shuswapwater.ca

# PHOSPHORUS ACTION PLAN for the Shuswap watershed

Photo Credit: Darren Robinson Photography / Shuswap Tourism







**EXECUTIVE SUMMARY** 

Phosphorus (P) is a non-replaceable, nonrenewable mineral resource that is essential to many forms of life, and to the agriculture sector for food security. There is no substitute for it and it's important for supporting a healthy ecosystem. But, when there are excessive amounts of phosphorus in aquatic environments it can increase algal growth, reduce water clarity, create odours, reduce the quality of water for drinking and recreation, and—in a worst -case scenario—form harmful algal blooms that are toxic to people, pets and livestock.

Recent research done in the Shuswap watershed has identified the following:

- The equivalent of 3 tri-axle dump trucks of P enter into Mara Lake from the Shuswap River, and the equivalent of 2 tri-axle dump trucks enter into Shuswap Lake from the Salmon River each year
- Upper reaches of the watershed, which are mostly forested and minimally impacted by housing, farming, and development, comprise a large area with low concentrations of P per unit area. These areas contribute 48% and 23% of the total inputs of P to the Shuswap and Salmon River systems annually, respectively
- Valley bottoms of the watershed, which are the areas with the most impacts from housing, farming, and development, comprise a small area with high concentrations of P per unit area. These areas contribute 46% and 69% of the total inputs of P to the Shuswap and Salmon River systems annually.

The use of phosphorus and the discharge of phosphorus-rich effluents is regulated in many ways, directly and indirectly. This Plan summarizes the regulatory framework for P. The provincial government has the most specific regulations to directly manage P and other nutrients, as well as regulating agriculture and resource management activities in the watershed (e.g., forestry).

Photo Credit: Darren Robinson Photography / Shuswap Tourism

Everyone in the Shuswap watershed can take action to reduce the amount of P being released into the watershed.

### LIST OF ACRONYMS

| AEMCOP | Agricultural Environmental Management<br>Code of Practice         |
|--------|---|
| ALR    | Agricultural Land Reserve   |
| BMP    | Beneficial management practice(s)                                 |
| CSRD   | Columbia Shuswap Regional District                                |
| MOECCS | Ministry of Environment & Climate Change<br>Strategy (Provincial) |
| MLWRS  | Ministry of Land, Water & Resource                                |
|        | Stewardship (Provincial)  |
| OMRR   | Organic Matter Recycling Regulation                               |
| N      | Nitrogen  |
| OCP    | Official Community Plan   |
| Р      | Phosphorus  |
| RDNO   | Regional District of North Okanagan                               |
| RGS    | Regional Growth Strategy  |
| SWC    | Shuswap Watershed Council   |
| TNRD   | Thompson-Nicola Regional District                                 |
| UBC-O  | University of British Columbia–Okanagan                           |
| WQO    | Water Quality Objective(s)  |

You will notice citations throughout this document, expressed as small Roman numerals. A full list of citations used in developing this Plan is available on page 14.

# **SECTION 1: OVERVIEW AND PURPOSE**

### Why a Phosphorus Action Plan?

The purpose of this Phosphorus Action Plan is to provide guidance to everyone in the Shuswap watershed on actions they can take to protect water quality by reducing the amount of phosphorus being released into the watershed, thereby protecting water quality for the long term. The plan summarizes existing phosphorus regulations and bylaws, and identifies new, innovative solutions and puts them into a single document.

This Plan is not a regulation, and the author, the Shuswap Watershed Council, is not a regulatory body. This Plan is informational and educational, and suggests and encourages steps that everyone in the Shuswap watershed can take to reduce their 'phosphorus footprint'. **We are all stewards of the** watershed, and we can all play a part in protecting our water quality whether we are agriculturalists or silviculturists; building or maintaining roads; tending to parks, lawns and gardens; choosing household products and minding what we flush down our drains; properly maintaining septic systems; and more. This Plan is for you!



This document is the culmination of input from many people and organizations. It is intended to be living document and be updated periodically.

Developing this Plan is an item in the Shuswap Watershed Council's Strategic Plan for 2021-26. Find it on their website: shuswapwater.ca

### Where does the P come from?

Water quality monitoring has shown us that phosphorus enters waterways by point sources (e.g., wastewater treatment plant outfalls, drain tile used in agriculture, and storm drain outfalls) and by non-point sources. The latter is by far a much bigger source of P to Shuswap and Mara Lakes. Non-point sources include surface run-off (rain and snowmelt) and groundwater seepage of phosphorus-rich water, and erosion of phosphorus-rich soils into rivers and lakes. More detail is described on page 5.

# **SECTION 2: BACKGROUND INFORMATION**

### The basics of Phosphorus

Phosphorus (P) is an important nutrient for all living things. It is needed for energy, for the formation of bones and teeth, and other essential functions. The amounts of P really matter in an aquatic ecosystem. Aquatic life such as algae, invertebrates, and fish need P to grow and reproduce. Therefore, it's important for supporting a healthy ecosystem. But, excessive amounts of P increase algal growth, reduce water clarity, create odours, reduce the quality of water for drinking and recreation, and—in a worst-case scenario—form harmful algal blooms that are toxic to people, pets and livestock. Furthermore, P is considered a limiting nutrient in most lakes in our region. That means that low P levels are holding back algae and other plant life; when P levels increase, more plant life and algae will grow. Renowned Canadian scientist David Schindler

demonstrated this in the 1970s with his research in the Experimental Lakes Area (northwestern Ontario)<sup>i</sup>.

P is a non-replaceable nutrient needed for agriculture and food security—there is no substitute for it. P is also non-renewable resource—there is a finite global supply. It is mined from phosphate-rich rock. Availability is declining based on known reserves.

### Did you know?

All mammals, including humans, produce P in our feces and urine, based on the foods we eat. On average:

- an adult excretes 1.5 g of P per day<sup>ii</sup> or 0.547 kg of P/year
- a dairy cow excretes 57 g of P per day<sup>iii</sup> or 20.8 kg of P/year.



# What the SWC has done to understand phosphorus in the Shuswap watershed

The SWC commissioned research by the University of BC–Okanagan to carry out two phases of research, beginning in 2016, to better understand phosphorus in the Shuswap watershed:

# 2016

Phase 1 of the research<sup>v</sup> took place from 2016–2019. It involved the collection and analysis of water samples by the research team from over 20 different sites on the Shuswap and Salmon Rivers, and from over 80 additional sites at ditches. seasonal streams, and wells. This work created 'nutrient budgets' for the two rivers, illustrating the changing concentrations of nutrients in the water as the rivers flow through their watersheds and accumulate nutrients off the landscape (this is referred to as 'loading'). The results show that the highest proportions of nutrients come from the settled valley bottoms of the Shuswap River and Salmon River. which are the areas most impacted by agriculture, housing, and development whereas the upper reaches of the the Shuswap River and Salmon River are naturally very low in phosphorus.

The research identified the following:

• The **total loading** of P during the study period was 63,490 kg from the Shuswap River watershed and 44,720 kg from the Salmon River watershed each year; this is the equivalent of 3 tri-axle dump trucks of P in the Shuswap River and 2 tri-axle dump trucks in the Salmon River<sup>vi</sup>

2014

- Forested land contributed the least, at an average of 0.035 kg P/hectare/year to the river.
- Urban land contributed an average of 3.83 kg P/hectare/year
- Agricultural land contributed the most, at an average of 13.5 kg P/hectare/year
- Urban and agricultural lands comprise a relatively small area of the entire watershed, yet they contributed the highest proportions of P, equivalent to 46% and 69% to the Shuswap River and Salmon River respectively, on an annual basis.

All areas of the Shuswap watershed matter; however, the research results indicate that urban and agricultural lands contribute the most P to the Shuswap watershed. Therefore, that's where we should focus our efforts at mitigating and minimizing P loading to the watershed.

### The SWC commissioned work by an agrologist in 2014 to identify **agricultural nutrient management strategies**<sup>™</sup> for maintaining and improving water quality.



Would you like to learn more? Check out this mini-report published by the SWC: Understanding Nutrients and Water Quality in the Shuswap River and Salmon River. Find it on the SWC website.

2018

Phase 2 of the research was done in 2018–2019. The SWC wanted to understand the historical levels of P in the Shuswap watershed (i.e., prior to European settlement). This phase of research involved the collection of sediment core samples from the bottom of Mara Lake. Using a type of science called **Paleolimnology**, the UBC–O research team determined the historic nutrient conditions in Mara Lake, and discovered how P inputs to the lake have changed over the past 150 years. The key findings were that P levels in Mara Lake today are not unprecedented in its history and have fluctuated over the decades, and that P levels are trending upward since the 1980s. There is a narrated presentation<sup>vii</sup> of the findings and research reportsviii available on the SWC website.

### **Research Conclusions**

The key conclusion of the research is that agricultural lands and urban areas within the valley bottoms contribute the highest proportions of P to the Shuswap watershed, via the Shuswap River and Salmon River. Furthermore, these areas have the best access and opportunities to reduce P inputs to Shuswap and Mara Lakes (as opposed to in the upland, forested areas of the watershed). In response to these findings, the SWC has developed an incentive program focusing on the delivery of grant funding to help improve nutrient management on farms and other land holdings (see Section 4 for more information).

# **SECTION 3: HOW PHOSPHORUS IS REGULATED IN THE SHUSWAP WATERSHED**

Phosphorus is regulated in many ways (e.g., laws, regulations, bylaws), directly and indirectly. However, the nature of our regulatory systems—with provincial, federal and local government laws, often by sector—means that the network of regulations is a patchwork. It is built from the bottom up, sometimes not considering the whole system.

The purpose of this section of the P Action Plan is to provide a short overview of how and by which order of government P is regulated, either directly or indirectly. It may not necessarily be comprehensive, and the reader is encouraged to investigate further regulations in their own jurisdiction.

### **Provincial regulations**

Key pieces of legislation or regulations that are under the jurisdiction of the province are numerous. Provincial laws regulate many areas and activities in the watershed, including resource management such as forestry and mining, agriculture, and various discharges and effluents.

### Water Sustainability Act

The Water Sustainability Act<sup>™</sup> is a key piece of legislation that regulates the allocation of water rights as well as habitats and ecosystems that require water. Changes within or near a stream or wetland, such as changes or inadvertent impacts to the land, vegetation, or flow of water require a notification or approval under section 11 of the Act.

### **Environmental Management Act**

The Environmental Management Act<sup>×</sup> regulates among other things—the operation of wastewater treatment plants. Within the Shuswap watershed, there are wastewater treatment plants operated in the following municipalities: Salmon Arm, Lumby, Chase, Enderby, and Sicamous. Each wastewater treatment plant has an operational certificate with specific discharge limits for different parameters, including P. Summaries of compliance and enforcement activities of the Environmental Management Act related to nutrient management can be found online<sup>xi</sup> and in a searchable Natural Resource Compliance and Enforcement Database<sup>xii</sup>.

### Agricultural Environmental Management Code of Practice

The Agricultural Environmental Management Code of Practice<sup>xiii</sup> (AEMCOP), a regulation of the Environmental Management Act, is the key provincial law regulating agricultural operations. The AEMCOP applies to all agricultural operations in British Columbia, from small hobby farms to large commercial operations. An agricultural operation includes raising or keeping livestock, poultry or insects, or growing and harvesting agricultural products on non-residentially zoned land; it also includes the activities associated with these operations, such as the storage or application of manure. Within the AEMCOP, there are designated high-risk areas including those that are phosphorus-sensitive areas (the entire Shuswap watershed is designated as such) and vulnerable aquifer recharge areas<sup>xiv</sup> (portions of the Shuswap watershed). Notably, commencing July 15 2021, the AEMCOP prescribes that agricultural operations of five hectares or more, located in a vulnerable aquifer recharge area, that apply nutrients to land, will be required to have and follow a nutrient management plan for the next growing season (i.e., spring 2022).

### Water Quality Objectives

The Environmental Management Act enables the creation of Water Quality Objectivesxvi. Draft Water Quality Objectives for Shuswap Lake were developed and released by the BC Ministry of Environment & Climate Change Strategy and Pespesellkwe te Secwepemc in spring 2022.<sup>1</sup> Water Quality Objectives (WQOs) are provincial policy statements that apply to specific waterbodies and must be considered in relevant statutory decisions made by the Ministry of Environment & Climate Change Strategy; they can also be used to inform other processes, such as land use decisions and Water Sustainability Act objectives. WQOs intend to protect the most sensitive uses and values of the waterbody to which they apply. Attainment of WQOs indicates water uses and values are at low risk of adverse effects with respect to a given parameter.

### **Organic Matter Recycling Regulation**

The Organic Matter Recycling Regulation<sup>xvii</sup> regulates the construction and operation of compost facilities and the production, distribution, storage, sale, and use of biosolids and compost. It provides guidance for local governments and compost and biosolids producers on how to use organic material while protecting soil quality and drinking water sources.

### Agricultural Land Reserve

The Agricultural Land Reserve (ALR) is a provincial zone in which agriculture is recognized as the priority use. Farming is encouraged and non-agricultural uses are limited. The Agricultural Land Commission (ALC) is an independent administrative tribunal dedicated to preserving agricultural land and encouraging farming in BC that was established by provincial legislation. It oversees the management of the ALR, among other purposes.



Photo Credit: North Shuswap Kicker

### Local government regulations

Local governments (municipalities, regional districts) indirectly manage P through plans and zoning for different land uses. When plans are approved, they are established as bylaws.

### **Regional Growth Strategies**

*Regional Growth Strategies* (RGS) are strategic plans that direct long-term planning for regional districts and municipalities. They also provide the basis for decisions about implementation of provincial programs in a regional district. Within the Shuswap watershed, the TNRD<sup>xviii</sup> and RDNO<sup>xix</sup> have regional growth strategies, but the CSRD does not. Examples of how P is regulated indirectly in the TNRD's RGS is in the topic of human and resort settlement and the policy to encourage urban and resort development with sewer and water services and supporting the use of innovative approaches and technology for the treatment and disposal of liquid waste.

### **Official Community Plans**

Official Community Plans (OCP) describe the longterm vision of communities. They are a statement of objectives and policies that guide decisions on municipal and regional district planning and land use management. They can be established by a municipality or regional district. OCPs usually do not explicitly identify

### Indigenous laws and plans

The Secwepemc and Syilx peoples have inhabited the Shuswap watershed since time immemorial and have never ceded their title or rights; they therefore have the right to exercise their authority and control over natural resources including water. They have their own Indigenous laws with responsibilities to future generations among others; while their laws were oral, they are being documented and opportunities to utilize these laws alongside colonial laws are occurring. Several First Nations are creating water declarations or laws.

### **Comprehensive Community Plans**

Indigenous communities often have *Comprehensive Community Plans* for land uses and activities on their reserve lands. These are roughly analogous to local government official community plans. management of P, but rather do so indirectly through land use. Within the Shuswap watershed, there are OCPs in each municipality (Salmon Arm, Lumby, Chase, Enderby, Sicamous, and Spallumcheen). Within the Columbia Shuswap Regional District, there are individual OCPs for the entirety of Areas C<sup>xx</sup>, E<sup>xxi</sup> and F<sup>xxii</sup>, and for the Ranchero-Deep Creek portion of Area D<sup>xxiii</sup>. Examples of how P is regulated indirectly in the Area C OCP is through the establishment of development permit areas within 100m of certain lakes. Salmon Arm's OCP<sup>xxiv</sup> has requirements for environmentally sensitive areas, economic growth of agriculture, wastewater treatment and service areas.

### **Riparian Areas Protection Regulation**

Local governments are charged with implementation of the provincial *Riparian Areas Protection Regulation*<sup>xxv</sup>. It applies to commercial, industrial, and residential development. It enables setbacks for building and development to protect stream health and productivity.

### Agriculture Plans and/or Strategies

Many local governments have created agriculture strategies and plans within the past 10 years, including RDNO and CSRD. These strategies and plans are not regulatory, so no detail is provided here. They do, however, promote agriculture and agricultural opportunities within the Shuswap.

### Federal regulations

### **Fisheries Act**

The federal *Fisheries Act* requires that work near water does not cause serious harm to fish unless authorized. This applies to lakes, streams and wetlands that support fish. Fisheries and Oceans Canada also has erosion and sediment control management guidelines.

# Concentration of Phosphorus in Cleaning Products Regulation

The Concentration of Phosphorus in Cleaning Products Regulation<sup>xxvi</sup> is a regulation within the Canadian Environmental Protection Act. It sets limits on amounts of P in various cleaning products that are manufactured in or imported into Canada.

# **SECTION 4: TAKING ACTION**

This section of the P Action Plan lists actions for residents and home owners, businesses, industry sectors and governments to reduce the amount of P being released into the Shuswap watershed. This section of the plan should be read as recommended, voluntary actions for all parties; it should not be read as required, or mandated.

### Taking action: Shuswap Watershed Council

| Action  | Rationale for P action  |
|---|---|
| <ul> <li>Continue to offer the Water Quality Grant Program<sup>xxvii</sup></li> <li>Budget \$50,000 per year</li> <li>Consider including local governments as<br/>eligible applicants to build wetlands</li> </ul>  | The Water Quality Grant Program is focused on agriculture<br>and landowners in the valley bottoms because these are<br>the areas of the watershed with the highest concentration<br>of P/ha/year to Shuswap and Mara Lakes  |
| Continue to coordinate water quality monitoring by all monitors   | Good information and data on sources of P can lead to effective action  |
| <ul> <li>Take a lead role and/or seek partnership opportunities for wetland restoration</li> <li>Develop a wetland restoration strategy, using maps and LiDAR data to identify locations of past wetlands that have been degraded, starting with Shuswap and Salmon River watersheds</li> <li>Overlay these areas with areas within flood maps, cultivated fields with slopes &lt;5%</li> <li>Seek external funding</li> <li>Seek willing landowners to participate.</li> </ul> | The research by UBC–O suggested that flow-path<br>modification of nutrient rich water through a wetland<br>is an effective method of improving water quality,<br>as well as delivering many co-benefits. Wetlands are<br>vital to the health of ecosystems by providing clean water<br>and recharging groundwater. They buffer the effects<br>of flooding and drought, and provide habitat for fish<br>and wildlife including endangered species. |
| Advocate provincial government for better monitoring<br>of provincial regulations, such as the <i>Agricultural</i><br><i>Environmental Management Code of Practice</i><br>and the <i>Organic Matter Recycling Regulation</i>  | A collective voice, such as that of the SWC, is louder than individual voices   |
| Advocate for funding support from federal and provincial governments for improvements to wastewater treatment plants, including P recovery technology   |   |
| Provide (or fund/coordinate) technical support for<br>riparian area enhancement projects which serve as<br>P sinks, whether wetlands or riparian restoration  |   |
| Encourage and facilitate collaboration between organizations  | No single government ministry, department or industry sector has access to all the levers to address P. SWC is a multi-jurisdictional body that can facilitate collaboration.   |
| <ul> <li>Identify multiple wins in taking action on P to protect<br/>water quality that also addresses:</li> <li>Flood prevention and mitigation</li> <li>Reduction in loss of property from erosion</li> <li>Moderating flows, storing water for late summer needs<br/>for agriculture and fish</li> <li>Groundwater recharge</li> <li>Climate change adaptation</li> </ul>  | P management doesn't exist in a vacuum. Managing<br>for P to maintain and improve water quality has many<br>co-benefits; similarly, taking action on flood mitigation<br>and prevention as a primary activity can have co-benefits<br>for P and water quality.  |
| Educate, and advocate for continued research and<br>education about P management (i.e., timing of fertilizer<br>application) and impacts to water quality   |   |





Photo Credit: Erin Vieira

# Taking action: Farms and Agriculture Sector

| Action  | Rationale for P action   |
|---|--|
| <ul> <li>Utilize various BMPs from the SWC-commissioned<br/>Nutrient Management Strategies report<sup>xxviii</sup>:</li> <li>Fertilize (whether manure or chemical) according<br/>to plant needs for P, not with excess P relative to N</li> <li>Use conservation tillage</li> <li>Use conservation buffers</li> </ul>                | Croplands have a higher export coefficient of P/ha<br>than do areas used for pasture or forage, therefore the<br>most effective remediation strategies will intercept<br>nutrients from cropland |
| <ul> <li>Use impoundments or sediment basins in ditches<br/>and ephemeral drainages to slow water flow<br/>and capture nutrients</li> <li>Stabilize streambanks with vegetation</li> <li>Build livestock exclusion fencing in riparian areas</li> <li>Utilize field management practices to reduce<br/>erosion and runoff.</li> </ul> | Opportunity for flow-path modification in ditches<br>and ephemeral drainages to mitigate seasonal fluxes<br>in nutrient levels   |
| Utilize nutrient-rich water for irrigation, whether<br>from groundwater or surface water (especially the<br>Salmon River)   | Facilitates the recycling of nutrients from nutrient-rich waters   |
| Explore opportunities for regenerative agriculture and use of cover crops <sup>xxix</sup>   | Cover crops over winter improve soil tilth, reduce<br>erosion potential and leaching of nutrients. Regenerative<br>agriculture builds up healthy soil to be able to retain<br>more nutrients.    |
| Manage the P source and the transport factors that lead<br>to P loss (i.e., erosion, surface run-off from fertilized fields)  |  |
| Use factsheet #6 <sup>xxx</sup> to identify fields that are most at risk<br>and the individual factors that could be causing P loss   |  |
| Use available tools for nutrient management on-farm:<br>• Nutrient management calculator <sup>xxxi</sup><br>• Manure management resources <sup>xxxii</sup><br>• Nutrient management plan. <sup>xxxiii</sup>   |  |
| Develop an Environmental Farm Plan <sup>xxxiv</sup> and access available funding for implementation of BMPs   |  |
| Collectively as an industry, explore economic opportunities for P such as struvite, biogases and others   |  |
| <ul> <li>Investigate opportunities for new technologies:</li> <li>Livestock Water Recycling<sup>xxxv</sup></li> <li>Manure centrifuge<sup>xxxvi</sup> developed by Salmon Arm-based<br/>Valid Manufacturing.</li> </ul>   |  |



Photo Credit: Darren Robinson Photography

### Taking action: Forest Industry

| Action   | Rationale for P action   |
|--|--|
| Manage road systems, culverts and bridges to<br>ensure natural drainage patterns are maintained,<br>no blockages are present, and erosion is minimized | Failed culverts lead to road blowouts; roads without<br>proper drainage expedite the flow of water to valley<br>bottoms and can lead to debris flows   |
| Promptly reforest upland areas following timber harvesting, salvage operations, and post-wildfire. Accept deciduous species.                           | Quicker hydrologic recovery of stands and watersheds can<br>reduce the risk of debris flows and stabilize sites. Accepting<br>deciduous species increases the amount of biomass on-site<br>utilizing nutrients and expediting hydrologic recovery. |
| Implement BMPs for riparian retention <sup>xxxvii</sup><br>on small streams  | BMPs reduce the risk of erosion and sedimentation and keep streams intact  |
| Utilize Joint Practice Guidelines: Watershed<br>Assessment and Management of Hydrologic and<br>Geomorphic Risk in the Forest Sector <sup>xxxviii</sup> | These are the best practices for avoiding downstream<br>adverse impacts. Although low in concentration per hectare,<br>the UBC–Okanagan research showed that 48% of the total P<br>loading came from the uplands of the Shuswap River.             |

### Taking action: Wastewater Treatment Operators (local government and private)

| Action  | Rationale for P action  |
|---|---|
| Educate system users (i.e., residents) to reduce<br>P contributions | Decreasing P in the wastewater system will reduce overall loading and can prevent rising operational costs          |
| Apply for grants to advance wastewater treatment systems            | Better wastewater treatment removes more nutrients from wastewater, thereby reducing the amount in treated effluent |

### Taking action: Transportation Sector (highways contractors)

| Action  | Rationale for P action   |
|---|--|
| Avoid building over, filling in, or destructing wetlands  | Wetlands slow water flow and retain nutrients in sediments and vegetation  |
| Reduce ditch-clearing where possible  | Clearing ditches removes the vegetative base that filters<br>snowmelt and rain coming off roads, and in turn leaves bare<br>soils to be transported to the nearest waterbody |
| Consider the impact of hosing down bridges in spring<br>to remove excess dirt and traction material, and look<br>for alternative ways to do maintenance |  |



# Taking action: Homeowners, waterfront property owners, boaters

| Group   | Actions   | Rationale for P action  |
|---|---|---|
| Homeowners or renters on a septic system                                | <ul> <li>Make sure your septic system works properly, is<br/>the right size for your household, is well maintained</li> <li>Access the SepticSmart Program<sup>xxxix</sup> for helpful resources</li> <li>Don't dump solvents down drains</li> <li>Choose low P products for cleaning, laundry</li> </ul> | Well functioning septic<br>system will protect the<br>surrounding environment                                       |
| Homeowners or renters<br>on a community<br>wastewater system            | <ul> <li>Become educated about collection and treatment<br/>services to reduce your P contributions</li> </ul>  | Decreasing P in the wastewater<br>system will reduce overall<br>loading and can prevent rising<br>operational costs |
| Homeowners or renters<br>in areas with stormwater<br>collection systems | Be aware of soap from washing your car or outside decks<br>and siding that goes into stormwater systems   | Storm drains empty directly into water bodies without treatment   |
| Homeowners or renters with livestock                                    | <ul> <li>Manage livestock manure properly, use BMPs</li> <li>Be conscious of the number of animals per hectare<br/>on your property and if it exceeds BMPs</li> </ul>   |   |
| Waterfront<br>property owners   | <ul> <li>Maintain natural shoreline vegetation<br/>as much as possible</li> <li>Avoid use of fertilizers on lawns</li> </ul>  | In-tact shoreline vegetation<br>reduces erosion and filters<br>over-land runoff                                     |
| Community groups  | <ul> <li>Raise awareness of P management within your<br/>community; encourage friendly competition</li> </ul>   |   |
| Boaters   | <ul> <li>Minimize boat wake to prevent erosion, especially when<br/>boating on rivers</li> <li>Don't discharge sewage (blackwater) or greywater into<br/>waterbodies, dispose of it properly</li> </ul>   |   |

# Taking action: Local Governments

| Action  | Rationale for P action   |
|---|--|
| Design new or modify existing drainage and storm-<br>water systems to slow runoff into lakes and rivers,<br>and re-capture nutrients. Consider creating settlement<br>ponds (investigate the maintenance needs long-term)<br>or constructing wetlands at opportune locations. | Runoff from large catchment areas that is captured<br>in stormwater systems may contain significant amounts<br>of nutrients; slowing this and/or recapturing nutrients<br>can divert these nutrients away from lakes and rivers. |
| Avoid building over, filling in, or destructing wetlands  | Wetlands slow water flow and retain nutrients in sediments and vegetation  |
| Restore ecosystems—especially wetlands—to a functioning state   | Wetlands and riparian areas are beneficial for reducing flood risk and retaining nutrients in sediments and vegetation   |
| Apply for grants to advance wastewater treatment systems  | Better wastewater treatment removes more nutrients from wastewater, thereby reducing the amount in treated effluent  |
| Consider biosolids and septage by-products for use locally  | Recycles nutrients in the waste stream   |
| Utilize the most recent flood <sup>x1</sup> mapping<br>to inform future development   | Significant flood events can mobilize nutrients and other pollutants into surface waters   |

# Taking action: Provincial Government



| Ministry   | Action  | Rationale for P action  |
|--|---|---|
| Ministry of Environment<br>& Climate Change Strategy<br>and/or Ministry of Land,<br>Water & Resource Stewardship | Work with federal government to install<br>nutrient monitoring instruments at<br>hydrometric stations on Shuswap<br>and Salmon Rivers   | Better data leads to better decisions<br>and action where most needed   |
|  | Utilize cumulative effects assessment<br>approaches to understand impacts to<br>water quality for future decisions  |   |
|  | Ensure sufficient water for fish in late summer, in particular in the Salmon River  | Lower flows of water have higher concentrations of P  |
| Ministry of Forests  | Mandate and/or expedite hydrologic<br>recovery in upper watersheds through<br>utilization of Forests for Tomorrow or<br>similar programs  |   |
|  | Manage non-status road system and culverts effectively and/or deactivate these roads  | Failed culverts lead to road blowouts;<br>roads without proper drainage expedites<br>the flow of water to valley bottoms<br>and can often lead to debris flows  |
|  | Lead the development of access<br>management plans in key watersheds<br>where road densities are high and risk of<br>erosion exists   | Access management plans will identify<br>opportunities for road deactivation and<br>therefore reduction of risk of erosion,<br>sedimentation and debris flows   |
|  | Implement the recommendations<br>from the Forest Practices Board special<br>report 60 Forest Practices and Water:<br>Opportunities for Action <sup>xli</sup>  | Including water as a core value in forest<br>planning, considering cumulative effects<br>in decision making, addressing forest<br>practices that contribute sediment to<br>streams and addressing historic practices<br>through watershed restoration would<br>reduce risk of P entering the water                        |
| Ministry of Agriculture,<br>Food & Fisheries   | Promote nutrient management with<br>clients. Encourage clients to manage<br>the P source and the transport factors<br>that lead to P loss (i.e. erosion, surface<br>run-off from fertilized fields) |   |
|  | Support research trials and education<br>in regional crop production and<br>nutrient usage  |   |
| Ministry of Transportation and Infrastructure  | Avoid building over, filling in, or destructing wetlands  | Wetlands slow water flow and retain nutrients in sediments and vegetation   |
|  | Upgrade culverts and infrastructure to suit the new climate   | Critical infrastructure that is more resilient will have less impacts to the environment  |
| Province—all/other   | Deliver funding programs that<br>recognize and encourage co-benefits  | Funding programs can have multiple<br>wins if they are structured to be flexible<br>and work across ministries. For instance,<br>naturalized flood protection through<br>the construction of wetlands can retain<br>nutrients, reduce peak freshet, augment<br>low summer flows and provide fish<br>and wildlife habitat. |



Photo Credit: Darren Robinson Photography / Shuswap Tourism

### Taking action: Federal Government

| Ministry                               | Action   | Rationale for P action  |
|--|--|---|
| Environment & Climate<br>Change Canada | Work with province to install nutrient monitoring instruments at hydrometric stations on Shuswap and Salmon Rivers | Better data leads to better decisions and action where most needed  |
| Federal—other                          | Fund improvements to wastewater systems  | Better wastewater treatment removes<br>more nutrients from wastewater, thereby<br>reducing the amount in treated effluent   |
|  | Deliver funding programs that recognize<br>and encourage co-benefits   | Funding programs can have multiple<br>wins if they are structured to be flexible<br>and work across ministries. For instance,<br>naturalized flood protection through<br>the construction of wetlands can retain<br>nutrients, reduce peak freshet, augment<br>low summer flows and provide fish<br>and wildlife habitat. |

# **POTENTIAL CO-BENEFITS FROM TAKING ACTION**

For many of the actions noted in this plan, there are co-benefits and win-win opportunities that will be achieved in addition to reducing and mitigating P inputs to the Shuswap watershed. These include:

- Stabilizing riparian areas through revegetation can reduce property loss via erosion, reduce flood risk, reduce turbidity, and reduce water treatment costs
- Restoring and constructing wetlands reduce flows, retain nutrients in sediments and vegetation, retain water for late summer which is beneficial for irrigation and aquatic ecosystems, and recharge groundwater.

# **ACKNOWLEDGMENTS**

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### What do you think?

Would you like to share your feedback on this plan with us? Contact the SWC, care of the Fraser Basin Council in Kamloops:

Erin Vieira evieira@fraserbasin.ca 250.314.9660

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Photo Credit: North Shuswap Kicker



### Who We Are

### About the Shuswap Watershed Council

The SWC was established in 2014 as a watershedbased partnership of several organizations with an interest in or responsibility for protecting water quality. There are up to 22 members that represent three regional districts, two municipalities, the Secwepemc Nation, three provincial government agencies, and Shuswap communities. The SWC is a collaborative, nonregulatory group that focuses on strategic initiatives to protect, maintain, and enhance water quality and promote safe recreation in the Shuswap. The SWC works alongside organizations that have regulatory roles in managing the Shuswap watershed, complementing their work and carefully avoiding duplication.

### Staff

The Fraser Basin Council, a provincial nongovernment organization, provides staff services to the Shuswap Watershed Council.

### **Our Vision**

Enhanced water quality that supports human and ecosystem health and the local economy in the Shuswap watershed.

### What We Do

### Our Goals

The SWC's goals are that water quality is maintained and improved in the Shuswap for the benefits of a healthy ecosystem, a thriving tourism economy, and a desirable lifestyle for residents; that the SWC is the trusted, go-to source for water quality information in the Shuswap; that people in the Shuswap practice safe waterbased recreation; and that the SWC is a wellgoverned, transparent, collaborative organization.

### The Work

The SWC's work on water quality, prevention of aquatic invasive mussels, and safe water-based recreation is guided by its Strategic Plan for 2021–26.

The SWC has a Strategic Plan for 2021–26. Find it on their website: shuswapwater.ca



# Shuswap Watershed Council. Phosphorus Action Plan. August 2022



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