

DIY Flood Forecasting

With more information you will know if there is real danger for flooding

By Bill Langmaid

If you've lived in Vernonia for any time at all, chances are you know someone that was affected by a flood. We had one in 1996, and then another in 2007. Other events have occurred as well, but they were much more localized than either of those 500 year flood events. As winter approaches, people look fearfully at the rivers, certain that the floods will happen again.

At some point they will, but it takes a very specific set of circumstances for a flood to occur. It's not just when we get a lot of rain, or just when there is snow on the ground, or when the folks on the Portland news stations are casting about for another sensational story and want to speculate on a recurrence of high water.

Now, I am no expert in any of the fields which are typically associated with flood forecasting, but I did pay attention to the available data and made some key observations of the data's behavior during the flood events. Hopefully you'll gain some knowledge from this article so that you'll be able to recognize when there is a danger and when there isn't one. But, if something does happen, even if you aren't expecting it, make sure to be prepared by following official recommendations as they are issued.

The two key floods in our recent history were similar in components, even if they acted differently. In 1996 the flood hit in the middle of winter, when we had had very cold weather followed by snow. This did two things. It made the ground impermeable, like a parking lot,

and the snow provided water storage. The amount of water in 1 cubic foot of powdery snow is considerably less than that in 1 cubic foot of slushy snow.

In 1996 the Pineapple Express headed right up the Willamette Valley, and the combination of very warm weather and heavy rains over a few days melted all that slushy snow. But the ground stayed frozen, and the melted snow and rain just ran to the valley bottoms and into the rivers. So, 1996 was frozen ground, a decent snowpack, lots of rain, and warm air.

The 2007 flood was caused by hurricane like conditions. There was a super-saturated weather system that moved quickly to the coast and then stalled as it climbed the Oregon Coast Range. As it stalled, the western edge of the system was still over the ocean, picking up water, which it then dumped over the land. A total of 11" fell in the Vernonia area, at a prolonged rate of .4" per hour.

The rain volume alone would have caused some flooding, but the real kicker was that the rain was being absorbed into the upland snow. The hurricane also brought warm air, and that warm air increased the temperature from 32 to 50° F in 24 hours, and melted all the snow in fewer than 8 hours. That meant there was an effective rainfall rate of over 1" every hour.

The river rose at a rate of 7" per hour on the Clear Creek gauge, and when those waters ran into the flow from Rock Creek, it was too much. Both rivers slowed down and backed up, dumping water over their banks and into the town. The events leading up to the flood-

ing were eerily similar, and allow us to predict our future actions with some accuracy. Rapidly increasing temperatures, saturated snowpack, and heavy rains from a stalled storm front were shared characteristics. The main difference was that the 1996 rain event lasted several days, and the 2007 event lasted one day.

That is what happened, and here are some tools to help you monitor the river. By looking at the USGS website (<http://waterdata.usgs.gov/nwis/uv?14299800>) that shows the Clear Creek gauge, anyone can check the rate of increase in the river height. Since the river is a modified vee shape, meaning the bankful width is greater than the bed's width, it takes more water to increase height as it gets higher. For example, at 5' of depth, the river is moving 270 cubic feet per second (cfs). At 10', still under flood stage, it has increased twelve-fold, to 3,270 cfs. It more than doubles again to reach 15' (it peaked at 18.6' in 2007) flowing at 8,640 cfs.

When I am monitoring the river because of my interest in evacuating the Vernonia Cares Food Bank, I am only interested in height increasing after it hits 9 feet. This is an important number because there is already a significant, but not dangerous, volume of water at that level. I then look at the shape of increase, and if it looks like a very steep line, with an increase of over .4 feet per hour, then it is important for me to look at other indicators, like snowpack, temperature, and duration of rain forecast.

The Snotel-Seine Creek recording station information is also available on the web, but isn't as user friendly. The site is located at

<http://www.wcc.nrcs.usda.gov/nwcc/site?sitenum=743&state=or> but the data is obscured by some links. The easiest one to use to get the information is the Snow Water Equivalent (SWE) hourly chart for the last 7 days, selected by the relevant report features and clicking on the yellow [View Current] button. For SWE, the important factor is the total available liquid. With .5" of falling rain, and .5" of snowmelt, that results in 1" of water available to enter the river.

If we have 1" of rain or snowmelt in Vernonia over the course of a day, the Nehalem will experience a two foot rise at Sword's bridge. Likewise, a rain/melt volume of 1" per day at the Clear Creek gauge will result in an 18" day rise in the river there. Snowmelt is hard to gauge without knowing the SWE of the snowpack, but if the situation warrants this information will be publicized.

The final site I watch is the north coast National Weather Service (NWS) forecast report at <http://forecast.weather.gov/MapClick.php?zoneid=ORZ003>. This is a forecast for a pretty general area, but the important indicators are warnings about unusual amounts of rain, and rapidly warming temperatures.

The floods of '96 and '07 were learning experiences for the NWS, and now they broadcast those warnings in conjunction with any flood warnings. Keeping these sites bookmarked in your browser can be helpful. There are more resources out there, but these are the ones that I use. The links above, plus more, are available at our city website, www.vernonia-or.gov.

Disaster Supplies Kit

- **Water**—three gallons for each person who would use the kit and an additional four gallons per person or pet for use if you are confined to your home.
- **Food**—at least a three-day supply in the kit, consider stocking a two-week supply of food and water in your home.
- **Items for infants, seniors, disabled persons or anyone with serious allergies**—including special foods, denture items, extra eyeglasses, hearing aid batteries, prescription and non-prescription medications that are regularly used, inhalers and other essential equipment.
- **Non-electric kitchen accessories**—a manual can opener; mess kits or disposable cups, plates and utensils; utility knife; sugar and salt; aluminum foil and plastic wrap; re-sealable plastic bags.
- **A portable, battery-powered radio or television and extra, fresh batteries**
- **Several flashlights and extra, fresh batteries**
- **A first aid kit**
- **One complete change of clothing and footwear for each person**—including sturdy work shoes or boots, raingear and other items adjusted for the season, such as hats and gloves, thermal underwear, sunglasses, dust masks.
- **Blankets or a sleeping bag for each person**
- **Sanitation and hygiene items**—shampoo, deodorant, toothpaste, toothbrushes, comb and brush, lip balm, sunscreen, contact lenses and supplies and any medications regularly used, toilet paper, towelettes, soap, hand sanitizer, liquid detergent, feminine supplies, plastic garbage bags (heavy-duty) and ties (for personal sanitation uses), medium-sized plastic bucket with tight lid, disinfectant, household chlorine bleach.
- **Other essential items**—paper, pencil, needles, thread, small A-B-C-type fire extinguisher, medicine dropper, whistle, emergency preparedness manual.
- **Entertainment**—including games and books, favorite dolls and stuffed animals for small children.
- **A map of the area marked with places you could go and their telephone numbers.**
- **An extra set of keys and IDs**—including keys for cars and any properties owned and copies of driver's licenses, passports and work identification badges.
- **Cash and coins and copies of credit cards**
- **Copies of medical prescriptions**
- **Matches in a waterproof container.**
- **A small tent, compass and shovel**

Pack the items in easy-to-carry containers, label the containers clearly and store them where they would be easily accessible.

NOTE: Always keep a shut-off valve wrench near the gas and water shut-off valves in your home.

This list is provided courtesy of the Centers for Disease Control, Atlanta GA
<http://emergency.cdc.gov/preparedness/kit/disasters/>

Be Prepared to "Shelter in Place"

By Bill Langmaid

"Shelter in place" is a concept that calls for citizens to manage their own survival needs during a disaster, at least in the short term. It gives emergency management services time to assess damages, prepare a response, and begin delivering services to those most in danger.

Vernonia has had its share of recent disasters, and experience has taught us that transportation can quickly become difficult or impossible. This means it is even more important to be prepared before a storm hits. Several companies have capitalized on the "shelter in place" concept by offering kits of one kind or another. Since these are usually fairly expensive, a lot of households skip this step.

But many of the items found in these kits are already available in your house. Please see the sidebar for a listing of these items. The Vernonia Cares Food Bank has graciously offered to help families that already receive assistance with the creation of a kit. All a person has to do is request those extra items, and the good folks down at the Food Bank will help out.

The items in the list are those that ensure survival during the 2-5 day window when otherwise healthy people are unable to get more supplies. These include adequate water (1 gallon/day/person), adequate food (>1200 calories/

day/person when not exercising, otherwise >2000 calories/day), and shelter. Shelter may seem like a "given" since we are talking about "shelter in place", but it is a word that includes warmth and comfort.

If the power is out and your house is heated with electric baseboards, you have no heat. What is the alternative? There are a number of them, including wood stoves, kerosene heaters, and propane heaters. All should be used cautiously, as improper use can cause death. The ultimate protection is a generator, which can either be gasoline or natural gas/propane powered. This allows continued use of our regular heat sources.

Other items to include should be a camp stove for cooking, candles for light, books, games, and items which occupy children. Have several changes of clothing for each person, and warm blankets or a sleeping bag. If a person in your household has special needs which cannot be met without power, notify the authorities *before* the emergency. Discuss plans with neighbors and friends, and develop a network of self-sufficiency. Waiting for help to arrive can be stressful, but good preparation can put you back in control of the situation.

Some other resources to investigate include web pages for the Red Cross, the City of Vernonia, and Mountain House--an Oregon business which sells freeze dried foods.