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THE UNFINISHED AGENDA  
FOR THE PROTECTION OF OUR WATER QUALITY**

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**SHOULD CLEAR-GOT LOGGING BE PERMITTED  
IN A WATERSHED SUPPLYING NEARLY  
ALL DRINKING WATER FOR  
THE CITY OF PORTLAND, OREGON?**

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## ABSTRACT

The Bull Run watershed is the principal source of drinking water for roughly 1 million people living in Portland, Oregon and in nearby communities. This watershed in the Mount Hood National Forest is managed by the U.S. Forest Service. Since 1958, much of the watershed has been commercially clear-cut or otherwise disturbed by large-scale logging operations; moreover, largely if not entirely because of this logging, extensive stands of Bull Run timber were blown down during a winter storm in 1983.

Many environmental scientists and concerned citizens believe that logging the Bull Run has brought continuing, possibly irreversible deterioration of the watershed and, consequently, has reduced the quality of water Portlanders drink. Some scientists and others have urged the Forest Service and the Portland Water Bureau to stop the logging, at least until a determination can be made about the effects of logging on water quality. Such a determination has never been made.

The Forest Service asserts that logging in the Bull Run has no impact on water quality. This, despite the facts that nearly one-quarter of the watershed has been clear-cut and profoundly disturbed; that a substantial quantity of timber has been blown down and is rotting on the ground, largely due to the clear-cutting in the first place; and that water quality data-collected in the Bull Run over the past 20 years may not be reliable, or at least not sufficient for the purpose intended, because of incorrect and deficient water-quality monitoring procedures.

This paper (1) presents a brief historic account of the Bull Run controversy; (2) discusses the highly debatable rationale allowing the Forest Service to log the watershed despite its status as a municipal water supply; and (3) points out the ineffectiveness and scientific flaws of the water quality monitoring program reputedly designed to protect Portland's drinking water from watershed deforestation.

## INTRODUCTION

For nearly 100 years the city of Portland, Oregon has obtained its drinking water from the Bull Run watershed, a system of lakes and rivers in old-growth timber located about 60 kilometers east of the city in the Mount Hood National Forest. On April 28, 1904 President Theodore Roosevelt signed into law the Bull Run Trespass Act (Public Law 206), which made entering the watershed illegal for persons other than "forest rangers and other persons employed by the United States to protect the forest, and Federal and State officers in the discharge of their duties, and the employees of the Water Board of the City of Portland." During the next 50 years the watershed remained almost untrammelled, its runoff protected by a largely unbroken expanse of old-growth timber.

In 1958, the U.S. Forest Service brushed aside the law establishing the forest reserve and quietly began large-scale commercial logging operations in the Bull Run. The agency gave a rationale for this new management policy: the need to lessen the chance of catastrophic fire by removing vast quantities of "decadent" old-growth timber (U.S. Forest Service, 1952). Between 1958 and 1973 almost a quarter of the watershed, or 16,000 acres, was clear-cut or otherwise affected by logging activities (Portland Water Bureau, 1978). Windstorms since have flattened even more of the watershed's timber, much of which once stood adjacent to clear-cut areas. Perhaps 70 percent or more of the estimated 300 million board-feet of timber blown down by a severe windstorm in December 1983 was near clear-cuts (U.S. Forest Service, 1987).

Commercial logging of the Bull Run watershed was stopped in 1976 by the Federal District Court after it found that this logging did not protect the forest, as claimed by the Forest Service, and was therefore in violation of the 1904 Bull Run Trespass Act (Short, 1983). Shortly though, acting on a measure sponsored by Oregon Senator Mark Hatfield and Oregon Congressman Robert Duncan, Congress rescinded Public Law 206 and replaced it with the Bull Run Watershed Management Act of 1977 (Public Law 95-200). This new legislation - signed into law by President Jimmy Carter on November 23, 1977 - legalized logging in the watershed, but only as long as water quality was protected. The Forest Service, now entrusted with water-quality protection, assured Congress and the City of Portland that protecting water quality would be the “principal management objective” in the Bull Run (U.S. Forest Service, 1979). According to the Forest Service, the key to water-quality protection was to continue removing fuel-laden, old-growth forest that, if ignited, could destroy the watershed and ultimately reduce the quality of Bull Run water (White, 1977).

Meanwhile, the Forest Service resumed its timber sales and logging proceeded apace in the Bull Run. The agency proclaimed its desire to manage the watershed for timber harvesting, postulating that its planned harvesting and land-use management schemes would not only be compatible with water quality, but could even “reduce long-term risks to water quality while making renewable resources available” (U.S. Forest Service, 1979). This indeed was a controversial statement: First, it lacked sufficient data to support it (Westgarth *et al.* 1978); and second, it ignored scientific reports documenting logging-related water quality degradation that had occurred in other Pacific Northwest watersheds (Hall and Lantz, 1969; Brown and Krygier, 1971; Fredriksen, 1971, 1973; Rice *et al.* 1972; Stone, 1973; Fredriksen and Ross, 1974; Swanston, 1976; Brown *et al.* 1977; Beschta, 1978; Shulters, 1981; Harr and Fredriksen, 1988). Scientists and Portland residents opposed to Bull Run logging were skeptical of the notion that piecemeal deforestation of the watershed would actually protect this ecologically fragile system of streams, lakes, and runoff surfaces. Some scientists argued that substantial, perhaps irreversible, damage had already occurred in the Bull Run owing to previous, less restricted logging operations (Westgarth *et al.*). They and others urged the Forest Service and the Portland Water Bureau to halt the logging, at least until, sufficient scientific data to demonstrate reliably the cause-and-effect relationships between logging and water quality were accumulated (Westgarth *et al.*). But such data were never collected, and logging continued despite sharp protests from a growing body of residents alarmed over the seemingly fast-track handling of timber sales and timber removal in the Bull Run.

Two principal arguments are used to justify clear-cut logging of the Bull Run watershed. First, as stated earlier, the Forest Service argues that logging - which removes hazardous fuels associated with old-growth forest - protects and even enhances water quality in the long run by reducing the risk of catastrophic fires. Second, both the Forest Service and the Portland Water Bureau contend that the Congressionally mandated water-quality monitoring program further protects Bull Run water by (1) ensuring compliance with water-quality standards and (2) detecting early indications of logging-related water-quality degradation. This paper examines the validity of these important arguments.

## **FIRE PROTECTION**

For years the Forest Service claimed that large accumulations of fuel in old-growth forest in the Bull Run watershed constituted a major fire hazard (White, 1977; U.S. Forest Service, 1952, 1979). Wild fires, according to the Forest Service, represented “a serious potential threat to Portland’s water supply” (White, 1977). Clear-cut logging, the argument continued, would “break up fire fuel

continuity, reduce fire fuel levels, and reduce heavy organic accumulations” (White, 1977). This process, the Forest Service concluded, would greatly reduce the risk of water quality degradation and thus sustain the watershed’s capacity to provide “clean, safe water” (U.S. Forest Service, 1979). Indeed, the assertion that water quality was seriously threatened by fuels accumulating in the Bull Run’s old-growth forest had been a decisive factor prompting Oregon’s Congressional delegation to act on behalf of the Forest Service and reopen the watershed to logging in 1977.

Oddly convinced that clear-cut logging was actually beneficial to water quality - despite irrefutable scientific data proving that logging had caused serious water-quality problems in other watersheds - the Forest Service proceeded with plans to convert much of the Bull Run’s remaining old-growth forest to younger, “less hazardous” stands of timber to protect the watershed from catastrophic fire (U.S. Forest Service, 1979). In fact, roughly half of the Bull Run watershed, or 32,000 acres, was targeted for clear-cutting by the year 2000 (Portland Water Bureau, 1978).

But the perception that old-growth forest in the Bull Run watershed is an extreme fire hazard contradicts Forest Service doctrine concerning old-growth forests west of the Cascade Range: These forests have been recognized for over 50 years as generally a low-to-medium-hazard fuel type (Pickford *et al.* 1979). In fact, forest-fire scientists consulting for the Mt. Hood National Forest (Pickford *et al.* 1979) have reported that “conversion of old-growth to younger, presumably less hazardous stands will, itself, create high-hazard fuels persisting for appreciable periods.” Pickford *et al.* (1979) concluded: “Harvesting an old-growth stand, although it reduces the total fuel loading by nearly 50 percent, results in an increase in available fuel loading because (1) the fine aerial fuels are added to existing surface fuels and placed in an ideally combustible fuel bed (homogeneous horizontally and vertically), and (2) the fuels are exposed to much greater drying, thus making significantly higher proportions of the fuel complex available.” Other scientists have also rejected the notion that significant fire hazard in the Bull Run is reduced by removing old-growth forest (Westgarth *et al.* 1978). Finally, most of the fires reported in the Bull Run after 1958 have resulted from logging activities (U.S. Forest Service, 1987).

## **WATER QUALITY MONITORING**

It is useful to know the quality of water supplying a major metropolitan area, but there was perhaps less need for water-quality monitoring in the Bull Run before 1958, when the area was still off-limits to loggers and others capable of polluting Bull Run waters. Indeed, with the exception of a few water-chemical analyses performed on water samples collected from the Bull Run River in 1911-12 (Van Winkle, 1914), and on tapwater samples collected in 1921, 1936, 1950, and 1956 (Portland Water Bureau, 1985, 1988), there is essentially no water quality data for the Bull Run watershed prior to logging in 1958. This lack of pre-logging data has made it virtually impossible to determine whether present water quality conditions are as good as or perhaps worse than they were before the watershed was logged: The Portland Water Bureau now concedes that “comparisons of current data to pre-1958 data are not feasible due to a general lack of pre-1958 watershed data” (Portland Water Bureau, 1985).

But after clear-cut logging began, a sound monitoring program was still omitted unfortunately, and the opportunity to assess and possibly minimize anticipated impacts of large-scale logging operations on water quality was lost (Westgarth *et al.* 1978). Logging proceeded for nearly a decade, and almost 15 percent of the watershed area was logged before monitoring was finally started, in 1967 (Westgarth *et al.* 1978; Portland Water Bureau, 1988). Even worse, the monitoring

that was subsequently carried out proved to be inadequate (Westgarth *et al.* 1978; Averett *et al.* 1980), and this at a time when logging activities were being stepped up (7,000 acres were logged between 1967 and 1973, including 3,550 acres clear-cut (Portland Water Bureau, 1978).

Water-quality monitoring finally became a matter of public importance in 1977 following passage of PL 95-200. Congress, apparently concerned that clear-cut logging might endanger Portland's water supply, wisely mandated that credible standards be adopted to detect water quality degradation caused by logging. Thus, PL 95-200 forbids any watershed activity, particularly logging, that would cause water-quality conditions to deteriorate to levels below established standards. These standards, which represent the least acceptable rather than the most desirable water-quality conditions, provided a basis for comparing water-quality data obtained through routine monitoring. Hence, a reliable monitoring program - one that would accurately and comprehensively characterize existing water-quality conditions throughout the watershed, especially around logging operations - was and is crucial to ascertaining compliance with the standards.

In 1978, as directed, the Forest Service and Portland Water Bureau initiated necessary water quality monitoring in the Bull Run. Water sampling was done almost entirely at four "key" stations located in the watershed upstream of the Water Bureau's two storage impoundments (Figure 1). Because sediment is the most important water quality problem associated with logging (Brown *et al.* 1977), each of the four stations was equipped with "automatic-pumping suspended-sediment samplers" which can obtain water samples once every 90 minutes during storms (Rinella, 1987). Additionally, stream-discharge, stream-temperature, and specific conductance were recorded at half-hour intervals at each station (Rinella, 1987). Grab-samples were obtained less frequently (weekly, monthly, or quarterly) at 20-25 permanent stations in the watershed, and analyzed for several water quality variables including dissolved and particulate solids, alkalinity, color, Ca, Cl, Na, Mg, K, Si, ammonia, and nitrate (Portland Water Bureau, 1988).

In 1979, the City of Portland's Bull Run Advisory Committee (BRAC) whose seven or eight members are appointed by the Mayor of Portland to oversee Forest Service management activities in the Bull Run - commissioned a task group of independent scientists to evaluate the monitoring program and the standards used at Bull Run to detect logging-related water quality problems. The task group concluded, after a year of careful deliberation, that the data were unrepresentative and that the standards were inadequate to ensure protection of Portland's drinking water over the long run (Averett *et al.* 1980). Unfortunately, for reasons unknown, neither the Forest Service nor the Water Bureau made any substantial effort to upgrade the monitoring program and the standards in accordance with the task group's recommendations.

Figure 1. Water quality monitoring stations in the Bull Run watershed, OR. Complaints of inadequate monitoring and possible watershed deterioration in the Bull Run reached the office of Oregon Congressman Ron Wyden. He responded in 1987 by commissioning another task group of independent scientists, called the Wyden Task Force, to investigate these complaints. This task force also concluded that water-quality monitoring in the Bull Run was inadequate. Among the findings: (1) The water-quality standards do not provide optimum baseline water-quality information; (2) the monitoring program generally fails to ascertain water-quality impacts resulting from individual logging operations; (3) inadequate monitoring at logging sites greatly limits extrapolation to basinwide effects; (4) the monitoring program is incapable of providing early warning of logging-related water-quality degradation; (5) routine monitoring cannot detect natural variability in basin water quality; and (6) monitoring reports and studies lack scientific analysis (Hawkins *et al.* 1989). In July 1989, reacting to the Wyden Task Force report, Portland's mayor and the City Council directed the Water Bureau to improve water monitoring in the Bull Run.

## SUMMARY AND CONCLUSIONS

Should logging be permitted in the Bull Run watershed? Those who advocate logging in the Bull Run insist that logging has had no effect on water quality. Some logging proponents even claim that the Bull Run “continues to produce clear, potable, raw water that is at least as high in quality as that which was found flowing one hundred years ago” (Portland Water Bureau, 1988).

It is true that there has been a considerable amount of water-quality monitoring in the Bull Run. Clearly, however, this monitoring has been, and is inadequate. Indeed, the approach used to monitor water quality in the Bull Run, network monitoring at fixed sites called “key stations” has been, and is, inadequate. Indeed, the approach used to monitor water quality in the Bull Run, network monitoring at fixed sites called “key stations”, has been strongly criticized because the data collected through this procedure may be unreliable or insufficient. In fact, nationwide concerns about network monitoring were weighty enough to prompt the U.S. General Accounting Office (GAO) to investigate the practices of the Environmental Protection Agency and the U.S. Geological Survey. GAO reported, based on earlier work by Rickert and Hines (1978), that special water-quality studies, and not network monitoring would “yield more scientifically sound and useful information on water quality” (U.S. GAO, 1981). Thus, logging has proceeded in the Bull Run without any reliable means of assessing, and consequently correcting the long-term effects of logging on the watershed’s capacity to produce high-quality, safe drinking water (Averett et al. 1980; Hawkins et al. 1989).

This impression is reinforced when we consider that monitoring was not even started until nine years after logging of the Bull Run watershed began. All this, unfortunately has posed a serious, perhaps unnecessary risk to Portlanders, many of whom are still not aware that the watershed is being logged.

To turn directly to management of the watershed, for example, suppose that monitoring indicated that water-quality standards were being violated. Assuming that the problem could even be identified and the source located, what could be done if the cause of the water-quality degradation turned out to be an area recently logged, or with a vast tract of blown-down timber or a massive landslide, and such an area was undergoing excessive erosion that was not expected when the watershed plans were prepared?

Water-quality degradation cannot be easily remedied once the watershed has harmed by logging and related activities, especially if the damage is irreversible. Water-quality monitoring may or may not allow authorities to determine whether certain activities in the watershed, such as logging are producing significant adverse effects on water quality. Even when the effects are recognized, it may be too late to take remedial action and correct the problem. Regrettably, this may be the case if it is determined after all that the purity of Bull Run water is diminishing.

Perhaps the most disturbing aspect about the Bull Run controversy, however, is the continuing disregard for the far-reaching consequences of a Bull Run water supply degraded by ongoing logging and logging-related timber blow-down. These consequences could include a filtration plant, which could cost upward of \$300 million, or some other expensive-cleanup and treatment process to counter a gradually deteriorating water source, not to mention forced and increasing reliance on other less suitable, more costly sources of supply. The Portland Water Bureau, for instance, has been developing a well field on the Columbia plain in an area that is heavily populated and still

without sewerage (Portland Water Bureau, 1988).

When Portlanders have had a chance to ponder all this, they may wonder whether these expenditures and alternative water sources would have been necessary had the Bull Run watershed been left in a pristine state, blanketed with old-growth timber and protected for future generations.

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