



**Silver Lake
Watershed
Management
Plan**

Summary

Silver Lake Watershed Management Plan Summary

prepared for

Cowlitz County

In Accordance with Task III of the Silver Lake Phase II Restoration Project

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by

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FORWARD

The Silver Lake Watershed Management Plan Summary is intended to be utilized in conjunction with the Silver Lake Watershed Management Plan Document. The summary provides background information, a watershed characterization, a brief summary of each inventory category, the recommended management alternatives developed by the watershed advisory committee, and a listing of implementation activities to date. The Silver Lake Watershed Management Plan provides a more comprehensive and detailed review of the individual inventories.

The user should keep in mind that this "plan" is designed to grow with the needs of the community. It provides a foundation for decisions and a means for facilitating action on resource management issues in the watershed community. The "plan" is only as strong as continued community involvement. The Silver Lake Watershed Advisory Committee should continue to grow and meet annually to update needs and offer coordination of actions in the watershed. A "lead" entity or individual should be identified to maintain continuity.

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Water Quality Monitoring

Summary

Washington State University (WSU) completed two investigations focused on identification of sources of nutrients causing accelerated eutrophication. In both studies hydrologic and nutrient budgets were constructed to help identify nutrient sources.

In WSU's first report, Bhagat (1975) indicated that contributions of nitrogen and phosphorus loading are closely related to drainage area. The exception is Basin 1 on the North side of the lake. The basin is relatively high in both nitrogen and phosphorus compared to similar drainage areas. Total contributions of nitrogen and phosphorus were highest for Hemlock Creek (36%-N, 45%-P). Septic systems, basin 1, were determined to contribute 23% of the phosphorus entering the lake.

The nutrient budget in WSU's second report indicates a slight shift in total contribution of phosphorus. Moore (1990), reported that the most important sources of phosphorus, in order of relative contribution, are Basin 1 (North side of Lake), Hemlock Creek, Sucker Creek, Basin 5, and internal loading. Again drainage area and nutrient contribution appear to be closely related with the exception of Basin 1. Contributions of nitrogen in order of magnitude was reported as Hemlock Creek, Basin 1, Sucker Creek, and Basin 5.

The 1990 WSU data showed the highest annual concentration of nitrogen to be associated with Basin 1 and the W54 inlet (Carnine Road Area). The highest annual concentration of phosphorus was associated with Basin 1 and Inlet A.

Both total nutrient contribution and nutrient concentrations are important in identifying alternatives for reducing nutrient input to the lake. Concentration are indicative of landuse effect on nutrients, while total contribution may indicate the cumulative impact and area has on water quality. Both aspects need to be considered in the development of management recommendations to minimize nutrient delivery to Silver Lake.

The Conservation District implemented an intensive storm survey water quality program during spring of 1993. The sample period did not fulfill the intentions of the intensive storm survey approach employed. The intention was to sample a storm event to obtain water quality data as streamflows increased, peaked, and receded then by waiting a week obtain data when streamflow was relatively low. The nature and timing of the storm event resulted in a sampling period that began at peak streamflow. Therefore, data was not collected during increasing streamflows, the period when concentrations of total suspended solids are generally greatest.

Estimates of daily loads support the conclusion derived by Washington State University that nutrient loads are highly dependent on drainage area. Similarly the data supports the exception to this generalization. The basin on the North side of the lake delivers a disproportionately elevated load than suggested by its drainage area. Ditchflows repeatedly exhibited the highest concentrations with the exception of ammonia. Vanhorn Creek samples exceeded State Standards for ammonia during the entire sample period. Although the creek is not considered a fishbearing stream it may be indicative of small streams draining similar landuse. The data suggests that prolonged human activity tends to increase water quality problems. In an undisturbed environment, nutrient cycling is fairly consistent

and nutrient loads being delivered to streams fairly constant. Human activities can result in additions to the nutrient cycle (fertilizers, septic systems, soil disturbances) that taxes nature's ability to buffer waterways. Road ditches improve the efficiency by which sediment and nutrients can be delivered to streams. The data supports the emphasis placed on the road network as a critical problem in the watershed.

Temperature was not a concern during the winter sampling period. However, single point temperature data collected in the summer months during stream surveys indicate that problems may exist for Lower Hemlock Creek and the West Tributary of Sucker. The lower reaches of Hemlock Creek were also identified as a concern during the stream surveys from a channel stability perspective. Efforts to correct one concern would compliment efforts to correct the other.

Recommended Alternatives

- 1) Implement a program to improve shade along the lower reaches of Hemlock Creek. This alternative should be conducted in conjunction with efforts to reduce bank erosion.
- 2) The Conservation District should establish a temperature monitoring program on the Lower reaches of Hemlock Creek to determine the extent of temperature problems and provide background data to evaluate the effectiveness of any activities to improve shading.
- 3) Establish and maintain a long term water quality monitoring program to determine if implementation activities are achieving the desired effect. This should include above and below sampling of individual implementation activities to allow for cost/benefit comparisons and may require additions to the phase II project. The District should provide assistance when possible for an instream sampling component.

Implementation to Date

Phase II of the Silver Lake Restoration Project provides for long term monitoring of lake water quality. This phase has been contracted with KCM. The District has been assisting KCM with sample site information.