



Non-Point Sources (NPS) in the Georgia Basin

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What is non-point source pollution?

Compared to point sources of pollution, such as the readily identifiable and quantifiable end-of-pipe discharges from industrial and municipal waste facilities, non-point source (NPS) pollution is more insidious and less easily identified. NPS pollution includes the vast number of diffuse sources associated with urbanization, agriculture, and other forms of land development. As in many other regions, regulatory actions by government and the implementation of voluntary controls by industry have successfully decreased point source releases of contaminants to the Georgia Basin. NPS pollution, which is still largely unregulated, is now recognized as the main source of many potentially harmful contaminants to the environment. Significant sources of NPS pollution to the Georgia Basin include combined sewer overflows (CSOs), urban runoff and stormwater, agricultural runoff, boating activity, poorly maintained on-site sewage systems (primarily septic systems), atmospheric deposition, aquaculture facilities, spills, and contaminated sites. Some pollution sources, such as stormwater, mines, and contaminated sites, as well as some atmospheric releases, can be classified as both point and non-point.

How does NPS pollution enter the environment?

The extent and origin of NPS pollution varies within Georgia Basin watersheds and is determined largely by land use. In highly urbanized watersheds, CSO discharges and runoff originating from urban development are important pollution sources. Excess runoff or stormwater is generated where land development has changed the natural flow of water (hydrology) and precipitation is no longer able to soak naturally into the earth. Instead, when precipitation falls, it may wash over impermeable surfaces (roadways, parking lots, driveways and rooftops) or be collected from lawns, golf courses, and agricultural lands. Stormwater and runoff from urban and agricultural areas can pick up a wide range of contaminants before it is channeled into ditches, storm drains, and storm sewer systems. Unlike sanitary wastewater, which is typically transported to municipal wastewater treatment plants for treatment prior to being discharged to receiving waters, collection systems carry stormwater and runoff to the nearest water body where, in most cases, it is discharged untreated.

Population growth has triggered increasing development in many watersheds of the Georgia Basin and has resulted in increases in both vehicular traffic and areas of impervious surfaces. These factors can result in increases in both the volume of stormwater and the loadings of contaminants entering local waterways. It is important to raise public awareness and to ensure that all levels of government work together to minimize the potential impacts of future population growth and urban development on stormwater generation and the resulting contamination of waterways. In addition to the numerous stormwater releases to local waterways, some CSOs in Metro Vancouver and Victoria periodically discharge mixtures of sanitary wastewater and stormwater. This occurs when the volume of wastewater in combined sewers exceeds the capacity of the sewer system during very heavy rainfall events. Significant pollution has been observed in the vicinity of some CSO discharges; however, long-term plans are in place to eliminate or greatly reduce CSO discharges to the Georgia Basin.

Other sources of NPS pollution predominate in rural and agricultural areas of the Georgia Basin. NPS pollution affects the quality of agricultural runoff, ditches, groundwater, and streams in the Lower Fraser Valley, particularly in areas of intensive crop production and high livestock density. In addition, poorly maintained on-site sewage systems (septic systems), boating activities and marinas, and aquaculture facilities can release pollutants to both freshwater and coastal areas.

Atmospheric deposition and contaminated sites are sources of contaminants to both urban and rural areas of the Georgia Basin. Contaminants originating from local and distant sources are transported by air currents and deposited to land and water bodies in rain and snowfall and also by dry deposition. Contaminated sites, while situated mainly in urban regions, are present throughout the Georgia Basin. At many of these sites pollutants leach from contaminated soil to groundwaters and adjacent surface waters.

What types of contaminants are released to the Georgia Basin in NPS pollution?

NPS pollution can contain a wide variety of contaminants such as persistent organic pollutants (POPs), pesticides, fertilizers, wood treatment chemicals, metals, oils, pharmaceuticals, hormones, surfactants, plasticizers, fire-retardants and nutrients, as well as fecal coliforms and other biological contaminants. In extensively urbanized areas of the Georgia Basin, CSOs, runoff and stormwater contain pollutants from vehicle exhaust and tire and brake wear; detergents, antifreeze and oil from the washing and maintenance of vehicles; road salts; particulates and chemical contaminants from combustion sources and other aerial emissions; contaminants from industrial sites; spilled and leaked chemicals from households and commercial facilities; pesticides and fertilizers from lawns and golf courses; and fecal coliforms and other pathogens from domestic animals. The release of contaminants such as PAHs, metals, AP and APEnOs, phthalate esters, pesticides, nutrients, pharmaceuticals, and surfactants from CSOs and stormwater discharges are of particular concern in urbanized areas of the Georgia Basin.

The intensive agricultural activity in the Fraser Valley contributes a variety of contaminants to local streams, ditches and groundwater. These include pesticides; fertilizers; excess nutrients (ammonia and nitrate) and fecal coliforms (and other biological contaminants) from manure; and veterinary drugs,

such as hormones and antibiotics, which are used to treat livestock.

In addition, atmospheric deposition contributes contaminants originating from both local and distant sources including POPs, PAHs, polybrominated diphenyl ethers (PBDEs), nutrients, metals and pesticides; aquaculture facilities release nutrients, chemical therapeutants, pesticides, and disinfectants; contaminated sites leach contaminants such as petroleum hydrocarbons, metals, PAHs, chlorophenols, PCBs, gasoline, toluene, and benzene into groundwater and nearby waterways; poorly maintained on-site sewage systems (septic systems) release nutrients and pathogens; boating activities and marinas can be sources of metals, PAHs, antifouling chemicals, solvents, grease, fuels, cleaning agents, and sewage; and accidental spills by both householders and commercial/industrial facilities can release a wide range of chemicals.

How does NPS pollution affect the environment?

NPS pollution can result in adverse effects on fish, shellfish and birds and their habitat; loss of commercial and recreational fish and shellfish resources; and/or degradation of the quality of drinking water and recreational waters. When NPS pollution enters waterways, concentrations of contaminants can build to levels which are toxic to fish or other aquatic life or can result in the degradation and ultimate loss of important habitat for these species. Mortality and health effects have also been observed in birds exposed to pesticides in agricultural areas.

Signs of contaminant-related stress, such as adverse effects on amphibian populations and benthic invertebrate communities, have been observed in both urban and agricultural areas within the Georgia Basin. In addition, agricultural and urban runoff, leaks from poorly maintained septic systems, CSO and stormwater discharges, boating activity, and seepage from on-site sewage systems have resulted in fecal and chemical contamination of shellfish populations in coastal areas. In addition, in the Lower Fraser Valley, an area of intensive agricultural activity, agricultural runoff has resulted in the contamination of groundwater and pesticides and nutrients have been detected in drinking water wells in some areas.

Although NPS pollution is acknowledged as the major source of contaminants to the Georgia Basin environment, information on loadings from these sources is lacking. While limited information is available on loadings of select contaminants from stormsewers, CSOs, and atmospheric deposition, additional information on loadings from these and other sources of NPS sources is needed.

Key References

(Information for this fact sheet was taken from the following publication)

Garrett, C.L. 2004. Priority substances of interest in the Georgia Basin: profiles and background information on current toxic issues. Technical Supporting Document of the Canadian Toxics Work Group of the Puget Sound/Georgia Basin International Task Force. GBAP Publication No. EC/GB/04/79. Environment Canada, Pacific and Yukon Region, Vancouver, BC.