Washington Lakes Protection Association Supports Banning the Application of Manufactured Lawn Fertilizers Containing Phosphorus

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Remember, when you're fertilizing the lawn, you MAY NOT just be fertilizing the lawn!

Image courtesy of the Washington State Water Quality Consortium

This image is used by the states on Minnesota, Wisconsin and New York in their on-line information on phosphorus runoff

Executive summary

The Washington Lakes Protection Association (WALPA) supports a ban on the application of manufactured lawn fertilizer containing phosphorus because it degrades the aquatic environment, is costly to Washington State and its citizens to restore degraded aquatic ecosystems, and is unnecessary for established lawns. This bill would ban the application of manufactured lawn fertilizers containing phosphorus from being used on residential properties, but would not apply to agriculture, golf courses, persons establishing new turf, or the application of organic compost. The goal of this 'phosphorus ban' is to help protect and restore Washington lakes, streams and rivers today, by reducing the transport of phosphorus via runoff from fertilized lawns to aquatic ecosystems. Lawns do not need excess phosphorus, lakes are degraded by excess phosphorus, and it is very expensive and difficult to restore lakes that have been degraded by excess phosphorus.

The negative effect of phosphorus on aquatic ecosystems

It is well known that phosphorus is generally the nutrient that limits the production of plants in freshwater ecosystems. A large majority of the fertilizer applied to lawns reaches stormwater collection systems which transmit this fertilizer to a receiving waterbody. Additional or excess phosphorus entering waterbodies stimulates vigorous plant growth because it removes nutrient limitation. At the microscopic level, excess phosphorus can stimulate blooms of algae that turn water green, and some cyanobacteria (blue-green algae) can be highly toxic to humans, pets, livestock, and other animals. Excess phosphorus can also result in extensive beds of macrophytes (large plants such as water lilies and Eurasian milfoil). Macrophytes can choke waterways, impairing boat traffic, restrict access to bays, and interfere with recreational activities such as fishing and swimming. Low or no oxygen conditions can also occur during the summer in shallow, macrophyte-choked bays. Excess phosphorus also has indirect negative effects on fish populations When the high biomass of plants starts to decay, oxygen dissolved in water is consumed and where oxygen is consumed at a rate faster than it can be supplied, it can result in stress to fish and even death.

Assessing and restoring ecosystems or upgrading wastewater treatment facilities is costly to Washington State agencies and citizens

Assessing and restoring aquatic ecosystems impacted by excessive phosphorus is costly. Throughout the State of Washington, 36 lakes are listed as category 5 on the Ecology 2002/2004 303(d) list for impairment by total phosphorus (Table 1). Under EPA regulations, a total maximum daily load (TMDL) assessment and comprehensive action plan are required for each of these listed lakes – items that are expensive and currently not included in any budget. Many of these impairments may be corrected preventing excess

phosphorus from entering the waterbody. In Michigan, the City of Ann Arbor was mandated by a state-imposed TMDL to reduce its discharge of phosphorus by 50 percent to the Huron River. After studying the situation, options to meet the requirement included a $1.5 million capital upgrade and a $167,000 annual increase in operating expenses to the city wastewater treatment plant, plus a three-year plant-scale test at a cost of $520,000. Instead, in 2007 the City enacted a ban on phosphorus application to lawns and was able to meet its mandated TMDL without significant cost to taxpayers or agencies. Similar cost savings can be realized for many of the 36 303(d) listed lakes in Washington and prevent other lakes from being added to the list. Banning the application of phosphorus-containing lawn fertilizers has no major adverse economic impact on Washington State citizens or agencies, and has the potential for far reaching positive effects on our aquatic ecosystems.

Application of manufactured fertilizers containing phosphorus to established lawns in Washington State is unnecessary

In Washington State, similar to other part of the U.S. where lawns are maintained, the soils provide sufficient phosphorus to meet the nutrient requirements of established turf grass. For example, no additional phosphorus is recommended by turf grass professionals if soil tests show at least 20 parts per million (ppm) of phosphorus, while some research shows that an optimum soil phosphorus level for established lawns is in the 11-15 ppm range. A study by the U.S. Geologic Survey further illustrates that established lawns require little if any supplemental phosphorus. In soil analyses from a lawn that had not been fertilized for 28 years, soil phosphorus levels were above concentrations suggested for lawn growth. Maintaining established turf in a healthy and green condition is not dependent on the addition of phosphorus in fertilizers and does not justify continued application when considering the environmental harm to our waters and economic impacts of this practice.

Unlike aquatic ecosystems, soils in terrestrial ecosystems are often nitrogen-limited, which is the reason that turf grass shows little or no response to the addition of phosphorus. Because manufactured lawn fertilizers break down rapidly, especially when wet, is the reason why applicators are cautioned not to apply most fertilizers before rain events. Excess phosphorus not taken up by plants becomes available to travel in the environment. Rain events, coupled with short lawns that promote sheet flow, provide a direct conduit for excess nutrients to be washed into storm drains and transported to receiving water bodies. In urban environments, storm drain systems carry this excess phosphorus directly into many of our waterbodies, bypassing any buffers that may be in place.

Given that the application of phosphorus provides little, if any, apparent benefit to established lawns in Washington, coupled with the benefits of preventing phosphorus from entering the environment and the related cost

savings to lake users and the State of Washington, are compelling reasons to adopt the phosphorus ban in manufactured lawn fertilizer.

Conclusion

Given the documented negative effects on aquatic ecosystems of manufactured lawn fertilizers containing phosphorus, and the insubstantial effort required of the citizens or agencies of the State in implementing this nutrient source control, removing phosphorus from manufactured lawn fertilizer is a logical piece of cost effective legislation. When contrasted with the far reaching benefits to our aquatic ecosystems and the avoided cost of lake clean-ups, this legislation is economically prudent for our State. We urge you to support WALPA to help ban the application of phosphorus in manufactured lawn fertilizer.

Why a ban on phosphorus in manufactured lawn fertilizer is good for Washington

We (Washington Lakes Protection Association – WALPA) are supporting a ban on the application of manufactured lawn fertilizer containing phosphorus. In Washington State, as elsewhere, established lawns require far less phosphorus than annually applied, making application of phosphorus superfluous and available for export via runoff to aquatic systems. The use of manufactured lawn fertilizers containing phosphorus is a significant contributor to many water quality problems in the United States and is unnecessary to the maintenance of healthy green lawns. This bill would ban the application of manufactured fertilizers containing phosphorus from being used on residential properties, but does not apply to agriculture, golf courses (managed by professional grounds keepers), or persons trying to establish new turf. This phosphorus ban will help to protect Washington lakes by reducing loads of phosphorus from being transported into our freshwater through runoff.

Excess phosphorus can lead to several water quality problems including, increased aquatic plant growth, change the amount of dissolved oxygen available for fish, and cause excessive algae blooms, including cyanobacteria blooms that are sometimes toxic. The application of lawn fertilizers contribute to phosphorus loading and scientific studies have shown that limits and bans of turf fertilizer containing phosphorus can significantly reduce the discharge of phosphorus into our State ground and surface water. Eliminating phosphorus in manufactured lawn fertilizer will improve water quality across Washington at essentially no cost to the citizens or State and will not have a negative impact on lawns. A ban on phosphorus in manufactured lawn fertilizer is one of the easiest, technically feasible, and cost effective changes we can make to protect Washington lakes.

Cost Savings and Phosphorus TMDLs in Washington

Throughout the State of Washington, 36 lakes are listed as category 5 on the Ecology 2002/2004 303(d) list for impairment by total phosphorus (Table 1). Under EPA regulations, a total maximum daily load (TMDL) assessment and comprehensive action plan is required for each of these listed lakes – items that are expensive and currently not included in any budget or staffing plans. In Michigan, the City of Ann Arbor enacted an ordinance in 2007 to limit phosphorus application to lawns to reach a state-imposed phosphorus TMDL requiring the city to reduce discharge of phosphorus by 50 percent to the Huron River. By implementing a ban on phosphorus in manufactured lawn fertilizers, the City of Ann Arbor met their TMDL mandated phosphorus reduction goals and avoided significant capital costs. If the phosphorus reduction goals had not been met, Ann Arbor would have been required to invest in costly technological solutions

such as an estimated capital upgrade of $1.5 million and an annual increase in operating costs of $167,000. Additionally, a three-year plant-scale test would have cost $520,000. The City of Plymouth, MN was able to avoid costs of over $840,000 by implementing a ban on the application of phosphorus in manufactured lawn fertilizer (USEPA)
https://notes.tetratech-ffx.com/newsnotes.nsf/606a2768c7ff5f63852565ff0061ae0d/a7be55405b36047385256d0100618bc1?OpenDocument

Similar costs savings can be realized for many of the 36 lakes in Washington that are listed for phosphorus on the 303(d) list, and future cost will be avoided by keeping additional lakes off of the 303(d) list by removing this excess load of phosphorus to allow our citizens to enjoy high-quality lakes.

The Fiscal impact statement attached to the Michigan legislation to ban on the application of phosphorus in lawn fertilizers states, 'There would be an indeterminate, although likely negligible, fiscal impact on state and local government. Any fiscal impact would be the result of increased administration and judicial caseload. It is logical to assume the fiscal impact in Washington would be negligible.

Why are we targeting manufactured lawn fertilizer?

Lawns do not need additional phosphorus

In Washington, as in most turf applications, native soils provide sufficient phosphorus to meet the nutrient requirements of turf grass. Eliminating phosphorus used in manufactured lawn fertilizer will not affect seed production or the growth of established lawns. Turf fertilizer formulations that contain no or very low phosphorus are currently available, so this ban will not economically impact stores that sell lawn fertilizer or professional landscapers. Maintaining established turf in a healthy and green condition is not dependent on the addition of phosphorus fertilizers. While significant reductions of phosphorus from laundry detergent and dishwashing detergent have been achieved both nationally and in Washington, similar progress in reducing phosphorus contributions from turf fertilizer has not been accomplished and will be a significant step towards keeping excess nutrients out of our lakes, streams, and rivers.

Most turf grass professionals recognize that established lawns typically do not require additions of phosphorus to maintain a healthy lawn. The Handbook of Turfgrass Management and Physiology, states that warm-season turf grasses generally do not have unusually high phosphorus requirements and the greatest effect of phosphorus fertilization occurs in the first eight weeks of establishment with much lesser effect thereafter. When clippings are returned to the soil, accumulated phosphorus in these clippings may provide sufficient phosphorus to

obviate the need for additional fertilization when a soil test indicates 'adequate' or medium' levels of phosphorus; however, routine phosphorus fertilization can generally be substantially reduced or eliminated with no adverse consequences.

Mohammad Pessarakli. Handbook of Turfgrass Management and Physiology. CRC Press, 2007.

Dr. Kussow, a leading turf grass professional at the University of Wisconsin, states that with nutrient demand being satisfied by soil phosphorus and potassium, the turf grass had no need for the fertilizer phosphorus and potassium. In other words, the evidence indicates that there is no agronomic benefit derived from applying fertilizer phosphorus to turf grass. He suggests conducting an easy and inexpensive soil test prior to any turf grass fertilization, and not applying phosphorus to soils with a concentration of less than 20 parts per million (ppm), while other research sets optimum soil phosphorus concentrations for established lawns at 11-15 ppm. The United States Geologic Service (USGS) presented research on soil cores from a lawn known not to have fertilizer applied for 28 years that still contained soil phosphorus above suggested lawn growth levels. Soils in Washington have adequate phosphorus and do not require the addition of additional phosphorus that can harm our surface waters.

http://www.soils.wisc.edu/extension/FAPM/2004proceedings/Kussow.pdf

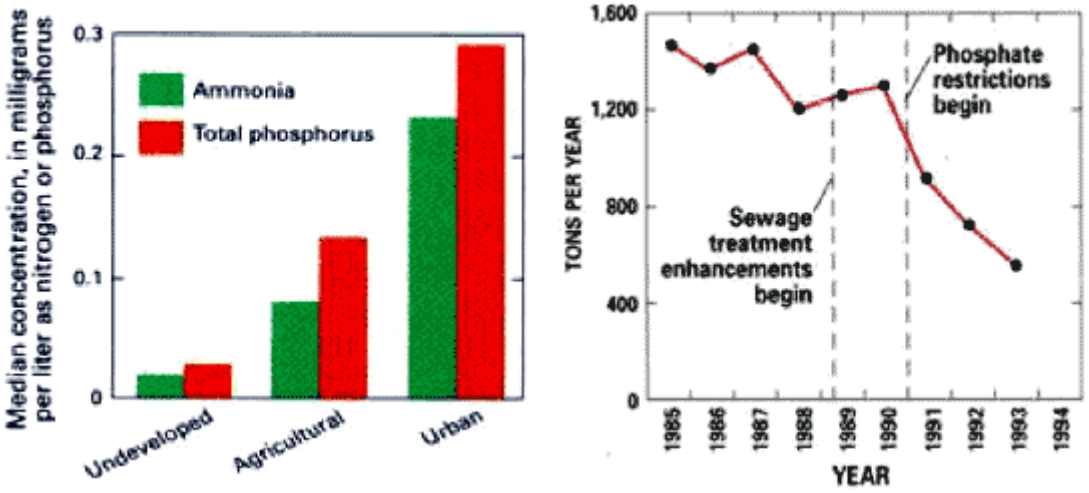
Other research done in Oklahoma corroborates these findings. In *Improving Nutrient Management in Lawns and Gardens to Protect Water Quality*, Hailin Zhang acknowledges that many homeowners do not have their soil tested before fertilizing their lawn and gardens. Nitrogen, phosphorus, and other nutrients in lawn and gardens are often present at higher levels than needed for plant growth; especially phosphorus, which is often several times higher than what is typically found on agricultural land. This may result in additional nutrients being lost via runoff.

Hailin Zhang. Oklahoma State University, Oklahoma State University, Plant & Soil Science Department, Stillwater, OK.

Established Lawns Do Not Need Additional Phosphorus

Addition of manufactured lawn fertilizer containing phosphorus causes additional loading to surface waters

The following graphs from the United States Geological Survey (USGS) illustrate the extent of the problem that phosphorus loading from urban and suburban landuses has on national surface waters, and that the elimination of phosphorus by the implementation of phosphorus bans (in this example banning phosphorus in laundry detergent) is effective.



http://pubs.usgs.gov/fs/fs218-96/

In a controlled study at one Wisconsin lake, measured runoff from lawns accounted for about 4 percent of the water flowing into the lake, but 51 percent of the total phosphorus input (Garn, 2002).

Garn, H.S., 2002, Effects of lawn fertilizer on nutrient concentration in runoff from lakeshore lawns, Lauderdale Lakes, Wisconsin: U.S. Geological Survey Water-Resources Investigations Report 02–4130, 6 p.

Garn et al. (2002) also noted that more than 50 percent of storm events resulted in surface runoff from lawns and that the median phosphorus concentration from regular fertilized sites was twice that from unfertilized sites. Hunt et al. (2006) report runoff from lawn sites with non-phosphorus fertilizer applications had a median total phosphorus concentration similar to unfertilized sites, which demonstrated that non-phosphorus fertilizer may be an effective, low cost practice to reduce phosphorus in runoff.

Randall J. Hunt, Steven R. Greb (WDNR), and David J. Graczyk. Evaluating the Effects of Nearshore Development on Wisconsin Lakes. Fact Sheet 2006–3033. August 2006.

In another study, measured concentrations of nitrate and phosphorus in groundwater underneath fertilized lawns were 3 to 4 times higher than concentrations measured in groundwater beneath wooded catchments. This finding suggests that higher rates of infiltration, such as those noted above, can result in enhanced nutrient loading to the groundwater system and subsequently to the lake, even if the runoff itself does not reach the lake. Elevated nutrient concentrations were also noted in deeper groundwater beneath both types of catchments, reflecting land use in areas more distant from the lake. Thus, a lake can be affected by land use in somewhat distant areas even if they do not contribute surface runoff directly to the lake.

Michigan Department of Environmental Quality Water Bureau June 2005 Total Maximum Daily Load for Nitrate for the River Raisin near Deerfield and Blissfield Lenawee County. Richard A. Smith, Gregory E. Schwarz, and Richard B. Alexander U.S. Geological Survey, Reston, Virginia. WATER RESOURCES RESEARCH, VOL. 33, NO. 12, PAGES 2781–2798, DECEMBER 1997

Use of Lawn Fertilizer Containing Phosphorus Increases Phosphorus in Surface Waters

Scientific evidence that banning phosphorus in lawn fertilizer is effective at reducing phosphorus concentrations in surface waters

A study of two communities in Minnesota measured a 23 percent reduction in phosphorus from the community that implemented a ban on phosphorus in manufactured lawn fertilizer. In 1996, the City of Plymouth enacted a phosphorus ban, but the neighboring city of Maple Grove did not. These two cities have comparable watersheds and presented a good opportunity to assess the effectiveness of a ban on phosphorus in lawn fertilizer. In 2001, using funds they received from an EPA Environmental Monitoring for Public Access and Community Tracking (EMPACT) grant, the Three Rivers Park District worked with the University of Minnesota, Duluth, to monitor the phosphorus in runoff in both the City of Plymouth and the City of Maple Grove watersheds. They saw a 23 percent reduction in the amount of phosphorus reaching the lakes in the City of Plymouth as compared to those in Maple Grove—a dramatic difference.

www.lakeaccess.org/lakedata/lawnfertilizer/mainlawn.htm

The most recent and detailed study to evaluate the effects of a ban on manufactured phosphorus lawn fertilizer was done in Ann Arbor, Michigan. The following is from the 2008 data report on this project:

> Statistical comparisons of 2008 surface water quality data with a long term historical data set at weekly and sub-weekly resolution has revealed significant reductions in total phosphorus (TP) and a trend of reduction in dissolved phosphorus following implementation of a municipal ordinance limiting the application of lawn fertilizers containing phosphorus (Lehman et al. 2008).
>
> No reductions were seen at a control river site (up river of Ann Arbor) not affected by the ordinance. Other control analytes, including nitrate and colored dissolved organic matter (not targeted by the phosphorus ban) similarly proved unresponsive compared to phosphorus. Statistically significant reductions of total phosphorus measured after 1 year averaged 31%.
>
> '*We can state objectively with a considerable degree of confidence that phosphorus concentrations were lower in 2008 at experimental sites compared with the reference period (2003 to*

2005) and that the reductions were coincident with a City ordinance restricting use of lawn fertilizers containing phosphorus.'

It would be tempting to conclude that the phosphorus reductions were caused by implementation of the ordinance, and that may indeed be the case. However, we must bear in mind that the ordinance was enacted in the context of public education efforts that encourage citizens to be more mindful of yard waste discharges into storm drains, to exert more diligence regarding buffer strips of vegetation along stream banks, and to exhibit more environmental awareness in general. These multi-faceted efforts make it difficult to isolate a single cause for the changes, but the changes appear to be real.

Evidence for Reduced River Phosphorus Following Implementation of a Lawn Fertilizer Ordinance (revision 1.2) John T. Lehman, Douglas W. Bell, and Kahli E. McDonald. Ecology and Evolutionary Biology Natural Science Building, University of Michigan, Ann Arbor.

Why is the application of organic compost not part of the proposed phosphorus ban in manufactured lawn fertilizer?

In most cases, finished compost is classified as a soil conditioner rather than a fertilizer due to the relatively low levels of nitrogen, potassium, and phosphorus. Finished compost adds these elements, and soil microbes which improve plant nutrient absorption, but releases them over a longer period of time than chemical fertilizers. Similar to nitrogen, much of the phosphorus in finished compost is not readily available for plant uptake since it is incorporated in organic matter. However, not all of the phosphorus mineralized from organic matter is available for crop uptake, because some of the phosphorus released from organic matter by microbial and chemical action is quickly made unavailable by binding with other elements in the soil. Some studies where plants have been grown with compost as the sole source of fertility added have shown phosphorus deficiencies more readily than nitrogen or potassium deficiencies. Generally, farmers should consider that compost is too low in phosphorus to consider use of compost in short-term fertilization of crops and should provide an additional source of phosphorus to ensure adequate crop nutrition.

Frank Mangan, Allen Barker, Steven Bodine, and Peter Borten. Compost Use and Soil Fertility.

Chemical lawn fertilizer is also capable of killing off many of the soil microbes that are responsible for decomposition, soil formation, nutrient production, and protection from fungus and other lawn diseases. Stronger chemicals ruin soil structure by dissolving the bonding materials (formed by microbes) that hold soil particles together, and can turn topsoil into the cement-like crust that forms in the

pots of houseplants that are regularly fed typical plant food. Many chemical fertilizers contain acids which in turn make the soil acid. The liquid forms encourage shallow rooting and thatch formation.

http://www.planetnatural.com/site/xdpy/kb/lawn-fertilizers.html

Soil is alive and the 'magic' of compost is its ability to inoculate soils with beneficial microbes, and it provides organic matter which is the energy source of these microbes. Lawns only require more work and volume of synthetic fertilizers if the instant gratification of an immediate green-up of a lawn is desired. Operations committing to an organic approach result in a decrease in fertilizer needs when using exclusively organic fertilizers.

Pers Comm. Craig Chatburn. B.S. in Ornamental Horticulture, Cal. State U. Chico, ISA Certified Arborist since 1992, WA state licensed pesticide applicator, Port of Seattle marine division landscape crew chief (100% organic 8 years), Seattle University Grounds Manager 5 years (100% organic campus), King County Master Gardener- 2006.

Why exempt vegetable and flower beds?

Unlike established turf grass lawn where soil provides sufficient phosphorus, many landscape plants and vegetables require nutrient additions to maximize productivity. Private gardens typically represent a much smaller acreage than lawns and their location next a house or in the backyard make result in a lower probability of runoff pollutants. Commercial gardens are currently regulated by the State of Washington, and this bill would not affect those regulations.

What has been accomplished in other states, counties, and cities?

A growing numbers of municipalities and state governments have adopted or are considering the adoption of restrictions on the residential use of phosphorus-containing fertilizers. These actions are based on awareness that phosphorus is often not a growth-limiting nutrient in many terrestrial soils, and that excessive application of this unnecessary element leads to runoff and eutrophication of surface waters. Examples include the State of New Jersey, with over 100 municipalities affected; the State of Minnesota; the State of Maine; Sarasota County, Florida; Dane County, Wisconsin; and the City of Ann Arbor Michigan.

http://www.hamiltonnj.com/government/pdf/EPI_pdf/StormWaterManagement/get-thephosphorus-out.pdf
http://florida.sierraclub.org/suncoast/SarasotaCountypassesstrongFertilizerOrdinance.htm
http://www.state.me.us/dep/blwg/doclake/fert/phospage.htm
http://www.co.dane.wi.us/pdfdocs/ordinances/ord080.pdf

In Washington, the City of Bellingham and Whatcom County currently regulate the use of phosphorus-containing fertilizers on residential lawns and public properties within the Lake Whatcom Watershed, with the exception of newly

established lawns during the first growing season (Lake Whatcom Cooperative Management 2007). A phosphorus-free fertilizer called the "Lake Whatcom Blend" has been developed and is available in local stores. In Eastern Washington, the Liberty Lake Sewer and Water District adopted a policy banning phosphorus lawn fertilizer in November 2005, but has no enforceable regulations on fertilizer use (Liberty Lake SWD 2005). These local actions are an excellent first step in protecting individual lakes. Lacking a statewide ban on phosphorus application these local efforts are undermined and the State of Washington misses the opportunity to realize the benefits of a statewide ban on the application of phosphorus in manufactured lawn fertilizers.

Conclusion

Passage of this bill will benefit the freshwaters of Washington State and will not cost the State to implement. A ban on phosphorus in manufactured lawn fertilizers is an effective tool to protect and improve many of the surface waters in the State of Washington. A ban on phosphorus in manufactured lawn fertilizers will not impact citizens who desire to fertilize turf grass lawns. A ban on phosphorus in manufactured lawn fertilizers will not cost the State of Washington to implement, and has the potential to save substantial amounts of money by reducing the impacts to lakes suffering from excess phosphorus and by avoiding lake restoration projects caused by excess phosphorus.

Given the documented negative effects on aquatic ecosystems of manufactured lawn fertilizers containing phosphorus, and the insubstantial effort required of the citizens or agencies of the State in implementing this nutrient source control, removing phosphorus from manufactured lawn fertilizer is a logical piece of cost effective legislation. When contrasted with the far reaching benefits to our aquatic ecosystems and the avoided cost of lake clean-ups, this legislation is economically prudent for our State. We urge you to support WALPA to help ban the application of phosphorus in manufactured lawn fertilizer.

Table 1. Lakes in the State of Washington on the 2002/2004 Department of Ecology 303(d) List for Total Phosphorus Impairments (Category 5).

Listing ID	Category	WRIA	Water Body Name	Parameter	Medium	Algal toxin measured
8621	5	1	WHATCOM LAKE	Total Phosphorus	Water	
6314	5	3	CAMPBELL LAKE	Total Phosphorus	Water	
6343	5	3	KETCHUM LAKE	Total Phosphorus	Water	microcystins
8637	5	5	SUNDAY LAKE	Total Phosphorus	Water	
6313	5	7	BLACKMANS LAKE	Total Phosphorus	Water	
6350	5	7	LOMA LAKE	Total Phosphorus	Water	
6332	5	8	DESIRE LAKE	Total Phosphorus	Water	
6339	5	8	GREEN LAKE	Total Phosphorus	Water	
6364	5	8	PINE LAKE	Total Phosphorus	Water	
6368	5	8	SCRIBER LAKE	Total Phosphorus	Water	
6336	5	9	FENWICK LAKE	Total Phosphorus	Water	
6340	5	9	HICKS (GARRETT) LAKE	Total Phosphorus	Water	microcystins
6356	5	9	MERIDIAN LAKE	Total Phosphorus	Water	
8182	5	9	SAWYER LAKE	Total Phosphorus	Water	
6329	5	11	Clear Lake	Total Phosphorus	Water	
8680	5	11	HARTS LAKE	Total Phosphorus	Water	
6360	5	11	OHOP LAKE	Total Phosphorus	Water	
6288	5	12	AMERICAN LAKE	Total Phosphorus	Water	
6374	5	12	STEILACOOM LAKE	Total Phosphorus	Water	microcystins
22718	5	13	CAPITOL (NORTH ARM) LAKE	Total Phosphorus	Water	
6348	5	13	LAWRENCE LAKE	Total Phosphorus	Water	
6352	5	13	LONG LAKE	Total Phosphorus	Water	
6361	5	13	PATTERSON (SOUTH ARM) LAKE	Total Phosphorus	Water	
6345	5	15	KITSAP LAKE	Total Phosphorus	Water	
6291	5	23	BLACK LAKE	Total Phosphorus	Water	
6328	5	23	CARLISLE LAKE	Total Phosphorus	Water	
6341	5	27	HORSESHOE LAKE	Total Phosphorus	Water	
6346	5	28	LACAMAS LAKE	Total Phosphorus	Water	
6375	5	28	VANCOUVER LAKE	Total Phosphorus	Water	
6366	5	33	SNAKE RIVER	Total Phosphorus	Water	
6355	5	34	MEDICAL LAKE	Total Phosphorus	Water	microcystins
6337	5	37	GIFFIN LAKE	Total Phosphorus	Water	
42782	5	41	MOSES LAKE	Total Phosphorus	Water	
6367	5	55	SACHEEN LAKE	Total Phosphorus	Water	
6358	5	57	NEWMAN LAKE	Total Phosphorus	Water	microcystins
6331	5	60	CURLEW LAKE	Total Phosphorus	Water	

Placement in Category 5 means that Ecology has data showing that the water quality standards have been violated for one or more pollutants, and that a TMDL or pollution control plan has not yet been developed. TMDLs are required for the water bodies in this category.