. However, during the late 1930's and early 1940's, most of the area now in Tillamook State Forest was burned over. The severe fires did not extend to our neighbor, Clatsop State Forest, but could easily happen in the future, especially if the droughts and temperatures predicted for global warming are correct.

Unless the fire danger is known well in advance and is not predicted to spread to any part of the access route, the best thing to do is to stay at Fishhawk Lake, where we can be fairly safe by boating out into the lake. However, there is a lot of advance preparation that we can do by participating in the Firewise

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program. Thus far we have significantly reduced the fire danger in our two Firewise days that we have held. There is still a lot to be done, but we have a good start.

Escape Routes

Kathy Cardona is working on locating possible routes to escape from Fishhawk Lake, and it is expected that different report will emerge from that work.

References

1. Fishhawk Dam Spillway Capacity and Hazard Rating Study (Draft Report) E. George Robison and Chris Runyan, April 26, 2011.

RECOMMENDATIONS

Recommendations for Individuals

1. Become familiar with sources of advanced warning of floods and snow storms.
2. Proper anchoring of boats and floating docks.
3. Drain the rusty water and sediment annually from your hot water tank.
4. Stock several days' supply of food.
5. Keep memorabilia and valuables on upper floors or high shelves
6. Investigate the feasibility of restricting the entry of water into your house.
7. Don't walk under the eaves during or after a heavy snow storm.
8. Remove snow from your driveway. It's not the responsibility of FLRC.
9. If you are a Ham with a station at Fishhawk Lake, notify FLRC personnel.
10. Carefully read and follow the FEMA recommendations on what to do before an earthquake and how to protect yourself during an earthquake.

Recommendations for FLRC

1. Follow through on improving dam outflow.
2. Establish and enforce regulations for boats and floating docks.
3. Consider upstream flow measurements.
4. Establish priorities for snow removal and maintain snow removal equipment.
5. Consider providing sandbags and/or permitting flood control walls.
6. Search for volunteer Hams to communicate in emergencies.
7. Consider renting one satellite phone.