# Byrne Creek Watershed 2006 Status Report Burnaby, B.C.



Prepared by Byrne Creek Streamkeepers www.byrnecreek.org March 2, 2007

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Indicator	Rating 2004-05	Rating 2006	Comments
Spawners	<ul> <li>Chum</li> <li>Coho</li> <li>Spawning Channel</li> </ul>	<ul> <li>Chum</li> <li>Coho</li> <li>Spawning Channel</li> </ul>	Both chum and coho numbers were down; however, more salmon used the artificial spawning channel. There was also a marked lack of male coho in pro- portion to female spawners.
Juvenile and Resident Fish	0	8	All fish killed by toxin introduced through storm drain in February 2006.
Water Quality: Sedimentation, Erosion, Pollution		8	Still occasional problems with sediment flow from construction sites; ongoing road wash; oil trickle.
Water Quality: Bug Surveys		8	February 2006 toxic kill affected bug quantities in upper creek
Water Quantity: Creek Discharge	8	8	Huge flows from watershed due to decreasing pervious surfaces caused considerable erosion in autumn 2006.
Water Quality: pH	N/A	<b>(</b>	Streamkeepers are beginning to monitor pH levels more consistently.
Habitat – Invasive Plant Species	8	8	Invasive plant species continue to spread.

# Summary of Byrne Creek Watershed Health Indicators

## **Suggested Solutions:**

**Spawners / Juvenile and Resident Fish:** An automated flap gate at the Byrne Creek/Fraser confluence may allow for increased opening of the gate without increasing risk of flooding. Improve quality of spawning habitat. Signs remind owners to keep dogs out of the creek.

**Water Quality:** Public awareness of storm drains, car washing, cars leaking oil and antifreeze, and pesticide use. Continued efforts to reduce or eliminate use of the insecticide Merit as it is toxic to aquatic invertebrates (bugs) that fish feed on. Enforcement of bylaws.

**Water Quantity – Creek Discharge:** Involve streamkeepers in the city's Integrated Stormwater Management Plan. Include water retention and infiltration in all new developments, and require a certain proportion of pervious surfaces. Construct SEA (street edge alternative) streets. Retain as much natural habitat and treed space as possible.

**Invasive Plant Species:** Streamkeepers would like to coordinate a program of invasive species removal and replanting with native plants and trees with the support of the City of Burnaby. A dumpster could be placed in the spawning habitat for collection of invasive species. Continued education is necessary about dumping garden trimmings and non-native plants, particularly for homeowners and landscaping companies working near ravine parks.

## Introduction



Byrne Creek Streamkeepers is a community volunteer group dedicated to the restoration and protection of the Byrne Creek watershed. Streamkeepers undertake community projects and public education, and help monitor the creek's rejuvenated populations of coho salmon, chum salmon and cutthroat trout.

Byrne Creek Streamkeepers present this report to summarize the state of the watershed and to show that it is possible to have salmon-bearing streams in urban areas, that education and perseverance do pay off, and that with hard

work we can preserve our amazing natural resources for future generations. Streamkeepers want to share their successes and their concerns, and continue to strive toward solutions to watershed problems.

Volunteers meet once a month to plan activities and events. The group works closely with the City of Burnaby's engineering, planning and parks departments, and Fisheries and Oceans Canada (DFO).

By the 1980s, flood control measures, habitat destruction and poor water quality had destroyed Byrne Creek as a fish-bearing watercourse. Streamkeeping activities began under the Vancouver Angling and Game Association (VAGA) in 1987. Members organized cleanups, fish releases and trail construction in the Byrne Creek ravine.

A catastrophic toxic spill into a storm drain in 1998 that killed 5,000 fish galvanized a new generation of streamkeepers who joined with the VAGA members to form the Byrne Creek Streamkeepers on April 1, 1999. Now in its ninth year, the group continues to grow and increase its monitoring and education activities.

#### A Short History of the Byrne Creek Watershed:

- 1960s: Wild salmon and trout disappear due to habitat destruction and water pollution
- 1980s: City of Burnaby constructed a new channel across the Fraser floodplain and a flood gate, improving lowland fish habitat and fish access to the river
- 1987: Vancouver Angling and Game conducted an assessment with DFO
- 1989: Coho salmon stocking initiated
- 1997: Chum salmon stocking initiated
- 1998: Toxic spill into storm drain kills 5,000 fish
- 1999: Byrne Creek Streamkeepers founded
- 1999: City of Burnaby builds salmon spawning and rearing habitat as compensation for road construction.
- 2000: First Stream of Dreams Mural unveiled on Rivers Day
- 2002: Lowland reach re-excavated to reduce the risk of flooding
- 2004: A post-rehabilitation record 91 spawners return to Byrne Creek (24 coho, 67 chum)
- 2006: All fish (app. 700+) in upper creek killed by toxin introduced into storm drain.
- 2006: Original Stream of Dreams Mural at Kingsway and Edmonds removed. The SDMS program has reached nearly 45,000 participants in three provinces.

## **Getting Located**



The Byrne Creek watershed is located in the steep south slope area of Burnaby. The watershed has an area of 825 hectares and is highly urbanized with a combination of industrial, retail and residential land uses. It can be thought of in three distinct parts: the Fraser lowland, which includes the constructed spawning habitat, the ravine park section, and the "Creek Under the Streets" section in which the water flows predominantly in buried pipes.

Streamkeepers reference data collection to a set of numbered location tags. These tag numbers are used along with descriptive names throughout this report to identify locations of survey points or features of interest.

A tag location map is included in Appendix A.



Streamkeepers and city staff salvage fish before the sediment pond is cleaned out in summer 2006



Canada Day: RCMP mascot patrols streamkeeper booth



Volunteers remove original Stream of Dreams

#### 2006: The Year in Review

2006 was a difficult year for Byrne Creek. In February, there was another major fish kill due to the introduction of a poisonous substance through the storm-drain system. All fish above Marine Way are thought to have been killed. (See Appendix D for full report). The good news was that the toxin did not penetrate into the gravel substrate so that salmon eggs remained alive and began to hatch shortly after the spill. Our aquatic bug surveys also demonstrated that the toxin moved through the system quickly, especially in the lower reaches of the ravine and further downstream. A BC Environment Ministry Fish Biologist conducted a study of the dead fish.

We were pleased that the media took a big interest in the spill and helped get the word out on how storm drains connect to local creeks.

Fish stocks, especially cutthroat trout, recovered reasonably well by summer. About 850 fish were salvaged, including 13 coho, and moved from the sediment pond prior to the City digging out the sediment in late August. Summer of 2006 saw a long, hot, rain-free period. Byrne Creek survived the drought and did not dry up.

Spawning season began with good returns and spawning success for chum salmon. Several were visible to the many people who regularly walk the ravine trail in Byrne Creek Ravine Park. It's always fun to see who will spot the first fish of the year! Unfortunately, the huge rainstorms in late November and the resulting high water levels in the creek due to the ever-increasing loss of permeable areas in the watershed washed out at least one of the spawning areas, and changed the course of the creek in many areas, bringing down trees and shifting large woody debris that had been stable for many years.

This was followed by repeated heavy rainstorms, snow storms and high winds. Many trees in the riparian area and in upland urban areas were lost. This will affect shade and food conditions next summer and in years to come, but will contribute to large woody debris and habitat improvement in the creek in the long run.



Invasive plant removal and tree planting crew



Collecting dead fish after February kill

## **Fish: Spawner Returns**



Byrne Creek Streamkeepers have been counting salmon that return to spawn in the creek for eight years. Prior to 1999, the Vancouver Angling and Game Association's Byrne Creek group monitored spawners from 1992. The spawning season runs from mid-October to the end of December, with chum salmon returning first and coho generally not appearing until closer to mid-November.

Streamkeepers look for fish between Marine Way (Tag 505) and the

Processing a female coho in the snow

bottom of the stairway into the ravine (Tag 521) daily, conditions permitting. Volunteers count dead fish, measure their lengths, determine species, gender and whether they have successfully spawned. The bodies are cut in half to avoid double counting and are returned to the creek to provide nutrients for other plants and animals. We also note locations and numbers of any live spawners observed.

The graphs and charts below show spawner survey results for the last eight years. The highest return was in 2004, with 91 spawners returning to Byrne Creek, including 24 coho. Since then the numbers have been in decline, as has spawning success, particularly for coho.

**Concerns**: Silt buildup in the artificial spawning channel discourages fish use; dogs or people walking in the creek can damage eggs during the spawning season and while eggs are in the gravel; high water levels at every rain due to high percentage of impervious surfaces in the upper parts of the watershed wash out fish nests (redds).

**Solutions:** Opening the gate in the sediment pond during 2006 (thank you Burnaby Environmental Services) has flushed away some accumulated sediment. Whimsical dog signs remind owners to keep dogs out. Build rain gardens for parking lots and streets that drain to infiltration swales in as much of the watershed as possible. Plant trees throughout the watershed

#### Rating for 2006:

Chum 🕑 Coho 🟵 Spawning channel 💬



#### Spawner Returns Cont'd.

Our coho and chum counts were disappointing in 2006, but some of the low numbers may be due to the extreme weather conditions on many days in November/December, which both prohibited streamkeepers from making observations and probably washed many carcasses downstream or buried them before they were observed. It appears that the low coho number is an issue that is not restricted to Byrne Creek, but may reflect larger issues related to spawner returns, such as high ocean and river temperatures and/or changes in food availability.

Starting in 2003, salmon began returning much earlier than in previous years. This is primarily due to the introduction of chum salmon, which was started in 1997. Typically, the chum salmon return to the creek in early and mid November, while coho return in late November and early December. It is estimated that in 2004, 86% of females successfully spawned compared to only 26% in 2002.

As can be seen in the graph to the right, spawning percentages have been much lower for coho than for chum in the last two years. Unfortunately, few male coho have returned to Byrne Creek in the last few years, and streamkeepers have often found coho females that have died before releasing their eggs.







Male coho spawner, autumn 2006

8

#### Fish: Juvenile and Resident Fish Counts



Coho fry that hatched in Byrne Creek

**Concerns:** A reduction in resident salmonid populations due to poor water quality, restricted fish access to river, increased sedimentation.

**Solutions:** Public awareness, environmentally friendly flap gate at Fraser River, increased water retention.

2006 Rating: 🛞

Juvenile fish trapping provides an indication of the number of young fish residing in the creek. Traps baited with salmon roe are placed at 10 locations along the ravine portion of the creek and retrieved a day later. The trap location and number, and length and species of trapped fish, are recorded before releasing the fish.





Trapping results are summarized in the two charts at the left. Of the 232 salmonids trapped in the ravine since 2003, 90% were cutthroat and 10% were coho. Results since winter 2005 have been disappointing, particularly the 2006 winter survey taken after the Feb. 26 kill when no fish were trapped.

The second chart shows how the juvenile fish population varies by location along the creek. There are large variations in the data due to the sporadic nature of juvenile trapping, but the fish population seems to increase as one moves down the ravine.

## Water Quality: Sedimentation, Erosion, Pollution

Byrne Creek suffered a massive fish kill in February 2006 when a toxin entered the storm-drain system. See Appendix D for a detailed report.

Streamkeepers have attempted to document changes in stream habitat over time by taking photographs at tag locations (see Appendix A for map of tags). In 2005, volunteers completed a baseline Stream Habitat Survey using methodology from *The Streamkeepers Handbook*. Ideally, such surveys should be conducted regularly; however, this is time-consuming work and would strain volunteer resources.

Creek geomorphology changed significantly in autumn and early winter 2006, particularly between the wooden bridge (Tag 516) and the bottom of the ravine stairs (Tag 521). Erosion and sedimentation concerns streamkeepers because it damages spawning areas and potentially smothers salmon eggs. **Concerns:** Pollution, erosion and sedimentation from storm drain runoff.

**Solutions:** An ISMP that includes green roofs, SEA (street edge alternative) streets, and creek daylighting (Ernie Winch Park?) to reduce runoff. Increase public awareness of water quality issues. Streamkeepers are encouraging the use of "rain drain" in place of "storm drain" so the public becomes more aware that all runoff enters local waterways.

Rating for 2006: 😕

Channel enlargement and down-cutting are due primarily to increases in stormwater runoff. Urbanization typically results in decreased canopy interception through the removal of vegetation cover, increased impervious surface areas occupied by buildings and pavement, reduced runoff storage capacity through grading surfaces and draining ponds and wetlands, and increased drainage density through the storm-drain system.

Streamkeepers are encouraged that the City of Burnaby will develop an integrated stormwater management plan (ISMP) for Byrne Creek starting in early 2007. The plan will address the following:

- Identify areas prone to flooding, erosion and sedimentation, and measures needed to reduce the risk of damage;
- Explore all stormwater source control management options, including online and offline detention systems;
- Review land use plans to improve stormwater management and protect the environment;
- Provide enhancement opportunities for aquatic and wildlife habitats; and,
- Reduce pollutant loadings, including inappropriate discharges, and improve water quality.



Autumn 2006 bank erosion and streambed changes

## Water Quality: Invertebrate Surveys



Aquatic bugs (invertebrates) provide us with a reasonably accurate indicator of water quality. Some species, such as mayflies, are pollution intolerant and will be absent in the stream if water quality is poor. Other species, such as aquatic worms, are more tolerant to poor water quality.

For the past six years, streamkeepers have completed regular invertebrate surveys twice a year following the standard methodology outlined in *The Streamkeepers Handbook*. Survey location

**Concerns:** Poor water quality due to toxic substances entering the creek from storm drains.

**Solutions:** Public awareness of storm drains, car washing, cars leaking oil and antifreeze, and pesticides. Bylaws prohibiting use of pesticides and other toxic materials.

Rating for 2006: 😕

points extend along the entire ravine and habitat sections of the creek (from Tag 544 to Tag 507). Spatial variations are shown in the chart below. The line indicates the average water quality rating, while the points (squares and triangles) indicate values for the 2006 winter and summer season. It is significant to notice that the winter 2006 survey readings taken before the Feb. 26 2006 spill are higher than average,





while readings taken after the spill are generally below average. It is encouraging to notice that water quality improved significantly between winter and summer 2006, particularly in the upper section of the ravine (Tag 544 to Tag 530).

Chronological and seasonal variations in water quality have also been analyzed. The figure below shows the average winter and summer readings for the past six years. Again, the winter 2006 value was likely influenced by the toxin that entered the creek in late February 2006, killing hundreds of fish.

## Water Quality: pH

The value for pH in stream water is determined by measuring its hydrogen ion concentration. Solutions with low pH or acids correspond to high hydrogen ion concentration, while solutions with high pH or bases correspond to low hydrogen ion concentration. The pH chart below shows that each decrease by one pH unit corresponds to a tenfold increase in the concentration of hydrogen ions.

The concentration of hydrogen ions in a solution is crucial for living things. Neutral water has a pH of 7. Creek water with pH greater than 8 or less than 6 can harm, or at greater extremes, kill, salmon and trout.

Our knowledge of pH in Byrne Creek has increased significantly over the past year due to the efforts of one of our volunteers. We used to use pH strips with a wide range of values (1 - 12). Since this method covers a wide range, it does not

**Concerns:** pH levels in the creek may at times be outside the safe range (6 - 8). It is uncertain whether this is from toxic material entering the creek, or from natural sources.

**Solutions:** Increase frequency of testing so that chronologic and spatial trends and relationships become more clear.

Rating for 2006: 😐

Concentration Hydrogen ions compared to di	of stilled water	Examples of solutions at this pH	Ion pH strips within a much narrower range (6 -9)
10,000,000		Battery acid, Strong Hydrofluoric Acid	The Byrne Creek Streamkeepers recently pur- chased three chemical (titration) pH test kits that
1,000,000	pH = 1	Hydrochloric acid secreted by stomach lining	provide an even more accurate measurement within the pH range 5.5 - 8.5. These kits have bee
100,000	рН = 2	Lemon Juice, Gestric Acid Vineger	compared to a neutral buffer solution, an electroni pH meter, and laboratory sample results.
10,000	$\beta H = \overline{2}$	Grapefruit, Orange Juice, Soda	Test results are still preliminary, but there is con-
1,000		Acid rain Tomato Juice	cern that pH readings outside the safe range may be occurring in the creek. Results also indicate that
100	pH = 5	Soft drinking weter Black Coffee	there may be considerable variation in pH as wate flows down the creek.
10	pH = 6	Urine Saliva	More testing is required to confirm preliminary
1	pH = 7	"Pure" water	will be performed along with juvenile trapping surveys. This will provide 10 samples of pH from the
1/10		Sea water	wooden bridge (Tag 516) to Griffith Pond (Tag 539) twice a year
1/100		Beking sode	
1/1.000	pH = 10	Great Salt Lake Milk of Magnesia	
1/10,000	pH = 11	Ammonia solution	
1/100,000	рН = 12	Soapy water	
1/1,000,000		Bleaches Oven cleaner	A Lo-Ion paper-strip pH bit to the left
1/10,000,000	pH = 14	Liquid drain cleaner	(orange) and a more accurate Hatch pH kit (blue) to the right 12

## Water Quantity: Creek Discharge

The figure below shows creek discharges recorded intermittently from July 2002 – December 2006. Streamkeepers have never been satisfied with this data because it only provides a sparse and sporadic history of creek discharge, which can easily be misinterpreted. The readings are recorded manually, so most peak rainfall events are lost unless our volunteers are available and vigilant enough to brave the elements on miserable days to take measurements. However, this situation is likely to change soon due to an initiative by the City of Burnaby.

As part of the Byrne Creek Integrated Storm Water Management Plan, the City is expected to install an automated data logger to collect discharge measurements in the sediment pond in the spawning habitat in January 2007. It is hoped that streamkeepers will be able to periodically access the data from this instrument to get a continuous his**Concerns:** Single-family housing is being replaced by higher-density development with less pervious surfaces. Continued reduction of urban forest areas in the upper watershed.

**Solutions:** Include water retention in future developments, require a certain proportion of pervious surfaces, and encourage development of SEA (street edge alternative) streets and rain gardens. Promote use of rain collector barrels and development of roofing systems that support vegetation (green roofs).

Rating for 2006: 🛞

tory of the creek discharge. This will allow us to identify all peak discharge events and compare them to other related processes such as ravine down-cutting, slides and sedimentation, and possible flooding in the lowlands. Eventually, it may be possible to relate the discharge to corresponding rainfall events, to determine whether the creek runoff from a given rainfall event is increasing or decreasing.

Byrne Creek discharge can be characterized as "flashy" because it exhibits a significant increase in flows immediately following the onset of rain and a rapid return to pre-rain conditions shortly after precipitation stops. This behavior will likely continue for the foreseeable future as more urban development takes place, and as the watershed's impervious surface area increases and water retention decreases.



## Habitat: Invasive Plant Species

Five species of invasive plants are a serious problem in sections of the Byrne Creek watershed: Japanese Knotweed, Himalayan Blackberry, English Ivy, Policeman's Helmet, and Scotch Broom. Other invasive plants present include Morning Glory and Lamiastrum. The chart below indicates the severity of the problem at seven specific locations in the ravine and lowland areas.

#### **Example Species: English Ivy**

It spreads quickly in native forests and urban ravines, and poses a problem by:

- smothering native forest plants by denying them light
- climbing into the tree canopy, shading out deciduous foliage
- wrapping itself around trees and preventing proper interaction with air and micro-organisms, often killing mature trees in less than 10 years
- adding substantial weight to trees, making them more unstable and contributing to slope slippage and erosion

Ivy is a widespread problem. For example, the Stanley Park Ecology Society estimates that up to 30% of that park is now affected by English Ivy.

Considerable time was spent during the spring and summer of 2006 to control the spread of English Ivy near the Homestead (Tag 536), and Policeman's Helmet in the reach between the Byrne Road bridge (Tag 507) and Marine Way (Tag 505), but additional actions are required to control the spread of these species.



Policeman's Helmet



**Concerns:** Invasive species are choking the creek and overpowering indigenous plants in the watershed. Tree removal invites greater spread of invasive plant species.

**Solutions:** An integrated invasive plant species control program needs to be established that would take advantage of volunteers to combat this growing problem, in combination with replanting with native species of plants, shrubs and trees. A dumpster placed in the habitat would aid in the collection and proper disposal of invasive species. Increased public education and enforcement are required to stop dumping of organic matter in ravines and parks.

Rating for 2006: 😕

## Rain Drain (aka Storm Drain) Marking



Rain drains (storm drains) along streets and in parking lots collect rain water. These drains discharge untreated water directly into Byrne Creek. Road runoff contains sediment, animal waste, oil, and particles from car exhaust and brake linings. Uninformed area residents may dump oil, swimming pool/ hot tub water, and toxic household or

industrial compounds on streets or into drains. All these substances can seriously harm fish, other wildlife, and the stream ecosystem.

Drain marking is an excellent way to raise community awareness about stream health. It can involve children, leaves a semi-permanent reminder on the street, and educational pamphlets are distributed to homes close to streams. **Concerns:** Uninformed people sometimes dump toxic materials down drains.

**Solutions:** Drain marking is an integral part of our continuing public awareness program to educate people about appropriate watershed management practices. Streamkeepers are encouraging the use of "rain drain" in place of "storm drain" so the public becomes more aware that all runoff enters local waterways.

Rating for 2006: 😇

In 2006, with help from local Cub Scouts and Girl Guides, the Byrne Creek Streamkeepers marked rain drains and delivered pamphlets to each household in the area shaded by dark green in the map below. The area covered in 2006 is around 10 % of the entire watershed.



#### **Community Involvement**



Explorers assist with Edmonds Clean Sweep

One of the primary goals of streamkeepers is to educate the public about their local watersheds; how to protect them and how to be environmentally conscious.

The Byrne Creek Streamkeepers organize or participate in a wide variety of events throughout the year where we perform community service or set up our information booth and talk to the public about local environmental issues. With our booth, we try to educate in a non-intimidating manner, and teach people of all ages about the Byrne Creek watershed.

On April 8, as part of the Edmonds Clean Sweep, we organized a cleanup of the area around Edmonds Skytrain station which attracted 42 people. We were present at the Burnaby Rhododendron Festival on May 7 as one of the only environmental booths in attendance. Then on May 13, we



Volunteers remove Kingsway/Edmonds mural

participated in the Stoney Creek Great Salmon Send-Off where the public are invited to release fish into the creek.

On June 27, Byrne Creek Streamkeepers organized a special event to take down the original Stream of Dreams fish mural from the corner of Edmonds and Kingsway that is the future site for the new Public Library. The event attracted 47 people and included a barbeque provided by Burnaby Firefighters. The Stream of Dreams education and art program that began in southeast Burnaby has now reached nearly 45,000 participants in three provinces.

As in previous years, a number of streamkeepers manned our booth at the Canada Day celebrations at Richmond Park. Then, on Labour Day, we participated in the Taste of Edmonds event organized by the Southside Community Church.



Streamkeeper booth at Alta Vista Park

Sept. 16 was busy: we had our booth at the annual Alta Vista Community Picnic on the corner of Royal Oak and McKee and later we set up our fish and other aquatic animal lanterns at the Night of 2006 Lights lantern festival at the Shadbolt Centre.

On Rivers Day on Sept. 24, streamkeepers set up our booth at Still Creek. The event provided an opportunity for the public to explore Still Creek by foot, bicycle or boat. That same weekend we participated in the Great Canadian Shoreline Clean-up around Edmonds Skytrain station.

#### **Connection with Youth and Schools**



Schoolkids listen to salmon story before releasing fry

Teaching youth and encouraging their involvement in streamkeeper events is an ongoing activity. Educating youth about environmental issues will make them more likely to lead environmentally conscious lives in the future.

After the highly publicized fish kill from a toxin dumped into a rain drain (storm drain) in late February, Byrne Creek Streamkeepers renewed our connections with various youth groups who wanted to help. We worked with Girl Guide and Scout groups to mark the drains in our watershed to show that they connect directly to local streams. As in previous years, a number of elementary school classes helped us with annual releases of chum fry and coho smolts into Byrne Creek.

Due primarily to the efforts by an active youth member, Eleanor King, we have formed a special connection with Burnaby South Secondary, particularly its Green Team environmental club. Streamkeepers have made annual presentations to the club for several years and expect to continue the tradition in 2007. We also hope to involve high school students in some of our continuous instream activities such as invasive plant removal and aquatic invertebrate surveys.

Burnaby South's Green Team has worked on a number of projects throughout the past year. At their annual school carnival in May, they presented a petition to Peter Julian, Burnaby-Douglas MP, to ban toxic PBDEs. He brought this petition to the House of Commons later that year. In November, the Green Team conducted a survey on the amount and types of garbage that their school produces. Discovering that 20% of the collected garbage could be recycled, they are planning a month-long campaign to educate students and staff about proper recycling. They are continuing a battery recycling program started the previous year, and are cleaning up the gardens around the school.

## Community Fish Releases by Elementary Schools

Byrne Creek Streamkeepers have been releasing salmon fry and smolts into Byrne Creek since 1990.The Department of Fisheries (DFO) brings the baby salmon from the Bell-Irving Hatchery at Kanaka Creek. The release dates are set by DFO and are the last week of April for 20,000 to 25,000 chum fry and the first week of May for 3,000 to 4,000 coho smolts (yearlings).

As part of our community education programs, we involve elementary schools in the Byrne Creek watershed in the releases:

- 1991: Stride Ave. Community School
- 1992: Suncrest
- 1993: Nelson
- 1994: South Slope
- 1995: Clinton
- 1996: Stride Ave. Community
- 1997: Stride Ave. Community and Glenwood
- 1998: South Slope and Nelson
- 1999: Clinton and Suncrest
- 2000: Clinton and Glenwood
- 2001: South Slope and Nelson
- 2002: Clinton and Glenwood
- 2003: Kenneth Gordon and Clinton
- 2004: Nelson and Stride Ave. Community
- 2005: Suncrest and Glenwood
- 2006: Clinton and Taylor Park

DFO Community Advisor Maurice Coulter-Boisvert makes an educational presentation at each release. The children all receive a color fish identification poster and a fish ID keychain. Over 500 grade 3 to grade 7 students have been involved since 2000.





**Appendix A: Byrne Creek Tag Locations** 



**Appendix B: Byrne Creek Ravine & Meeting Locations** 



**Appendix C: Byrne Creek Lower Ravine, Habitat & Lowland Locations** 

## **Appendix D: February 2006 Fish Kill**



Some of the dead fish collected after the kill.

#### Summary:

About 700 cutthroat trout, over a dozen coho salmon, and other aquatic species were killed in Byrne Creek in southeast Burnaby on the weekend of Feb. 25/26, 2006, when someone poured a toxin into the storm-drain system in the upper watershed somewhere in the Edmonds area. City of Burnaby staff and BC Environment biologists responded

promptly when notified by streamkeepers of the kill.

Without a witness, it is impossible to identify the substance or the exact source. There was extensive media coverage on television and in local newspapers. Subsequent fish-trapping surveys found no fish in the upper half of the creek, and very few in the lower half. Byrne Creek Streamkeepers were conducting bug counts of aquatic invertebrates before the spill and continued after, and found a drop in numbers in the upper watershed, while lower areas were not significantly affected. Chum salmon fry

(babies) were seen in the creek in mid-March, so it appears some of the eggs laid by spawning salmon in autumn 2005 survived.

#### Estimated time of fish kill:

The kill happened between mid-afternoon on Saturday, Feb. 25, and morning Sunday, Feb. 26. Two streamkeepers first saw dead fish in the lower ravine above Southridge Dr. on Sunday, Feb. 26, 2006, in the early afternoon. They checked nearby pools and collected and photographed dead cutthroat trout from 10cm to 25cm long, and a coho smolt (yearling). The trout live in the creek yearround, and coho live in the creek for one year after they hatch before going out to sea. They called the Burnaby emergency spill line at 604-294-7200, and a staff member from the Engineering Department was on the scene within half an hour to take water samples and help with an initial assessment of numbers of dead. The two streamkeepers had walked the ravine on Saturday and had not noticed any dead fish, so the kill happened between midafternoon Saturday and early Sunday, for the fish had been dead for at least several hours by the time they were discovered Sunday afternoon.





truck or mixer, a concentrated cleaning compound or something else.

#### Numbers of dead fish collected:

On Sunday, streamkeepers counted over 150 dead fish in the artificial spawning and rearing habitat at Meadow Ave., and a city staff member counted over 50 more in the ravine.

#### Extent and source of fish kill:

The source was likely a storm (rain) drain in the Edmonds area. The effect was total mortality in the upper section of the creek (upstream of Southridge Dr.), with some signs of life below Marine Way, likely due to escapement to tributaries, or gradual dilution of the toxin as it flowed downstream.

Following dead fish upstream narrowed down the source of the toxic input. On Monday, Feb. 27, another streamkeeper traced dead fish upstream to Griffiths Dr. (as far up as fish are known to inhabit the creek) and observed dead worms in the creek up to 16th Ave. where Byrne Creek emerges from pipes. It appeared that all fish from the top of the creek (near Griffiths Dr.) to Marine Way died. The toxin likely entered the storm-drain system when someone poured a poisonous substance into a street drain, a basement floor drain or parking garage drain somewhere in the area bounded by 18th Ave., 18th St., 10th Ave., Davis St., Edmonds, and Kingsway (refer to accompanying maps).

There was little chance of determining what toxin entered the stream because it had been flushed out of the creek. It could have been a pesticide, chlorine from a pool or hot tub, concrete wash from a Two biologists from the BC Ministry of Environment arrived on Monday, Feb. 28, to collect dead fish, assisted by streamkeepers and city staff. They covered the area from Tag 523 near the storm outfall known as the Hell Hole, accessed from Ron McLean Park, upstream to Tag 539 near the fish ladder at the pool known as Griffiths Pond. The biologists intended to make the best of a bad situation by collecting as many of the dead fish as possible to determine counts of species, sex, size, etc., to get a picture of life in an urban creek.

The biologists returned on Tuesday, Feb. 28, and collected dead fish from Tag 523 (the Hell Hole) downstream through the ravine, artificial spawning habitat, and as far as Marine Way (Tag 505), assisted by streamkeepers. Over 350 cutthroat trout, several coho smolts, and a lamprey were collected, and based on that data, the biologists eventually estimated that about 700 fish died.

#### Media coverage:

Television coverage included video and interviews on CTV, Global TV and Shaw Community Cable (BCIT Magazine). The *Burnaby Now* and the *News Leader* both had front page coverage with photos, and both had editorials about the kill. The *Vancou*- ver Sun mentioned the kill in its Lower Mainland section. City staff have informed streamkeepers that the media exposure led to calls about other stream problems in the city. Two new members have joined the streamkeepers after hearing about the kill.

#### Fish trapping March 2/3:

There was no life in upper creek, a few fish in lower reaches. The Ministry of Environment biologists placed 16 fish traps in the creek on Thursday morning March 2, and a streamkeeper helped collect, tally and release fish on Friday morning March 3.

Ten traps were placed between the Fraser River and the golf course (Tag 501 - Tag 504), three near the habitat at Meadow Ave. (Tag 507 - Tag 508), and three near the Hell Hole accessed from Ron McLean Park (10m upstream, at, and 10m downstream of Tag 533).

There were a few signs of life in the lower reaches that were the farthest away from the toxin's point of The Byrne Creek Streamkeepers would like to entry. The tally was 3 cutthroat trout, 1 coho smolt, several dozen stickleback, and 1 sculpin spread out among the 10 traps between the Fraser and the golf course. They could have come from tributaries, or found refuge in them, or perhaps the toxin was diluted by that point.

There were a couple of stickleback in three traps around Meadow Ave. and the lower end of the spawning channel that may have survived by being in the upper reaches of the overflow pond where they might have avoided the toxin. Stickleback are often seen at the upper end of the overflow pond, and such off-stream habitat may prove to be a refuge in future events.

There were no fish the three traps upstream and downstream of the storm outfall called the Hell Hole

#### Fish trapping March 11/12:

No fish were found in the upper creek between Griffiths Dr. and Southridge Dr.

During regular semi-annual juvenile fish trapping on March 11/12 in the ravine from the wooden footbridge (Tag 516) to Griffiths Pond (Tag 539), streamkeepers did not find any fish in 9 traps. Based on previous surveys the "normal" range would have been three to four fish per trap, or a total of 27 to 36 fish.

#### Bug surveys:

There was a noticeable reduction of quantity/ quality of invertebrates in upper reaches, and little noticeable effect in downstream areas.

#### Fry observations:

Streamkeepers observed hundreds of chum salmon fry in the spawning habitat section of the creek on March 19, so it appears at least some of the eggs deposited by spawning salmon in autumn 2005 survived the toxin.

thank the Engineering Department of the City of Burnaby and the BC Ministry of Environment for their invaluable assistance in following up on the kill.



A dead cutthroat trout

# Appendix E – Byrne Creek Streamkeepers Activities Jan. 1, 2006 – Dec. 31, 2006

Jan. 1—10, 2006	<b>Spawner Monitoring:</b> Streamkeepers continued monitoring the creek for returning salmon as the spawning season wound down.
Jan. 12, 2006	<b>Regular Meeting:</b> Dr. Marvin Rosenau from the UBC Fisheries Centre entertained us with a presentation on Fraser River white sturgeon. These remarkable fish can grow to around 640kg, and the oldest identified was nearly 140 years old! They are protected in a catch-and-release only sport fishery, and over 25,000 have been tagged in an ongoing research program.
Feb. 1, 2006	<b>Parks Commission Report:</b> Streamkeepers presented the 2005 annual Byrne Creek Water- shed Status Report to the City of Burnaby Parks Commission.
Feb. 6, 2006	<b>City Council Report:</b> Streamkeepers presented the 2005 annual Byrne Creek Watershed Status Report to the City of Burnaby Council.
Feb. 9, 2006	<b>Regular Meeting:</b> We discussed creek reports, including the sighting of salmonid fry the same day. The fry are likely chum, but are yet to be positively identified. We planned activities including bug counts and creek tours for the coming month.
Feb./March, 2006	Winter Aquatic Invertebrate Survey: We held bug counts over several weekends. More samples were taken than usual, because the counts were interrupted by the February fish kill.
Feb. 26—March 27, 2006	<b>Fish Kill Activities:</b> Streamkeepers worked with the City of Burnaby, the B.C. Environment Ministry, and the DFO in regard to the fish kill caused by a toxic substance being poured into a rain drain in the upper watershed in the Edmonds area. Over 300 dead trout and a few coho were collected, and fish trapping after the spill resulted in no signs of life in the upper creek, and only a few fish in the lower reaches.
March 9, 2006	<b>Regular Meeting:</b> We discussed the recent fish kill in the creek and planned activities including bug counts and creek tours for the coming months
April 8, 2006	<b>Edmonds Community Clean Sweep:</b> We had our booth set up from about 9:30 a.m. in the parking lot at Edmonds Skytrain station for this event that ran from 10:00-12:00. We registered 42 volunteers and led them on cleaning up the area along Byrne Creek, and then joined other volunteers at noon at the Eastburn Community Centre on Edmonds St. for refreshments.
April 13, 2006	<b>Regular Meeting:</b> We discussed creek reports, followed up on the fish kill at the end of February, and talked about upcoming events.
April 25, 2006	<b>Chum Salmon Fry Release:</b> We invited children from Clinton elementary school to release fry (baby fish) into the creek.
May 7, 2006	<b>Burnaby Rhododendron Festival:</b> We had our booth and a display of invasive plant species at this classic Burnaby event at the Shadbolt Centre in Deer Lake Park.
May 8 & 10, 2006	<b>Gladstone Secondary Tours:</b> We took several classes of students from Gladstone High School on tours of the creek and ravine. We talked about streamkeeping activities, the impacts of development on streams, urban biodiversity, etc
May 9, 2006	<b>Coho Salmon Smolt Release:</b> We invited children from Taylor Park elementary school to release smolts (yearling fish) into the creek.
May 11, 2006	Regular Meeting: We reported on creek conditions and planned spring events.
May 13, 2006	Stoney Creek Great Salmon Sendoff: We had our info booth up at this fun-filled event.
May 15, 2006	<b>Moberly Elementary Release:</b> We helped kids from the school release their "salmon in the classroom" chum fry, and talked about the importance of the riparian zone along the creek.

May 27, 2006	<b>Invasive Plant Species Survey:</b> Streamkeepers did an annual survey of invasive plant species along Byrne Creek.
May 30, 2006	<b>Storm Drain Marking:</b> Streamkeepers marked storm drains in southeast Burnaby with yellow fish.
June 3 & 14, 2006	<b>Storm Drain Marking:</b> Streamkeepers marked storm drains in southeast Burnaby with yellow fish. On several occasions we were joined by local Scout and Guide groups. Thanks!
June 8, 2006	Regular Meeting: We reported on creek conditions and planned summer events.
June 11, 2006	<b>Burnaby Environment Awards:</b> Several members attended this annual event. This year, two Byrne Creek Streamkeepers won the award for Community Stewardship and another won a Youth Environmental Star award.
June 17, 2006	<b>Ugly Bug Ball:</b> Byrne Creek Streamkeepers attended this second bi-annual all-day event put on by Department of Fisheries and Oceans Community Advisors. It was great fun!
June 27, 2006	<b>Removing Original Stream of Dreams:</b> The original Stream of Dreams mural at the corner of Kingway and Edmonds in Burnaby came down on June 27 after six years of charming the community. Byrne Creek Streamkeepers assisted in dismantling the mural that they helped create in 2000 to honor the deaths of 5,000 fish and other animals in Byrne Creek in 1998 when someone dumped a toxin into a storm drain. We encourage suggestions as to where the salvaged Dreamfish can go.
July 1, 2006	<b>Canada Day:</b> Byrne Creek Streamkeepers had their booth set up at this annual event at the Eastburn Community Centre at 7435 Edmonds St. in Burnaby.
July 8, 23, 30, 2006	Summer Aquatic Invertebrate Survey: Byrne Creek Streamkeepers did their summer bug count in the creek over three weekends.
July 25 & 26, 2006	<b>Summer Fish Trapping:</b> Byrne Creek Streamkeepers did their annual summer fish trapping to assess numbers and species of fish in the creek. Results were much lower than in previous years, but still positive considering the toxic spill that wiped out the creek in February this year.
Aug. 2, 10, 17, 19, 2006	<b>Invasive Species Removal:</b> Streamkeepers met on an ad hoc basis to tackle invasive Policeman's Helmet, Himalayan Blackberry, Scotch Broom, etc.
Aug. 14 & 23, 2006	<b>Storm Drain Marking:</b> Streamkeepers marked storm drains in southeast Burnaby with yellow fish.
Sept. 1 & 4, 2006	<b>Sediment Pond Cleanout:</b> The city cleans out the sediment pond in the Byrne Creek spawning habitat every two years. Streamkeepers helped city staff and Envirowest staff trap, count and remove cutthroat trout and coho yearlings from the pond before it was drained and the accumulated sediment was removed.
Sept. 4, 2006	<b>Taste of Edmonds:</b> Byrne Creek Streamkeepers had their information booth set up at this annual community event near Southside Community Church at Arcola and Walker in southeast Burnaby.
Sept. 14, 2006	Regular Meeting: Streamkeepers began planning for autumn activities and events.
Sept. 16, 2006	Alta Vista Community Picnic: We had our booth set up at this community event on Royal Oak a few blocks south of Rumble. This long-running annual fundraiser to maintain and improve this small playground is always great fun. Kudos to the organizers for their impressive prize draw!
Sept. 16, 2006	<b>Night of 2006 Lights:</b> We participated yet again with our fish and other animal lanterns in this amazing event around the Shadbolt Centre at Deer Lake Park. It just keeps getting big-ger and better.

Sept. 23, 2006	Great Canadian Shoreline Cleanup: Streamkeepers helped out with this national event, focusing their efforts on the Edmonds area.
Sept. 24, 2006	<b>Rivers Day:</b> Streamkeepers took part in this annual event at a new location this year on Still Creek. Our aquatic bug identification table using a sample from Still Creek was a big hit with kids. Burnaby and Vancouver have great plans to revitalize the Still Creek watershed over the next few decades.
Oct. 12, 2006	<b>Regular Meeting:</b> Streamkeeper planned the annual autumn schedule for monitoring the creek for salmon returning to spawn.
Oct. 15—Dec. 31, 2006	<b>Daily Spawner Monitoring</b> : Streamkeepers patrolled the creek daily, as weather allowed, to tally salmon returning to spawn.
Nov. 9, 2006	Regular Meeting: Streamkeepers discussed autumn events and activities.
Dec. 9, 2006	<b>MLA Tour:</b> Streamkeepers took local MLA Raj Chouhan on a tour of the Byrne Creek spawning habitat and ravine, explained their volunteer efforts, and discussed concerns about urban biodiversity and watershed management.
Dec, 14, 2006	<b>Regular Meeting:</b> Streamkeepers reported on creek conditions following several heavy storms, and on observations of returning salmon spawners.
Dec. 17, 2006	<b>Tree Wrapping, Invasive Plant Removal, Planting:</b> Streamkeepers wrapped deciduous trees in the spawning habitat with chicken wire to ward off increasing depredations by beavers. We also removed invasive plant species and replanted with native trees.





- Byrne Creek Streamkeepers collectively tallied 1,794 hours of volunteer time in 2006.
- This is equivalent to one full-time person working eight hours a day, five days a week, year-round.
- This was the number reported to the group's record keeper, and is likely missing many hours.