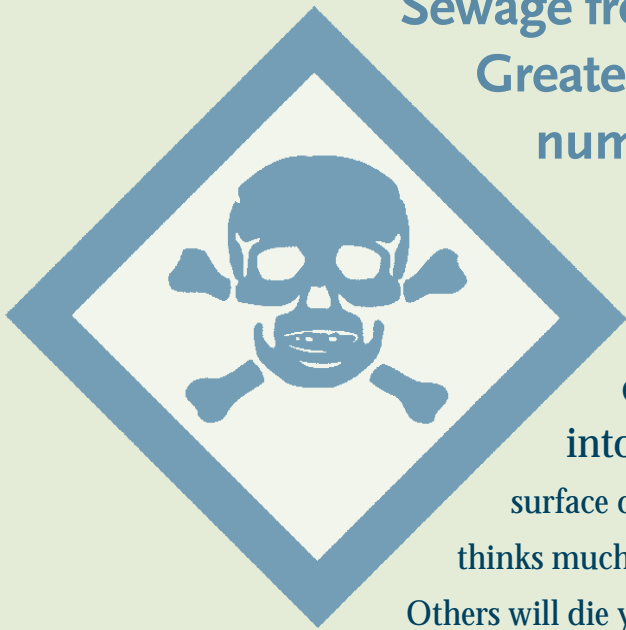




Hidden KILLER

Sewage from Greater Vancouver and
Greater Victoria is Georgia Strait's
number one pollution threat



Barely treated sewage laced with hundreds of
deadly toxins is dumped in vast quantities daily
into Georgia Strait. It spews from huge pipes deep under the
surface offshore from Victoria and Vancouver. It is unseen. No one
thinks much about it. But it kills. Some marine organisms die outright.
Others will die young. Juveniles are most at risk.

Why sewage is harmful

Sewage contains a host of toxic chemicals that can kill fish and threaten human health

Most people think that all sewage is fully treated at a sewage treatment plant and enters the ocean relatively clean. Some waste water engineers portray sewage as being largely human waste that is dispersed well in tidal currents with no effect on the environment. Think again.

WHAT'S IN SEWAGE

In fact, sewage contains hundreds of toxic chemicals dumped into the sewage system by households, businesses and industries. Some are harmful in very low concentrations. Some toxins combine with others in this deadly brew to create new compounds that are even more dangerous. Tests on Vancouver sewage show heavy metals like mercury, lead, chromium and copper. There are phenols, organochlorine compounds and hydrocarbons. There are also trace levels of persistent organic pollutants such as polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAHs), substances known to cause mutations and cancer.

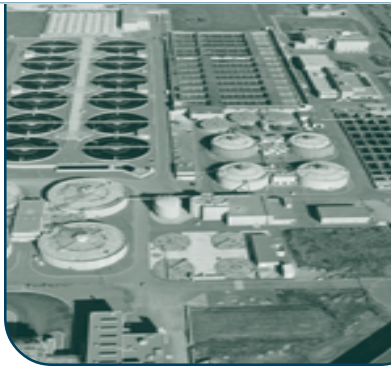
EFFECTS ON FISH AND OTHER MARINE LIFE

The organic waste in sewage is not benign. Dissolved oxygen in ocean water is used up by bacteria that feeds on decomposing organic material. This oxygen demand can literally suffocate fish and other sea creatures. Sewage also contains large amounts of suspended particles of matter that can prevent sunlight from reaching underwater plants that are the food source for so many species. Suspended solids can also cause abrasions on the gills of fish or delicate membranes of other organisms.

HUMAN HEALTH

Greater Vancouver is ringed by dozens of combined sewer outfalls (see following pages) that regularly discharge raw sewage when a heavy rainfall backs up the sewer system. City beaches get closed when bacteria counts soar. Tests in Burrard Inlet and False Creek show elevated toxin levels. Kayakers in False Creek have reported rashes on their hands after paddling near sewer outfalls.

Sewage contains hundreds of deadly chemicals that end up in Georgia Strait.



Some highly toxic industrial chemicals end up in the sewage system with little or no treatment.



FACT The amount of sewage dumped by the GVRD into Georgia Strait each year is 10,000 times the volume of the Exxon-Valdez oil spill.

MYTH Most people think sewage treatment plants remove all harmful substances. In fact, most toxins remain in effluent after primary treatment.

Long term ecosystem damage

Toxins disrupt immune systems, hormone function and reproduction in humans and marine life

Sewage is a hidden but deadly killer of marine life. Although Greater Vancouver sewage outfalls have often proven to be acutely toxic to fish, killing test subjects outright over a couple of days, this may not be the worst impact. Research is now showing that lower concentrations of the worst toxins can have disastrous effects over the long term.

SLOW DEATH FOR MARINE LIFE

Even small amounts of the most hazardous chemicals found in sewage can cause irreparable harm to fish, particularly juveniles. The result is not immediate and visible like the aftermath of an oil spill. There are no fish floating dead on the surface. It is a quiet, unseen death over time. Dead and dying fish are simply eaten by other marine organisms.

Death comes in a variety of ways. Some chemicals suppress the immune system allowing the onset of disease. Heavy metals, pesticides, persistent organochlorines, plastics, surfactants and aromatic hydrocarbons can disrupt the endocrine system interfering with sexual and bone development.

There is evidence that these chemicals can also disrupt the complex hormonal processes as juvenile salmon acclimatize to the saltwater ocean environment. This is bad news for the billions of juvenile salmon that spend months in the shallow waters around Vancouver. Many juvenile salmon simply will not make it.

The toxins found in sewage can also change fish behaviour, inhibiting normal swimming, schooling and migration in ways that significantly reduce their chances for survival.

BIOACCUMULATION

Some heavy metals and persistent chemicals that stay in the body biomagnify as they work their way up the food chain. Larger fish eating large numbers of contaminated smaller fish can end up with thousands or millions of times the level of toxins than the organisms that first absorbed them.

A poisonous brew of harmful chemicals make sewage a hidden but deadly killer of sea life.



Toxic chemicals under the kitchen sink and in the workshop often end up down the drain, then out to sea.

FACT Toxic chemicals can combine with other chemicals in sewage to create new toxins that are many times more deadly.

Pollutants from cars and trucks wash into storm drains that empty into local salmon streams.



Hundreds of stormdrain outfalls lead directly into sensitive salmon streams like this one in North Vancouver.

Stormdrains add to toxic load

Stormwater is laced with sediment, grease and toxins from cars, trucks and illegal dumping

Many people think that the stormdrains they see on most streets just carry off small amounts of harmless rain. In fact, discharges from stormwater outfalls are roughly the same volume as sewage outfalls and contain many of the same dangerous toxins found in sewage.

STORMDRAIN RUNOFF HARMFUL TO FISH

Although the concentrations of toxins are not as acute as those in the sewage system, the first hour of runoff after a heavy rain can contain seriously harmful levels of oil, grease, nitrogen, phosphorus, hydrocarbons, metals and suspended solids. A large proportion of these outfalls flow directly into freshwater stream systems, many of them salmon-bearing. Every year there are reports of thousands of salmon fry, often the hard work of voluntary salmon enhancement programs, killed by toxins poured down stormdrains by individuals or industry.

Oil, antifreeze and other compounds leak from cars and trucks, staining parking stalls in every parking lot. All this eventually runs into the stormdrain system. Car and truck exhausts emit PAHs and other toxins that settle on our roadways only to wash into the storm sewer during the next rain. These chemicals are linked to liver lesions and cancer in fish and are know to biomagnify through the food chain.

Leftover hazardous wastes are inadvertently or purposely dumped down stormdrains. Car washing detergents and pesticides in gardens and lawns often end up in the system. Stormwater is not treated and enters our waterways with all the toxins intact.

SEDIMENT CAN BE DEADLY

Sediment from washing cars, road work or from construction sites makes its way through the stormdrain system to the nearest salmon stream. Sediment can smother salmon eggs and damage the gills of juvenile salmon.



FACT There is about the same volume of stormwater effluent as sewage effluent and it contains many of the same toxins.

MYTH Many people think stormwater goes to the sewage treatment plant. In fact, most stormwater is untreated and often goes directly into salmon streams.

Combined sewage outfalls

Raw sewage is dumped from dozens of outfalls when the system backs up during a heavy rain.

Although most of our sewage goes to treatment plants, raw sewage frequently backs up into the stormwater system dumping 36 billion litres of untreated effluent from outfalls in Vancouver, Burnaby and New Westminster each year.

That's enough to fill B.C. Place stadium more than 28 times.

SEWAGE AND STORMWATER IN ONE PIPE

The reason is that older parts of the sewage and stormwater system use one pipe that carries both sewage and stormwater combined. On dry days, all of it goes to the sewage treatment plant.

But during heavy rainfalls, the stormwater – including runoff from streets, highways and parking lots – overloads the system, backing up and discharging from 42 combined sewer outfalls.

The outfalls are underwater, so the public never sees the raw sewage. But it is harmful to marine life all around the outfalls and regularly contributes to swimming closures at local beaches.

CLARK DRIVE OUTFALL WORST

The worst outfall empties into Burrard Inlet at the north end of Clark Drive. Because it is an industrial zone in the Port of Vancouver, most people are unaware of the huge volumes of raw sewage discharging regularly from this site, often on a continuous basis. A large area of the ocean floor is smothered by human feces, condoms, tampons and toilet paper. The plume from the outfall reaches as far as New Brighton Park.

There are also outfalls at Brockton Point in Stanley Park, Coal Harbour, English Bay, Kitsilano and five in False Creek. More than a dozen outfalls go directly into the Fraser River, where billions of juvenile salmon spend months acclimatizing to the saltwater environment.

The Greater Vancouver Regional District has set a fifty year timeline for eliminating these raw sewage discharges even though Fisheries and Oceans Canada considers them a violation of the Fisheries Act.

Disease-carrying raw sewage laced with toxins is regularly dumped into False Creek.



This sign at New Brighton Park warns that shellfish is contaminated: a nearby combined sewage outfall is to blame.

FACT The volume of raw sewage and stormwater discharged from Greater Vancouver combined sewage outfalls would fill B.C. Place 28 times each year.

Sewage and stormwater

BURRARD INLET

All sewage from North and West Vancouver, including sewage from the heavy industries lining the waterfront, end up at Lions' Gate Sewage Treatment Plant. It receives minimal (primary) treatment that leaves most toxic chemicals intact. The largest single raw sewage discharge is the combined stormwater and sewage outfall at the north end of Clark Drive in Vancouver.

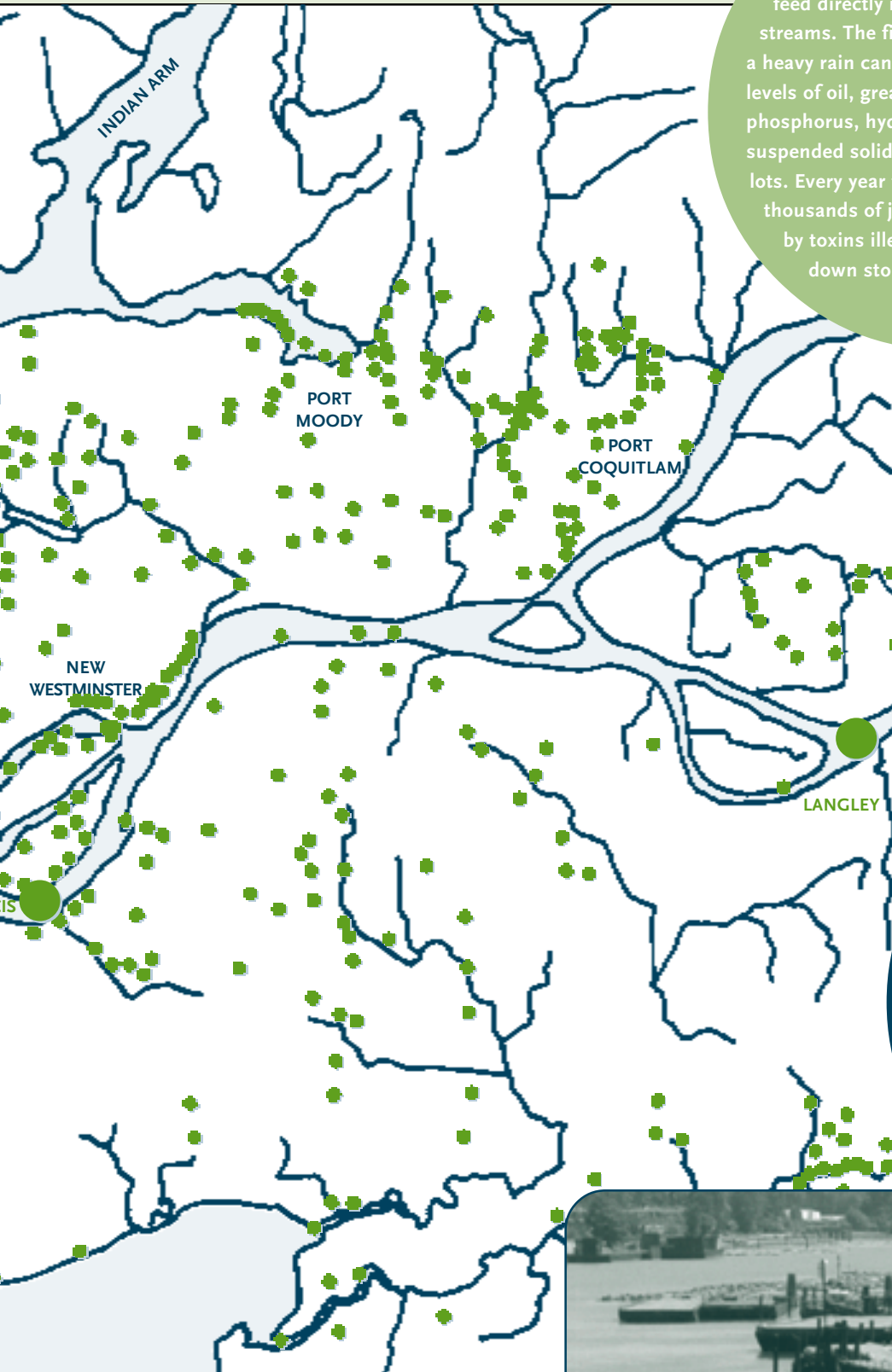


IONA OUTFALL

The largest single pollution source in Georgia Strait is at Iona on Sea Island. Sewage from Vancouver and Richmond receives minimal (primary) treatment that does not remove the toxic chemicals that enter the system from industry and households. It is the equivalent of several Exxon Valdez supertankers full of sewage being dumped every day into Georgia Strait.



Outfalls in Greater Vancouver



SALMON STREAMS

Hundreds of city stormdrains feed directly into small salmon streams. The first hour of runoff after a heavy rain can contain seriously harmful levels of oil, grease, nitrogen, phosphorus, hydrocarbons, metals and suspended solids from roads and parking lots. Every year there are reports of thousands of juvenile salmon killed by toxins illegally poured down stormdrains.



- Storm sewer outfall
- Sewage plant outfall

FRASER RIVER

The Fraser River is the home of the largest salmon runs in Canada. Three major sewage treatment plants empty directly into the Fraser. Dozens of combined sewage outfalls in South Vancouver and New Westminister dump raw sewage into the Fraser after every heavy rain. Juvenile salmon migrating out to sea are the most at risk from even low levels of toxins from these outfalls.



Vancouver plan inadequate

The Greater Vancouver sewage plan will continue to violate the Fisheries Act for decades

In the spring of 2001, the Greater Vancouver Regional District asked the provincial government to approve a sewage plan with no guarantees that the Iona and Lions Gate Sewage Treatment Plants will be upgraded to secondary treatment. The plan says the GVRD will consider the feasibility of upgrading but gives no firm commitment. Under the plan, combined sewage and stormwater pipes would be gradually separated to eliminate raw sewage overflows, but completion will take 50 years.

VIOLATION OF THE FISHERIES ACT

Both Fisheries and Oceans Canada and Environment Canada, the two federal bodies responsible for safeguarding the marine environment, have told the GVRD that their sewage treatment plan is inadequate. Fisheries and Oceans Habitat Director wrote a letter to the GVRD in February 2001 calling for a “defined upgrading schedule for Iona and Lions Gate” and a “firm timeframe whereby Combined Sewage Outfalls such as Clark drive would be eliminated.”

POOR GRADE IN CROSS-CANADA STUDY

A Sewage Report Card published by Sierra Legal Defence Fund gives Greater Vancouver a C minus grade for failing to clean up the single biggest source of pollution in Georgia Strait, the Iona Sewage Treatment Plant. The report points out that many major Canadian cities such as Edmonton, Winnipeg and Toronto have moved to full secondary sewage treatment. Calgary has 100 percent tertiary treatment with biological phosphorus and nitrogen removal.

All municipalities in the U.S. were forced by their federal government to upgrade to secondary treatment some years ago.

The United Fishermen and Allied Workers’ Union – CAW is seriously considering its own prosecution of the GVRD under the Fisheries Act based on repeated failed toxicity tests at the Iona and Lions Gate plants.

Secondary treatment of sewage at Iona and Lions Gate is not part of the GVRD plan.



Primary treatment at Iona Sewage Treatment Plant only settles out solid matter: most harmful substances remain.



PRIMARY TREATMENT

Primary treatment uses settling tanks or ponds. Suspended solids sink to the bottom and are removed as sludge. Floating solids, oil and grease are skimmed off the surface. The remaining wastewater is discharged. Such treatment can remove 25-40 percent of biological oxygen demand and 40-60 percent of suspended solids.



SECONDARY TREATMENT

Secondary treatment is an additional process that uses biological oxidation to assist micro-organisms to break down organic matter. Air-activated sludge and biological filtration are two common methods. Secondary treatment can reduce biological oxygen demand and suspended solids by 85-90 percent. Some toxins are removed with the solids.

Victoria plans no treatment

Victoria remains one of the last cities in Canada without even primary treatment of its sewage

More than 45 million litres of raw sewage are discharged annually by Greater Victoria's Capital Regional District. Effluent tests show that the sewage is toxic to fish. The outfalls are located on a major salmon migration route. An extensive area is closed to shellfish harvesting. The seabed near the outfalls shows increasing levels of heavy metals and toxic organic contaminants over the last two decades.

NEW SEWAGE REGULATION SIDESTEPED

Although the province brought in a new sewage regulation designed to move all sewage treatment to secondary level, Victoria seems determined to flaunt the intent of the new law and the federal *Fisheries Act*. There are no plans to move to even primary treatment. The District has set no land aside for the construction of a new sewage treatment facility. Nor does it appear to have any intention of doing so, even though it is required to do so under the terms of its waste management permit.

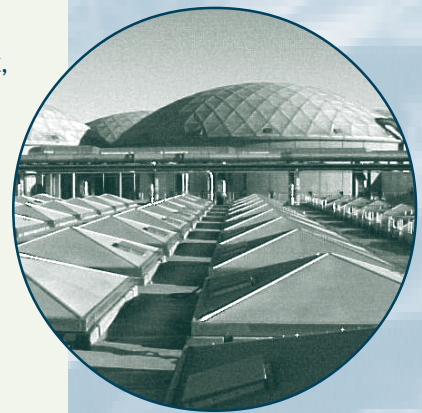
Victoria continues to argue that there is no need to move to secondary treatment, given that it discharges into a large body of water with strong currents and tidal action. But bacterial and heavy metal pollution extends from one to two kilometres away from the Macaulay Point outfall and there is a growing "dead zone" surrounding the end of the deepwater pipe.

SEWAGE UPGRADE DEMANDED

The regional Pollution Prevention office for the Ministry of Water, Land and Air Protection has refused to approve the District's Liquid Waste Management Plan because it comes nowhere near required standards. Despite the objections of the ministry's own staff, the Minister has the power to allow the plan.

Environmental groups are urging the province to reject the plan and send it back to the Capital Regional District demanding that a scheduled timeline be in place for a move to full secondary treatment.

Greater Victoria's
sewage is discharged
raw from underwater
outfall pipes.

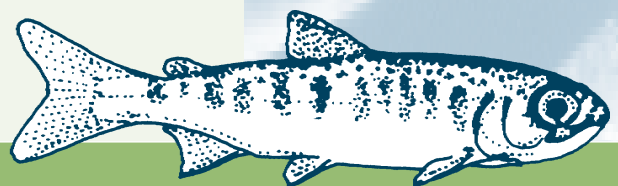


Annacis Sewage Treatment Plant has now been upgraded to secondary treatment.



TERTIARY TREATMENT

Tertiary treatment processes wastewater after secondary treatment, targeting specific harmful substances for removal through a variety of biological and chemical processes. Nitrogen, ammonia, phosphorus and some metals can be reduced using micro-strainers, sand filters, chemical precipitation or reverse osmosis.



ALTERNATIVE TECHNOLOGIES

A variety of new alternative sewage treatment technologies have emerged that can remove almost all harmful substances and toxic chemicals. Artificial wetlands and greenhouse solar aquatics use micro-organisms, plants and insects to break down and absorb harmful chemicals and purify the water mimicking natural biological processes.

What needs to be done

Secondary treatment is needed while reducing harmful substances entering the system

There are concrete actions that governments, industry and individuals can take to protect our marine environment from a long-term toxic disaster.

MANDATORY SECONDARY TREATMENT

The province has taken a good first step towards mandatory secondary sewage treatment through the new Municipal Sewage Regulation. Unfortunately, Greater Victoria and Greater Vancouver could be effectively exempted from this regulation by getting special ministerial approval for sewage plans that fall far short of federal environmental protection laws.

The federal *Fisheries Act* is clear: no harmful substances should be discharged into fish-bearing waters. All new municipal sewage plans and all upgrades to municipal sewage treatment plants must comply with federal law by setting secondary sewage treatment as the minimum standard. Greater Vancouver and Greater Victoria should upgrade their sewage plans to target secondary treatment of all sewage within ten years.

TOUGH SOURCE CONTROL

Stopping toxins from entering our sewer and stormwater systems is the most effective way to clean up the sewage problem. Source control programs exist but should be stepped up. Industries should be working towards zero discharge of the worst toxins into our sewer system with tough enforcement and penalties. Industries and households should be working to replace harmful chemicals with more environmentally friendly alternatives. An outright ban on some chemicals – pesticides for example – should be considered.

REDUCING HOUSEHOLD TOXINS

Individuals can take action in their own homes by reducing or eliminating the use of cleaners, solvents, pesticides and other products that may end up down the drain or down the toilet. Hazardous wastes should go to the local hazardous waste station. Stormdrains on the street or in driveways should never be used for dumping any harmful substance.

Fishermen's Union Environment Director Mae Burrows and Georgia Strait Alliance Executive Director Laurie MacBride speak at a 1993 news conference at the Clark Drive outfall after both organizations sued the GVRD for pollution violations under the *Fisheries Act*. A second lawsuit by the union for pollution violations at Annacis coupled with additional provincial funding led to the upgrading of the Annacis plant (above) to secondary treatment.



Secondary sewage treatment should be the minimum standard.



Get up to speed, get involved

Here are some places to get more information on sewage, toxins and local action

SIERRA LEGAL DEFENCE FUND

The National Sewage Report Card can be found on the Sierra Legal website at: www.sierralegal.org/toxins.html

In it you will find detailed information on the various toxins found in sewage, an overview of the problem of endocrine disrupting chemicals, descriptions of the various levels of sewage treatment and some sewage success stories documenting efforts by a number of municipalities to drastically reduce their sewage pollution impacts. There is also a full report on the status of sewage and stormwater treatment in major cities across Canada.

GEORGIA STRAIT ALLIANCE

An excellent ToxicSmart Resource Guide can be found on the Georgia Strait Alliance website at: www.georgiastrait.org/toxicguide.htm

Click on the ToxicSmart Program, then follow the links to the Resource Guide. Scroll down to the table of contents where you can click on specific information on reducing toxins in the garden, in the hobby room and workshop. There are good tips on alternative household cleaning products. And there is a section on proper disposal of hazardous wastes.

B.C. ENVIRONMENTAL NETWORK (BCEN)

The BCEN is a network of over 250 environmental organizations throughout B.C. The BCEN helps people and citizen-based organizations to exchange information and network with each other on a wide variety of environmental issues. The network publishes a directory of environmental organizations, indexed by issues of concern. The network staff can often suggest local groups active on pollution issues where you could get more information or get involved. Contact the BCEN at: 604-879-2279.



Local groups pressing for tough pollution standards have made a difference.

A volunteer with Friends of False Creek takes water quality samples from her kayak: the group wants False Creek outfalls cleaned up.

This publication was produced by the T. Buck Suzuki Environmental Foundation. The Foundation works to protect and improve fish life and fish habitat in B.C. by encouraging policy, laws and public behaviour that ensure that fish-bearing marshes, streams, rivers, lakes and marine waters are not polluted, dammed, diverted, wasted or degraded. Contact us at: 160 – 111 Victoria Drive, Vancouver, B.C. V5L 4C4 Ph: 604-255-8819 Fax: 604-255-3162 bucksuzuki@ufawu.org

This booklet was written by T. Buck Suzuki Executive Director David Lane, designed by Kris Klaasen and Elaine Littmann of Working Design with desktop production by Nadene Rehnby. Thanks to Sean Griffin, John Werring, the Georgia Strait Alliance, the Sierra Legal Defence Fund and the Labour Environmental Alliance for background information and photos. Printed in a union shop on recycled, non-chlorine bleached paper. The photos of salmon fry on the front cover and subsequent pages are courtesy of Fisheries and Oceans Canada; photos of the Annacis plant on page 9 and 10 are courtesy of the GVRD. Funding support was provided by the Vancouver Foundation, the Commercial Fisheries Conservation Stamp, B.C. Gaming and the T. Buck Suzuki Environmental Foundation.



VANCOUVER
FOUNDATION

What you can do

You can be part of the solution, helping to ensure that Georgia Strait has a clean and healthy future

Here are some things you can do to stop stormwater and sewage from harming salmon, the Fraser River and the Georgia Strait ecosystem.

KEEP TOXINS OUT OF STORMDRAINS

- don't wash your car on the street
- avoid using pesticides on your lawn and garden that could wash off into the stormdrain system
- don't dump used motor oil into the stormdrain

KEEP TOXINS OUT OF THE SEWAGE SYSTEM

- stop using hazardous cleaning products (see GSA website listed on the previous page)
- don't throw solvents, paint, leftover pesticides and other toxic chemicals in the workshop down the drain – use them up or dispose of them properly at your local hazardous waste station
- don't use a garborator, it overloads the sewage system with organic matter and depletes oxygen in the receiving water – compost your kitchen waste instead

KEEP THE ISSUE ON THE AGENDA

- call your local municipal councillor to say that clean streams and ocean are important and that you are willing to pay a bit more in taxes to make sure salmon, whales and other marine creatures will still be here for the next generation to enjoy
- write the Minister of Water, Land and Air Protection to make it clear that better sewage treatment is needed for Greater Vancouver and Greater Victoria (contact information for Ministers, provincial MLAs and ministry offices is available by calling B.C. Inquiry at 604-660-2421 in the Lower Mainland or 1-800-663-7867 toll free).



Toxic household cleaning products can easily be replaced by products that cause little harm to the environment.

