



The Bull Run Watershed:  
Our Treasured Water Supply

By Harold Mansperger

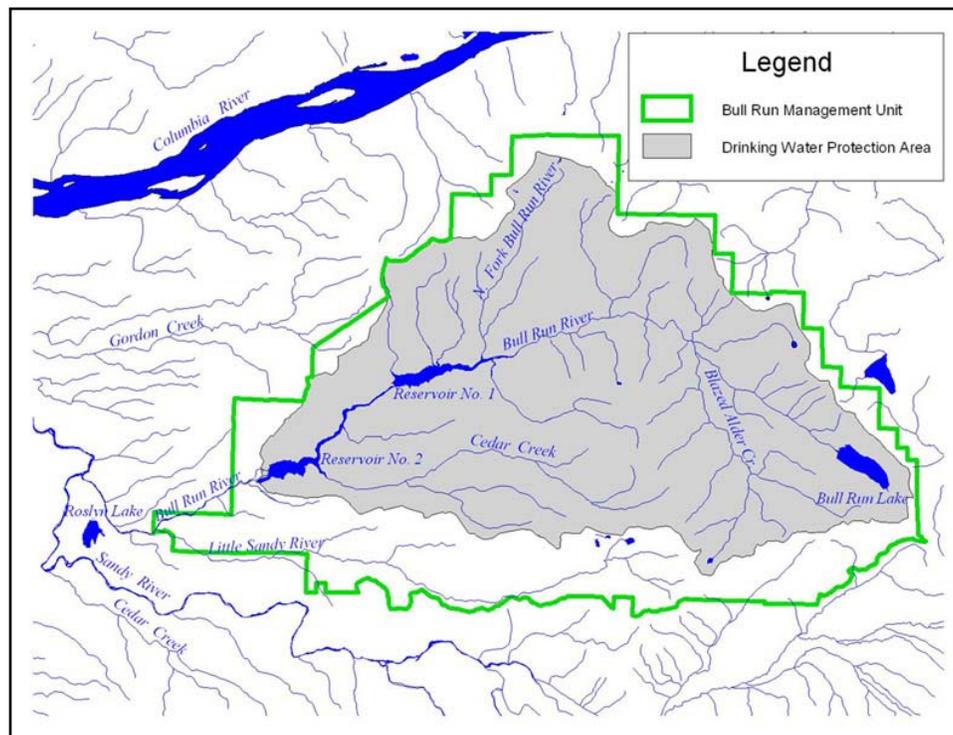
M. Campbell-McCrea  
Geography of Oregon – Geography 206  
March 15, 2006

On January 2, 1895, the first Bull Run water flowed to Portland, Oregon. The Portland Hotel, completed in 1890 and now the site of Pioneer Courthouse Square, boasted that it served only Bull Run water to diners in its elegant restaurant. Within two years the City's health officer documented a phenomenal decrease in the number of cases of typhoid fever and the lowest death rate on record at the time (Early Development). The earliest architects of Portland's future understood the importance of clean, pure drinking water. These visionaries set in motion a course of actions that would establish the Bull Run watershed as one of the most protected watersheds in the United States. What may surprise many Portlanders is that the primary source of our water is rainfall. Since rainfall is the main source of water in the Bull Run watershed, an understanding of its human history and natural environment can provide the clues needed to understand how the Bull Run can provide unfiltered water for nearly one-quarter of Oregon's population, including Portland residents and nineteen suburban cities (Sources).

So what human actions and forces of nature have combined to create the purity and appeal of Portland's treasured drinking water? Let's begin with a little historical background on the region. There are several variations as to how the Bull Run got its name, but there is a common theme to all of these stories. In the early 1800s, some cattle and oxen belonging to pioneer wagon trains crossing the Cascade Range, along the Oregon Trail, broke loose and escaped into the dense forests. It is said that the Bull Run Lake and Bull Run River were named by the locals, who would occasionally spot the fugitive cattle in the river (McArthur 123).

In the late 1800s, City and local community interests organized in an effort to establish water-source protection legislation in the Bull Run watershed. They wanted strong federal legislation that would limit land management activities to those only necessary to protect water quality and operate the water supply (Resource Protection). Thanks to their efforts, President

Benjamin Harrison proclaimed the watershed a national forest reserve (Socolofsky 70). The Bull Run Act of 1892 would set the course for protecting and providing water for Portland for more than 100 years. This legislation placed restrictions on federal land use and required that the United States Department of Agriculture Forest Service consult and coordinate with the City of Portland to ensure management programs, practices, and standards to protect its drinking water quality. In 1904, President Theodore Roosevelt signed Public Law 206, the Bull Run Trespass Act, which closed the watershed's boundaries to settlement and human entry (Short 48). In 1977, Public Law 95-200 established the Bull Run Watershed Management Unit, a 147 square-mile area surrounding the watershed, to resolve legal issues (see Fig. 1). The City now had a say in any decision made by the Forest Service in Mt. Hood National Forest that would impact the water supply (Short 104). The Oregon Resources Conservation Act of 1996 amended Public Law 95-200 to limit timber management activities to those needed to support water quality and



**Figure 1 – Bull Run Watershed Management Unit**

quantity, and the development, operation, and maintenance of hydropower facilities (Discover).

Today, 95 percent of the land in the Bull Run Watershed Management Unit is federally owned and managed by the Mount Hood National Forest. Four percent is owned by the city of Portland, and one percent is federally owned lands managed by the Bureau of Land Management (Location).

The physical environment and natural history of the region is as diverse as its political history. The Bull Run watershed is located approximately 25 miles east of downtown Portland and is within the Mount Hood National Forest (see Fig. 2). The 102 square-mile watershed is contained within the 147 square-mile Bull Run Watershed Management Unit (Discover). Bull Run's reservoir and lakes are fed by streams and rivers that flow into the Bull Run River. The

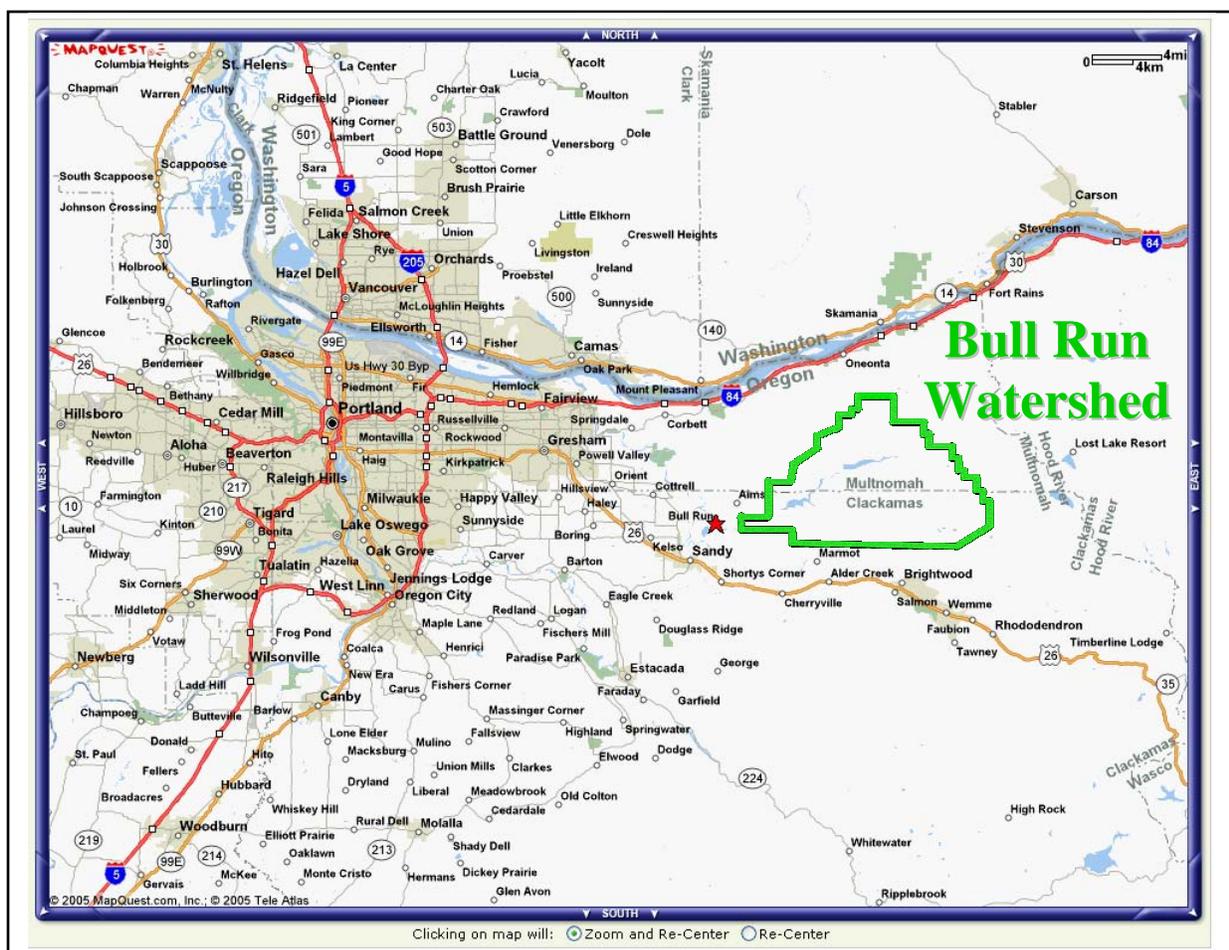


Figure 2 – Bull Run Watershed is 25 miles from Portland.

watershed receives an average of 135 inches of precipitation per year. Precipitation ranges from 80 inches per year at the City's Headworks Diversion Dam to as much as 170 inches on the northern boundary of the watershed (see Fig. 3). In comparison, Portland receives an average annual rainfall of about 40 inches (Rain). Most of the precipitation is in the form of rain since the average elevation is only 2,600 feet. The remaining precipitation is in the form of snowfall or fog drip. The timing and amount of snowfall is important in determining water supply. A deep snow pack in the upper elevations through late spring will contribute to higher "base flows" in the summer months (Rain). Although the watershed is in the northwest foothills of Mount Hood, a ridge prevents snow pack and glaciers on Mount Hood from draining into the watershed (Discover).

The average runoff is approximately 575,000 acre-feet, which is equivalent to a water depth of 105 inches spread uniformly over the watershed. The watershed's reservoirs and lake holds approximately 21 billion gallons of water with normal operational storage of approximately 11 billion gallons. Over the course of an average year, the amount of water diverted through the City's conduits for municipal water supply comprises about 23 percent of the average annual runoff (Rain). The

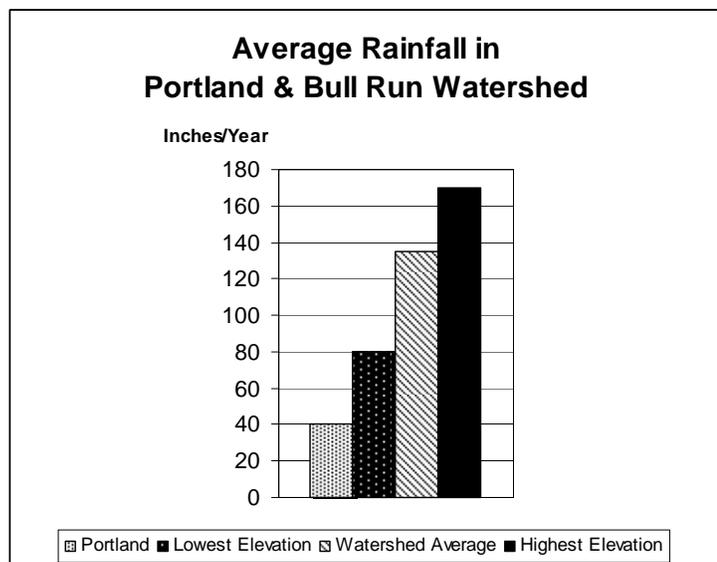


Figure 3

Bull Run Lake is a natural lake above the headwaters of the Bull Run River. It is the highest reservoir in the Bull Run watershed, which overflows at 3,175 feet. The lake was part of the

city's original water supply in 1895. The City last used the lake to supplement rainfall and runoff in 2000 (Bull Run).

The Bull Run watershed's unique natural and human-managed history support a mosaic of forest cover types. Approximately 53 percent of the watershed is considered to be old growth and mature (Discover). Most of these stands are over 500 years old and larger than 21 inches in diameter. Twelve percent of the watershed is composed of young forests that function as openings in the forest canopy. Nearly 31 percent of the watershed is composed of intermediate aged stands that are generally between 9 to 21 inches in diameter (Forest). The Western Hemlock zone, located below 3,400 feet, supports Douglas-fir, Western Hemlock, and Western Redcedar. Douglas-firs are the dominate species in this region because the environment favors this fast-growing, long-lived species. The Western Hemlock is not the dominate species at this time, largely due to past logging and large wildfires. The Western Redcedar grows along the moist areas bordering the streams and lakes. The Pacific Silver Fir zone, located above 3,400 feet, includes Pacific Silver Fir, Noble Fir, and some Douglas-fir. Pacific Silver Fir is the "climax species" in this region (Forest).

The history of logging, road building, and a hydroelectric dam within the Bull Run Watershed Management Unit has had its own impact on the watershed. According to Portland's Water Bureau, there has been no logging in the watershed since 1993 and that no future timber sales have been planned. In 1996, the United States Congress passed Amendments to the Bull Run Act of 1977 strengthening restrictions on logging within the watershed. Prior to this, about 24 percent of the watershed had been previously logged. Private logging interests logged about 1,500 acres (2.3 percent of the watershed) in the area southeast of Larch Mountain between the turn of the century and 1950. The City of Portland cleared the area for Reservoir 1 in 1927.

Between 1956 and 1958, Portland removed timber to clear the way for Reservoir 2 (Is Logging Allowed). The U.S. Forest Service began harvesting timber in 1958. About 10,000 acres (15.3 percent of the watershed) were clearcut-logged as recently as 1993. An additional 4,550 acres (7.0 percent of the watershed) were selectively logged during the same period, which included salvage of trees blown down by severe windstorms.

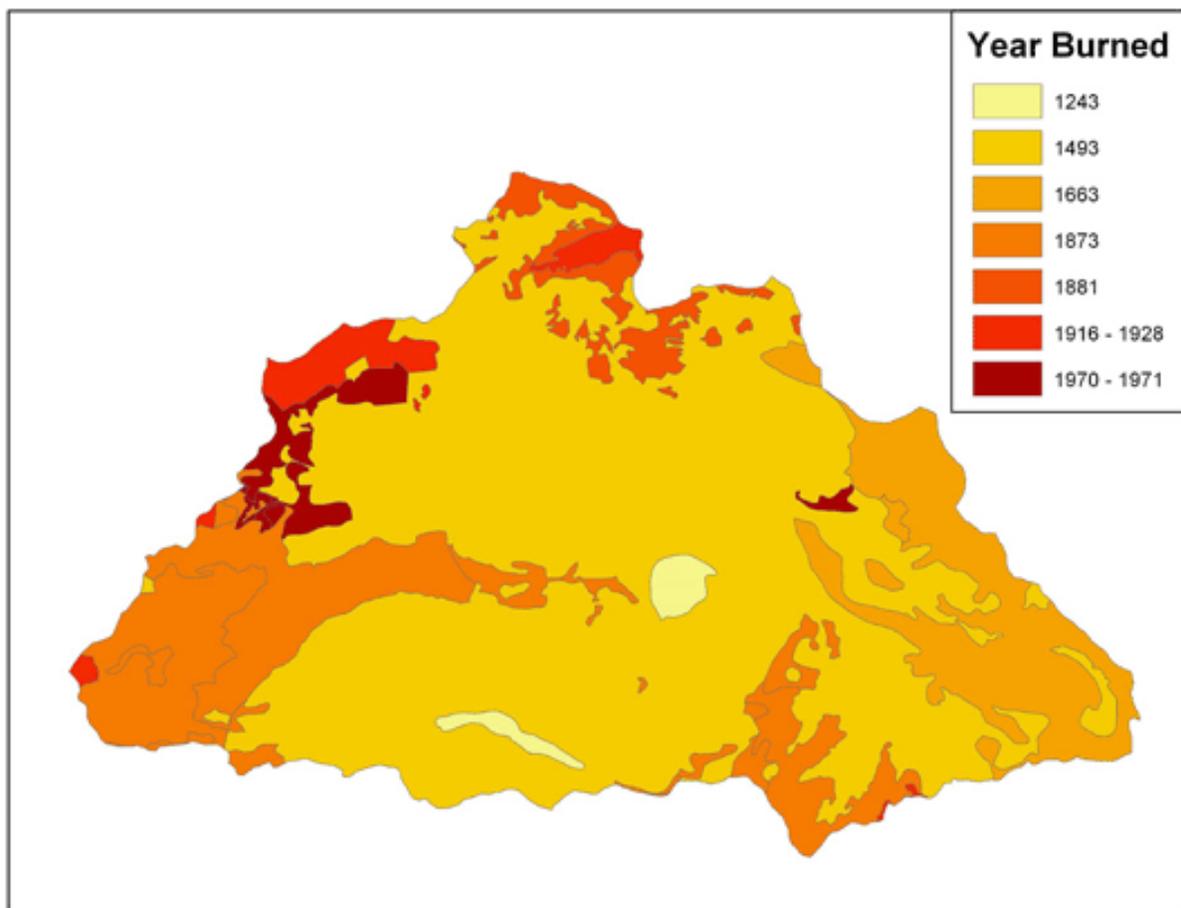
With logging come issues involving road-building and its impact on the watershed. The Portland Water Bureau maintains that no road-building has occurred for almost a decade. On the other hand, they recognize that existing roads pose a threat to Portland's water purity in the form of turbidity - the cloudiness of water. Uncontrolled turbidity could force the City to begin water filtration. This has not been a major issue yet, but the threat of cost increases associated with filtration is a major concern for the City. In 2001, the Portland City Council released a Source Water Protection Policy that stated, "Continued dedication to source water protection will minimize long-term future capital and operating costs of treatment improvements [...], by limiting the amount of natural and human-caused contaminants in the untreated source water" (Source Water). However, the City Council also recognizes that they must still consider filtration in order to "increase the City's ability to reliably meet the public health and safety needs of its customers under changing weather conditions, and water demand and environmental compliance requirements." Portland City Council is not the only organization concerned about roads and turbidity. The current U.S. Forest Service management has confirmed that roads pose a major threat and their goal is to "obliterate roads in the watershed that pose a risk to water quality and are no longer needed for protection, operation or maintenance of the watershed" (Source Water). In Michael Milstein's *Oregonian* article, "Murkier Waters to Flow with New Rules," he explains the Oregon Department of Environmental Quality's plans to allow 30 percent more turbidity in

Oregon Rivers. He argues that not only does cloudiness limit whether fish can see to feed and whether sunlight reaches underwater plant life, but that “murkier water also often means cities bear higher costs for filtering drinking water”. In a March, 2005 letter to Oregon’s United States Congressional delegation, the Oregon Natural Resources Council (ONRC) and the Portland Water Users Coalition (PWUC) called for two-million dollars in U.S. Forest Service funding to be dedicated to the decommissioning of roads in the watershed. Kent Craford, director of PWUC, purported that “\$2 million spent decommissioning roads might save us \$200 million for a filtration plant” (Businesses).

A hydroelectric dam has presented its own set of problems for the watershed environment. The City’s Bureau of Hydroelectric Power was established in 1979 to supervise the construction and then administer the operation of the Portland Hydroelectric Project. The project was completed and began generating commercial power in 1982. The City sells the output to Portland General Electric (PGE), who operates, maintains and repairs the project’s facilities. In 1984, the City entered into an agreement with the Oregon Department of Fish and Wildlife (ODFW) to mitigate for the loss of fish habitat caused by the construction of the City’s Headworks Diversion Dam in 1924. Through that agreement, the Portland Hydroelectric Project pays the ODFW for the annual off-site rearing of 32,000 pounds of fish smolts at the Clackamas River Fish Hatchery. Those spring Chinook salmon and winter steelhead smolts are released into the Sandy and Clackamas Rivers (Bureau of Hydroelectric Power).

Not only human forces, but natural forces have played a considerable role in shaping the Bull Run Forest Reserve. Wildfires have shaped the age, species, and structure of forests in the watershed. In 1996, scientists at the University of Washington completed a fire history study of the Bull Run (Fire). They studied tree rings to map the location and date of large fires in the

region (see Fig. 4). They concluded that the “Bull Run has had an inherently low occurrence of catastrophic fire because of its high rainfall, short typical duration of high fire-danger conditions, and low incidence of lightning.” However, they went on to say that when large fires do occur, they tend to be high severity “stand replacement” fires. Some areas have burned as many as three times in the past 500 years. A catastrophic fire burned about 99 percent of the watershed around 1493. The two small stands that escaped this fire are over 750 years old. Four other moderate size fires, ranging from 2,100 to 7,700 acres, burned the combined equivalent of about one-third of the watershed between 1493 and the early 1900s. A total of 3,300 acres, about 6.5 percent, burned during the twentieth century. The most recent significant wildfire occurred in 1923.



**Figure 4 – History of Wildfires in Bull Run**

Another important natural disturbance that has shaped the watershed is windthrow. The watershed is vulnerable to blowdown because of its proximity to the Columbia Gorge. Oregon State University researchers estimate that strong winds have blown down trees on a scale of up to thousands of acres (Windthrow). The researchers mapped the region to study the relationships between windthrow and several environmental factors: climate, soils, topography, and forest characteristics. They concluded that about ten percent of the forest has been affected by windthrow since 1980. Most of the detectable windthrow occurred during strong east-winds in 1931, 1973, and 1983. Most of the windthrow in 1973 and 1983 occurred on the edges of clear cuts.

The watershed contains a rich diversity of wildlife habitats, ranging from low elevation wetlands to old growth forests. These habitats are home for up to 250 wildlife species. Common species include deer, elk, black bears, cougars, and bobcats. Less common species include Cope's giant salamanders, red-legged frogs, harlequin ducks, Townsend big-eared bats, red tree voles, Larch Mountain salamanders, and the common loon. Common loons use the reservoirs and lake for resting and feeding in the early spring before continuing on to their breeding habitat further north. In fact, the Klickitat name for Bull Run Lake was *Gohabedikt*, meaning Loon Lake (McArthur 123). Threatened and endangered species include peregrine falcons, bald eagles, and the northern spotted owl. About 55 percent of the watershed is considered suitable spotted owl habitat (Wildlife). The operation of the Bull Run water supply system directly impacts threatened Chinook salmon and steelhead. The federal Endangered Species Act (ESA) makes it illegal to damage the habitat of a species that is listed as endangered or threatened. The National Marine fisheries Service and the United States Fish and Wildlife service share responsibility for implementing the ESA. In order to continue to operate the system and comply with the ESA, the

City must apply for a permit that authorizes the anticipated take. This permit is known as an Incidental Take Permit (ITP). To obtain an ITP, the City must develop a Habitat Conservation Plan (HCP), designed to minimize and mitigate for the impacts of the Bull Run system. The HCP is the basis for a contract authorizing the bureau to continue operations in the Bull Run. The Portland Water Bureau is currently developing a HCP for the Bull Run water system and expects it will take several years to complete (Endangered Species). In the mean time, the Portland Water Bureau has been releasing water from the Bull Reservoirs into the lower Bull Run River each summer since 1998 to determine the effects on river temperatures and habitat quality (Bull Run).

Forces of nature and human actions have impacted the Bull Run Forest Reserve in countless ways. Portland's founders recognized and understood the significance of protecting an uncontaminated water supply that is essential to the health and wellbeing of Portland's future citizens. The Regional Water Providers Consortium (RWPC) was formed in 1996 to coordinate the implementation of ongoing water supply strategies for the Portland Metropolitan Area. They point out that we're used to thinking of water as plentiful and widely available in the Pacific Northwest. They also warn that because of dryer summers, climate changes, and population growth, it's likely that we could face shortages in the near future. "Of all the earth's water, 99% is salt water, frozen, or too polluted for human consumption. Only 1% of the earth's water is available for drinking water" (Regional Water). If the RWPC is correct in its assessment of Portland's future water needs, the value of a clean water source and protecting the Bull Run watershed will become even more vital to our regions livability. Continued protection and wise resource management will assure us that the purity of our treasured water supply will continue for generations to come.

Works Cited

- Businesses and Environmentalist Call for Decommissioning of Bull Run Logging Roads. Oregon Natural Resources Council & Portland Water Users Coalition. 14 Feb. 2006. 16 Mar. 2005. <<http://www.onrc.org/press/103.bullrun.html>>.
- Discover Your Drinking Water. Portland: Portland Water Bureau, Aug. 2005.
- McArthur, Lewis L. Oregon Geographic Names. Seattle: University of Washington Press, 2003.
- Milstein, Michael. "Murkier Waters to Flow with New Rules." Oregonian 31 Oct. 2005.
- Portland and Bull Run Watershed. Map. 2006. 26 Jan. 2006. <[www.mapquest.com](http://www.mapquest.com)>.
- Portland Water Bureau. Bull Run Lake and Bull Run River. 2006. 26 Jan. 2006. <<http://www.portlandonline.com/index.cfm?c=30223>>.
- . Bull Run Management Unit. Map. 2006. 26 Jan. 2006. <<http://www.portlandonline.com/shared/cfm/image.cfm?id=28225>>.
- . Bureau of Hydroelectric Power. 2006. 26 Jan. 2006. <<http://www.portlandonline.com/index.cfm?c=39294>>.
- . Does Snow Pack On Mt. Hood Affect Portland's Supply Of Water? 2006. 27 Jan. 2006. <<http://www.portlandonline.com/index.cfm?&a=29768&c=29926>>.
- . Early Development. 2006. 26 Jan. 2006. <<http://www.portlandonline.com/index.cfm?c=29461>>.
- . Endangered Species Act Compliance. 2006. 27 Jan. 2006. <<http://www.portlandonline.com/index.cfm?c=30210>>.
- . Fire History. 2006. 27 Jan. 2006. <<http://www.portlandonline.com/index.cfm?&a=32812&c=30231>>.
- . Forest Cover Types. 2006. 27 Jan. 2006. <<http://www.portlandonline.com/index.cfm?&a=32810&c=30231>>.
- . History of Wildfires in Bull Run. Map. 2006. 26 Jan. 2006. <<http://www.portlandonline.com/water/index.cfm?&a=32812&c=30231>>.
- . Is Logging Allowed in Bull Run? 2006. 26 Jan. 2006. <<http://www.portlandonline.com/index.cfm?&a=29767&c=29926>>.
- . Location and Land Ownership. 2006. 26 Jan. 2006. <<http://www.portlandonline.com/index.cfm?c=30160>>.

- . Rain, Snow and Streamflow. 2006. 27 Jan. 2006.  
<<http://www.portlandonline.com/index.cfm?c=30161>>.
- . Resource Protection. 2006. 26 Jan. 2006.  
<<http://www.portlandonline.com/index.cfm?c=29459>>.
- . Sources and System. 2006. 26 Jan. 2006.  
<<http://www.portlandonline.com/index.cfm?c=29338>>.
- . Wildlife. 2006. 26 Jan. 2006. <<http://www.portlandonline.com/index.cfm?c=30234>>.
- . Windthrow. 2006. 27 Jan. 2006.  
<<http://www.portlandonline.com/index.cfm?&a=32813&c=30231>>.
- Regional Water Providers Consortium Homepage. Regional Water Providers Consortium. 14 Nov. 2005. <<http://conserveh2o.org>>.
- Short, Casey. Water: Portland's Precious Heritage. Portland, OR: City of Portland, 1983.
- Socolofsky, Homer Edward and Allan B. Spetter. The Presidency of Benjamin Harrison. Lawrence: University Press of Kansas, 1987.
- Source Water Protection Policy Statement. Resolution No. 35981. 4 April, 2001. City of Portland.  
<<http://www.portlandonline.com/auditor/index.cfm?&a=13010&c=28123>>.