Volunteer Manual

Weedbusters Volunteer Manual

Karin Albert and Alison Evely
GVRD Parks, Central Area
2005

Welcome!

Welcome to the Weedbusters program. We are delighted that you want to participate. If there are questions that the manual doesn't answer, please don't hesitate to ask one of the other volunteers or a Parks staff member. We are here to assist, and we recognize and appreciate the valuable contribution that you are making.

This manual is continually evolving and we welcome your suggestions for important additions and improvement. A copy of this manual will be in the Burnaby Lake Nature House and in the storage shed to serve as a reference.

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Weedbuster Basics

The Weedbusters program is designed to provide you with the tools to identify, document, monitor and assist park staff in controlling invasive weeds in Burnaby Lake Regional Park. The program, which is modeled on the Nature Conservancy's invasive species program, complements the Forest Management Plan for Burnaby Lake (March, 2002). The plan makes a series of recommendations, including the management of invasive species, to restore biodiversity at Burnaby Lake Regional Park

What is an invasive species?

Every species -- plant, animal, fungus and bacteria -- has a native range or a home where its life has been shaped by the natural forces of climate, moisture, storms, fire, soils, and species interactions. Over thousands of years, these natural processes, in addition to other physical and biological factors, have determined the species' habitat and distribution. A native species is one that lives in a given area as a result of these processes and without the direct or indirect assistance of humans. An organism is considered a non-native when it lives outside its historical range due to transportation by humans. Although there are many non-native species currently found in North America, most non-natives pose no threat to natural ecosystems. Only certain species, which exhibit a host of characteristics, earn the name "invasive species."

Invasive species, are those plants and animals that not only live outside their natural distribution, but also have the potential to detrimentally affect the species composition of natural ecosystems. Invasive plants exhibit some or all of the following characteristics: rapid growth and maturity; prolific seed production; highly successful seed dispersal, germination and colonization; and vigorous vegetative spread. Using these characteristics to their advantage, invasive plants are able to out-compete native plant species for space and resources. Since they are out of their natural range, biological controls, such as insects and disease, are not present to keep their populations in check. Thus, they expand at unnatural rates, using most of the resources and shading out native plants. Organisms that depend on native plants for food and shelter are left with a less than satisfying, and often useless, alternative. Thus, all levels of an ecosystem are affected. The negative impact of invasive species on biological diversity has reached such an extent that most scientists now think it is second only to direct habitat destruction.

Invasive Species are the single greatest threat to biodiversity, after direct habitat loss.

Invasive species cause more damage than some pollutants.

Almost half of the native species in America are endangered because of invasive species

Daniel Simberloff, U.S. Invasive Species Advisory Committee.

Invasive species have been transported beyond their historical ranges both intentionally and accidentally. Some examples of intentional movement include Himalayan blackberry (*Rubus discolor*) which is an important berry crop, Japanese knotweed (*Polygonum japonica*) which was introduced as an ornamental, and Kudzu (*Pueraria lobata*) which was brought from Japan for erosion control and animal fodder. Some accidental transports are Russian thistle (*Salsola*

iberica) thought to have been introduced as a contaminant in flax seed, and purple loosestrife (*Lythrum salicaria*) which was initially introduced from ships' ballast.

Invasive species are known to occur in association with disturbance. We often see an invasion of exotic species following roads, trails, construction areas or other areas highly influenced by human activities. Invasive species can also take advantage of natural disturbances, such as fires, floods, or wildlife trails to become established. This correlation between invasive species presence and both human and natural disturbance provides clues as to where and when new invasions can occur. Natural ecosystems adjacent to urban areas are particularly prone to invasion by exotic species.

Species of Concern at Burnaby Lake

The 2000 Burnaby Lake Forest Management plan identified Himalayan and evergreen blackberry (*Rubus discolor* and *Rubus laciniatus*), hops (*Humulus* spp.) English ivy (*Hedera helix*), policeman's helmet (*Impatients glandulifera*), Scotch broom (*Cytisus scoparia*) and Japanese knotweed (*Polygonum cuspiudatum*) as threats to the forest ecosystem. Other species of concern include purple loosestrife (*Lythrum salicari*a), reed canary grass (*Phalaris arundinacea*), yellow flag iris (*Iris psuedocorus*) and white waterlily (*Nymphaea odorata*).

So, you want to be a Weedbuster…

Weedbusters help to protect and restore the natural diversity of Burnaby Lake by removing invasive species that compete with native vegetation. Weedbusters can also play an important role in educating park visitors about the impacts of invasive species.

As a volunteer Weedbuster you will receive training in plant identification, "best practices" for removal, mapping and record keeping, as well as training in safe operation of tools you'll be using. Weedbusters can assist at scheduled work parties, adapt a trail section or work independently as their schedule allows.

Only those species that can be controlled through manual removal and/or proven biological controls are targeted for removal by Weedbusters. Some species, such as blackberry, reed canary grass and Japanese knotweed would require an intensive mechanical and/or chemical removal program that is beyond the scope of a volunteer program. Furthermore, attempts to control these species using chemicals and or mechanical equipment may have detrimental effects on the sensitive marsh and forest ecosystems.

The Weedbusters program utilizes a number of techniques and provide a wide range of volunteer opportunities – from highly trained volunteer "Weedbusters" capable of working independently, organizing work parties and/or educating others, to individuals, families and community groups who simply want to 'get their hands dirty' at scheduled work parties. The level of involvement is up to you.

Work Parties

Work parties are scheduled throughout the year. The timing of work parties is based on the plants phonology (i.e. the ideal removal time based on the plant's life history), availability of staff to assist with the work party and other factors. Work parties are announced in local newspapers, posters in the park and other GVRD publications. As work parties draw a mix of experienced and inexperienced volunteers, seasoned Weedbusters can act as mentors for new volunteers. Equipment is supplied, but volunteers are expected to wear appropriate clothing and footwear for the task. In 2006, work parties are scheduled for April, May, June, September and October.

Working Independently

Weedbusters who volunteer to work independently or "adapt a section" will be given T-Shirts and identification tags with the Weedbusters logo. It is essential that you wear the identification while working independently in the park to ensure that park visitors are aware that you are acting with GVRD approval. You will almost certainly get questions from park visitors; this will provide you with an opportunity to inform visitors about the problems of invasive species and spread the word about the Weedbusters program. Interested visitors can be encouraged to come to an upcoming work party.

When working independently:

1. Call the office to let us know you intend to work in the park. Staff are able to inform you of potential conflicts or safety concerns in the area you plan to work in. One day's notice is requested.
2. Work with a buddy wherever possible. If you choose to work alone, limit your work to light hand-pulling. Heavy work involving the use of tools such as weed wrenches, pruning shears or saws should only be attempted with a partner present.
3. Wear gloves and boots to protect your hands and feet.
4. Wear Weedbusters T-shirt and/or identification tags.
5. Leave filled garbage bags at garbage cans located at trail heads.
6. Complete and submit a Weedbusters removal report for each species removed.

Record Keeping

Record keeping is an essential part of both the Weedbuster Program. Documenting infestations, removal techniques, volunteer-hours, volume of material removed and follow up activities are important components that will allow staff to assess the effectiveness of the program, fine-tune techniques, and set priorities for removal. Reporting forms are found in Appendices 1 and 2.

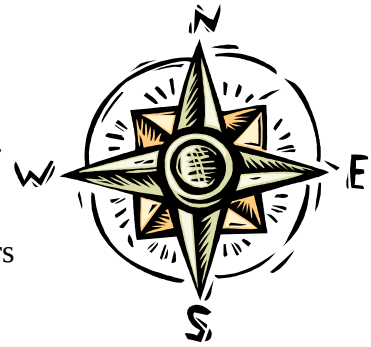
Mapping and Inventory

Volunteers can identify invasive species, document the extent of the infestation and provide site locations to produce a map that will be used to develop a comprehensive program for Burnaby Lake.

Although the goal is to collect information and map all invasive species in Burnaby Lake Regional Park, only those species that are identified for removal through the Weedbusters program will be mapped initially. Exceptions to this rule are new outbreaks or situations where an invasive plant threatens rare plants or a sensitive habitat. For example, blackberry is not targeted for removal, however a small clump of blackberry adjacent to a patch of cloudberry (*Rubus chamaemorus*) should be noted, as the blackberry may be removed or trimmed to protect the cloudberry.

A few species have already been mapped using GPS. Broom and ivy were mapped in February 2004, and policeman's helmet was partially mapped in May 2004. Annual mapping allows the research technician to monitor spread and assess the efficacy of control methods.

Burnaby Lake has been mapped with GPS to create discreet map units that make it easy to locate infestations and outbreaks. For example, the freeway trail is divided into 13 sections, each section lies between two hydro-towers or other readily identifiable markers. Trails, signposts, bridges, culverts and boardwalks throughout the park have all been mapped and can be used to provide precise locations throughout the park. For example, an infestation 10 meters west of culvert SS20 on the South Shore Trail can be readily identified on a map and added to the geographic database.



The basic tools for mapping are: pen or pencil, monitoring report form, base map. With training, you should have sufficient skills to identify, monitor, record, map and remove invasive species at Burnaby Lake. You can choose to work independently or in groups as your personal schedule permits. The data you collect is added to a geographic database. The database is used to monitor the spread of invasive species, assess the effectiveness of control methods and target areas for management.

Restoration of Native Ecosystems

It can take several years to eliminate invasive species from a site. Plants such as English ivy have tenacious roots systems that will require repeated removal to exhaust and eliminate. Other species, such as broom and policeman's helmet have established seed banks that may persist for one or more years. In some cases it may be possible to restore sites by planting native species or sowing grass seed immediately after invasive plants have been removed, but in most cases restoration will be a long term project involving repeated clearing of invasive species until the root system and or seed bank is exhausted.

The research technician will monitor sites to determine prescriptions for cleared areas. There will also be opportunities for Weedbusters to help restore sites by planting native species and monitoring their growth.

General guidelines for volunteers

While working in the park, volunteers are requested to conduct themselves according to the following guidelines:

- Let us know ahead of time if you are planning to participate in a work party (we like to know numbers since we are providing tools and refreshments).
- Sign in and the beginning of a work party or phone in beforehand if working independently.
- Wear closed sturdy shoes (hiking boots are preferred) when working in the park.
- Wear long pants and sleeves especially when working with ivy and blackberry. Ivy gives some people a rash, while blackberry will scratch up your arms and legs.

- Treat all park visitors who might approach you and ask questions about what you're doing with respect.
- Never argue aggressively with members of the public.
- Volunteers can inform a member of the public to that they're carrying out an activity that is harmful to the park or its wildlife, but volunteers should not try to stop that person from carrying out that activity.
- Take breaks whenever you need them.
- Drink lots of water.
- If you are getting too tired or too hot or have another commitment later on in the day, it is fine to leave early. But please let one of the parks staff know, so we don't search for you at the end of the work party.

In Case of an Emergency

Emergencies

Police	**911**
Fire	**911**
To report forest fires	**1-800-663-5555**

Non-emergency crime including car break-ins

Burnaby RCMP	604-294-7922

Transit

BC Transit Information	604-953-3333

Types of emergencies

- If you get bitten by a squirrel or other animal, ask a staff person on-site for a disinfectant and band-aid or bandage and go see a doctor for a rabies vaccination.
- A first aid kit is at every work party, ask a staff person for assistance.
- In case of serious accident or injuries to volunteers or the public, call 911.
- Never get into a verbal or physical fight with any members of the public. If a visitor becomes aggressive, leave the situation immediately and notify GVRD Parks staff.
- In the event of an earthquake, remain calm and take yourself to the safest place – an open area away from trees, buildings, and power lines.

Outreach and Communication

Invasive Species Display and Powerpoint Presentation

We welcome volunteer interest in developing a desktop display on invasive species. Once developed this kind of display would be available to all volunteers to sign out and take to special events or meetings. GVRD Parks has a powerpoint presentation on invasives which you can use to spread the word about invasive species and get other people involved. Check with Karin or Alison to get a copy of the presentation.

Frequently Asked Questions from Park Visitors

Taking plants from the park

Q. Can I take plants from the park
A. No. As a Weedbuster volunteer you can take out invasive species when you are part of a work party, have adopted and are monitoring a site that has been treated already, or have obtained prior authorization from GVRD Parks staff to remove invasives from a specified area on your own or as part of your own small work party.

Q. Can I pick mushrooms in the park?
A. No, as with any other plants, mushroom picking is not allowed in parks.

Q. Why are you only removing some plants and not others?
A. We can't address all invasive plants at the same time. We are starting with the once we can do something about right now and will attempt to control other invasives as we gather more information about best practices with respect to their removal and disposal.

Trails

Q. How long does the loop around the lake take?
A. Lake loop is 11 km and takes between 2.5 to 3.5 hours (see *Walking Trails at Burnaby Lake Regional Park* on page 22 for more detail).

Park size and age

Q. How big is the park?
A. 300 hectares.

Q. How old is the park?
A. The park was created in 1975 and managed by the City of Burnaby until 1979. GVRD has operated and managed the park since 1979.

Animals in the park

Q. What animals live in the Park?
A. The park supports a wide variety of aquatic and terrestrial animals including: large and small mammals, such as coyotes, raccoons, squirrels, mice, voles and shrews, beavers, otters, weasels and mink; shorebirds, ducks, owls, birds of prey, and perching birds; fish, frogs and salamanders; and a host of invertebrates – from slugs and snails to butterflies. You can check out the displays at the Nature House on Piper Avenue which is open every weekend from 10 a.m. to 4 p.m. from Victoria Day to Labour Day.

Injured Wildlife

Q. I have found an injured animal. What do I do with it?
A. Please take it to Wildlife Rescue on Glencarin Drive on the south side of the Lake past the Burnaby Sports Complex. Their phone number is 604-526-7275.

Vehicle Break-ins

Q My car was broken into and my purse was stolen. Can I leave a description and phone number?
A. Yes, please do, but also make sure to report the theft to the local RCMP (6355 Deer Lake Avenue; non-emergency telephone: 604-294-7922). If we can document thefts, this will increase RCMP surveillance of the area.

Public Transit

Q. Is the Park served by public transit?
A. The #110 leaves from Burnaby Lake/Sperling station and stops a few blocks up at Piper and Government. Call B.C. Transit at 604-953-3333 for route details.

Nearby Food

Q. Where is the closest place to eat?
A. The Edelweiss Delicatessen and the LakeCity bakery on Production Way, just north of Lougheed and the Production Way/SFU Skytrain station. The gas station at Lougheed and Winston has Bread Garden fare. There are restaurants on Bainbridge and Lougheed.

Biking

Q. Can we bike the trails here?
A. No. You can cycle along Winston Ave and along the Brunette River off Cariboo Road at the east end of the Park.

Bird Feeding

Q. Do you sell grain here?

A. No. Feeding makes waterfowl become too tame, and the feed attracts undesirable animals like rats. IF YOU HAVE TO FEED BIRDS, GRAIN IS PREFERABLE. DO NOT FEED BREAD – IT SWELLS UP IN THE BIRDS STOMACH AND CAN BE HARMFUL.

Burnaby Lake Rejuvenation Project

Q. What is happening with the Burnaby Lake dredging project?

A. In 2002, the City of Burnaby obtained Federal and Provincial permits for an ambitious lake rejuvenation program that would reduce sediments in the lake, improve water quality, restore fish and wildlife, and maintain open water for recreation and other uses. The plan was based on extensive environmental studies including biological inventories, test dredging and sediment analysis. The program, which is anticipated to cost $27 million, could begin as early as spring 2006, if federal funding is secured. For more information, see http://www.city.burnaby.bc.ca

Part 2 - Behind the scenes

Who's Involved

Weedbusters was initiated by GVRD Parks with the support of the Burnaby Lake Park Association and a small group of dedicated volunteers who provided ideas and assistance in developing the program from the early stages onward. GVRD Parks provides planning and technical support for the program. The Burnaby Lake Park Association assists in volunteer recruitment and works with GVRD Parks staff to determine program direction.

The Burnaby Lake Park Association

The Burnaby Lake Park Association (BLPA) is an independent society that works with the GVRD to preserve, protect and enhance the natural environment of Burnaby Lake.

The BLPA was formed in 1996 to bring together different groups active in the park. The association now includes representatives from BCIT, Eagle Creek Stream keepers, Wildlife Rescue, the Burnaby Rowing Club and local residents.

The Association participates in and initiates stewardship events in the park (like tree planting and nest box building). Members also attend open houses and public events to advocate for the Association's position on stewardship of the Brunette watershed.

BLPA mission:

The Burnaby Lake Park Association is dedicated to preserving, protecting and enhancing the Park's natural environment, while advocating respect, appreciation and enjoyment of the Park's natural attributes and recreational resources.

BLPA Programs:

- Birds, Butterflies, and Bees, an early season family event, 1999 – 2003
- EcoAction Burnaby Lake reforestation program and planting events
- Nest box monitoring and maintenance
- Sundays at Burnaby Lake, hosting the Nature House during the off-season, 2001-2003
- Weed Busters
- Nature walks (Morning's for the Birds in early June and Christmas Nature Walk in early December)
- Butterfly garden

Issues of interest:

- Invasive species control
- Forest management
- Nature house

- Beaver management
- Piper Spit board walk renewal
- Burnaby Lake viewing tower
- Burnaby Lake rejuvenation

Association meetings …

- are open to the public and volunteers are encouraged to attend and get involved.
- run from 7 p.m. – 9 p.m., every third Thursday of the month, except in July, August and December
- take place at GVRD Parks Central Area office, 9146 Avalon, off Cariboo Road North, on the east side of the lake
- Phone Karin at 604-520-6442 to get current contact information for the BLPA.

Groups active around Burnaby Lake:

Besides the park association, a number of other groups are active around the lake:

- Streamkeepers: Eagle Creek, Stoney Creek, and Silver Creek Streamkeepers
- BCIT Fish, Wildlife and Recreation Program
- Wildlife Rescue Association
- Burnaby Horsemen's Association
- Sapperton Fish and Game Club
- Hearts in Parks Walking Club
- Burnaby Lake Rowing Club
- Burnaby Lake Park Association

The Park Partnership Program

The Burnaby Lake Park Association is part of a network of park associations working with GVRD in parks across the regional park system. Not every park has a park association but about fifteen of them have either a park association or a partner group.

Every park association identifies its own projects depending on member interest. The associations promote and coordinate community activities, provide public education on park ecosystems and trail user ethics, and work to balance conservation and recreation interests. Membership to park associations is open to all GVRD residents.

The Regional Parks Forum

Each park association and partner group sends a representative to the Regional Parks Forum, an umbrella group for the Park Partnership Program. The Regional Parks Forum supports ongoing communication and learning needs of its members. For example, the Forum, through its Communications Coordinator, produces the Park Warbler, a quarterly newsletter which provides updates on park partner activities across the lower mainland. As a regular volunteer, you will receive the Park Warbler. In cooperation with GVRD staff, the Forum also offers training


The PARK Warbler
Newsletter of the GVRD Parks Partnership Program
www.parkpartners.ca
Greater Vancouver Regional District Parks Partnership Program · Winter 2003 - 2004 · Vol. 4 No. 4
2004 Celebration of Volunteerism and Ideas Fair
Dave Smith, Chair, Kanaka Education and Environmental Partnership Society

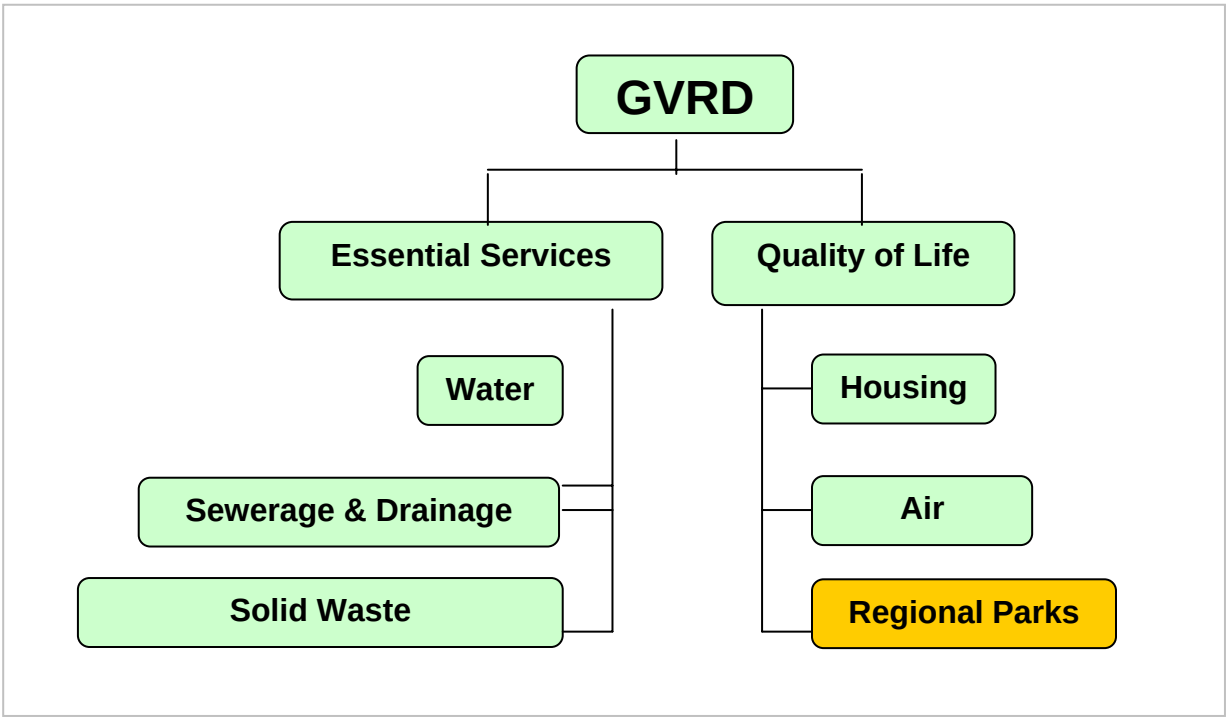
workshops for volunteers on stewardship, leadership development and other relevant topics.

To get involved with the Regional Parks Forum or any of its communications, education, or stewardship committee, contact Karin Albert for the contact information of the current Park Forum chair.

The GVRD

Burnaby Lake Regional Park lies under the jurisdiction of the Greater Vancouver Regional District, or GVRD for short. The GVRD is a federation of 21 municipalities and two electoral areas working together to provide essential services and facilities which are too big in scope for individual municipalities to undertake.

GVRD responsibilities include regional parks, water supply and distribution, air quality, labour relations, sewage treatment and disposal, regional housing, solid waste disposal, and a number of regional research and planning services. GVRD is governed by a Board of Directors consisting of Mayors and Councillors appointed from each municipality within the region.



About Regional Parks

Regional Parks has the largest membership of any GVRD function, with participation from all 21 GVRD Municipalities and Electoral Districts. Membership is voluntary and extends from Bowen Island to Matsqui. There are now 25 Regional Parks in the GVRD.

Regional Parks are split into three areas: *West* (Pacific Spirit, Crippen, Capilano River, Lynn Headwaters, Iona Beach, Deas Island, Fraser River Islands Reserve, Boundary Bay, and Burns Bog), *Central* (Burnaby Lake, Belcarra, Minnekhada, Widgeon Marsh Reserve, Colony Farm, Tynehead, Surrey Bend, and Douglas Island), and *East* (Campbell Valley, Aldergrove Lake, Matsqui Trail, Glen Valley, Kanaka Creek, Derby Reach, Blaney Bog Reserve, Grant Narrows, and Brae Island Reserve).

Each area has staff who take care of park operations, interpretation, planning, community development, and visitor services.

Regional Park Facts:

- 25 regional parks
- 11,714 hectares of greenspace
- 20 operating parks, 5 park reserves
- Approx. 6.5 million visitors yearly
- 90 heritage buildings, 4 hatcheries
- 320 picnic tables and 12 picnic shelters
- 192 campsites, 5 group camps for 180 visitors/night
- 412 kilometers of trails
- 84 at risk plant and animal species in regional parks
- Special events attract 24,500 people
- 26,260 people attend 490 interpretation programs

GVRD Parks Mission

Regional Parks' mission is to protect and care for a legacy of diverse landscapes and features which represent our region and which provide outstanding opportunities for outdoor recreation, education and community participation.

Burnaby Lake Regional Park

Quick Facts

Some stats

Great Blue Heron

- Park Type: Nature
- Size: 307 hectares (758 acres)
- Visitors: 285,000 in 2004
- Staffing: 2 full-time, 2 seasonal
- Trails: 11 km Burnaby Lake loop
- Equestrian trails on east side

Recent history

- 1972 - designated as wildlife sanctuary by City of Burnaby
- 1974 - Nature House opens, first interpretive programs start
- 1975 - designated a Regional Park: Land managed by GVRD under long term lease from City of Burnaby. City has jurisdiction over lake, manages rowing facility, sports fields, equestrian facilities
- 1996 - completion of Burnaby Lake trail system

Some species found in the park

- The lake and marsh are habitat for waterfowl, shorebirds, beaver, muskrat, otters and mink.
- The forest is home to a variety of birds, mammals, amphibians and insects.
- 212 bird species have been identified, including:
  - Raptors: Osprey, Bald Eagle, Northern Harrier, Cooper's Hawk, Short-eared Owl.
  - Ducks: Wood Duck, Green-winged Teal, Northern Shoveler, Bufflehead.
  - Songbirds: Dark-eyed Junco, Red-winged Blackbird, Pine Siskin, Hutton's Vireo.
- For a comprehensive list of birds, ask for the Burnaby Lake Regional Park Bird Checklist.

Wood Duck

Park Etiquette

Following are several rules that we ask people to follow while in Burnaby Lake Regional Park:

- **No picking or collecting.** This includes plants, mushrooms, organic matter, and animals, unless a research permit has been granted by GVRD Parks.

- **Stay on trails** to avoid damaging plants and animal homes and to avoid getting lost.

- **No bicycles on trails**. The trail is to narrow and too soft in places to allow for bikes.

- **No camping or fires**. Open fires and camping are prohibited. Barbeque stands are located behind the Nature House for hibachis and barbeques.

- **Horses in designated areas only** near the Avalon Avenue entrance and on the Freeway Trail.

- **No dumping animals (wild or pets).** It might seem harmless, but exotic species and/or domestic species such as rabbits, turtles, cats, ferrets and rats and frogs can disrupt ecosystems by consuming native plants and animals, and competing with wildlife for resources. Many abandoned pets will succumb to disease or preyed on by predators.

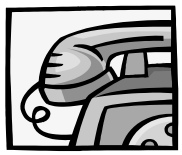
- **No littering**.

- **No feeding animals**. We request that visitors refrain from feeding animals, other than the ducks at Piper Spit. Please feed only good quality grain (no bread or popcorn) at the Spit. Excess food can encourage rats and aggressive behavior in the animals being fed (e.g., squirrels, geese, and raccoons).

Walking trails at Burnaby Lake

All trails at Burnaby Lake are suitable for the novice hiker, as they are flat. See the park map for trail locations and further details.

Trail	Hiking Level	Distance	Time	Notes
Circuit around Burnaby Lake	novice/ inter-mediate	11 km	2.5 - 3.5 hours	Make note of water and washroom locations before you go.
Brunette Headwaters Trail	novice	1.8 km	20 - 30 minutes	Cool, shady walk.
Conifer Loop & Spruce Loop Trail	These cool, shady trails wind through towering second growth conifers and do not add much time to the Brunette Headwaters Trail.			
Avalon Trail and South Shore Trail	novice	0.8 km and 2.4 km respectively - total 3.2 km	40 - 60 minutes	There are two parking lots and park entrances along this section of trail: the larger Avalon Avenue parking lot to the east near the Burnaby Equestrian Centre and the smaller Glencarin Parking Area near Wildlife Rescue to the west.
Equestrian Loops & Freeway Trail	novice	2.7 km for Freeway Trail	40-60 mins.	The Equestrian Loops and the Freeway Trail are for both horse and pedestrian traffic. Freeway Trail parallels Hwy. 1 and is very noisy. Wildlife Rescue has a wonderful wildlife garden, wildlife sighting sheet on their information kiosk and a gift shop; a nice spot for a rest.
Pavilion Trail	novice	3.1 km	40 - 60 minutes	A large portion of the Pavilion Trail lies outside the boundaries of Burnaby Lake Regional Park and is maintained by the City of Burnaby. The northern section of this trail is crushed rock or gravel.
Cottonwood Trail	novice	2.6 km	30 - 40 minutes	Roughly halfway along the Cottonwood Trail is Philips Point, one of the few places that you can reach the shoreline of Burnaby Lake without getting wet feet.
Other trails and features near Cottonwood Trail are: Piper Mill Trail Burnaby Lake Viewing Tower Piper Avenue Spit			A loop of Piper Mill Trail, taking in the Viewing Tower and Piper Avenue Spit, is	



GVRD Parks Central Area Contacts

CENTRAL AREA OFFICE

9146 Avalon Avenue, Burnaby, BC, V3N 4G8
Tel: 604-520-6442 Fax: 604-520-3520

WEED BUSTER PROGRAM STAFF CONTACTS

Karin Albert, Community Development Coordinator	604-520-6442
Alison Evely, Research Technician	604-520-6442

BURNABY LAKE FIELD STAFF

Wendy Warn, Park Operator
Roger Boucher, Park Assistant

INTERPRETATION STAFF

(You might see these folks at the Nature House in the summer)
Lynn Castagner, Park Interpretation Specialist
Cal Martin, Park Interpretation Leader

OTHER CENTRAL AREA PARK STAFF

Frieda Schade, Area Manager
Heather Wornell, Park Planner
Rick Novosel, Acting, Park Operations Supervisor (Burnaby Lake, Colony Farm, Tynehead, Douglas Island)
Ron Wood, Park Operations Supervisor (Belcarra, Minnekhada, Widgeon Marsh, Sapperton)
Kelly Hoskins, Area Visitor Services Coordinator
Vera Gabrielson, Office Supervisor
Gin Paul, Office Assistant
Tanya McMasters, Office Assistant

NATURE HOUSE: 604-420-3031

Part 3 - Invasive plants at Burnaby Lake

Invasive plant descriptions and management actions

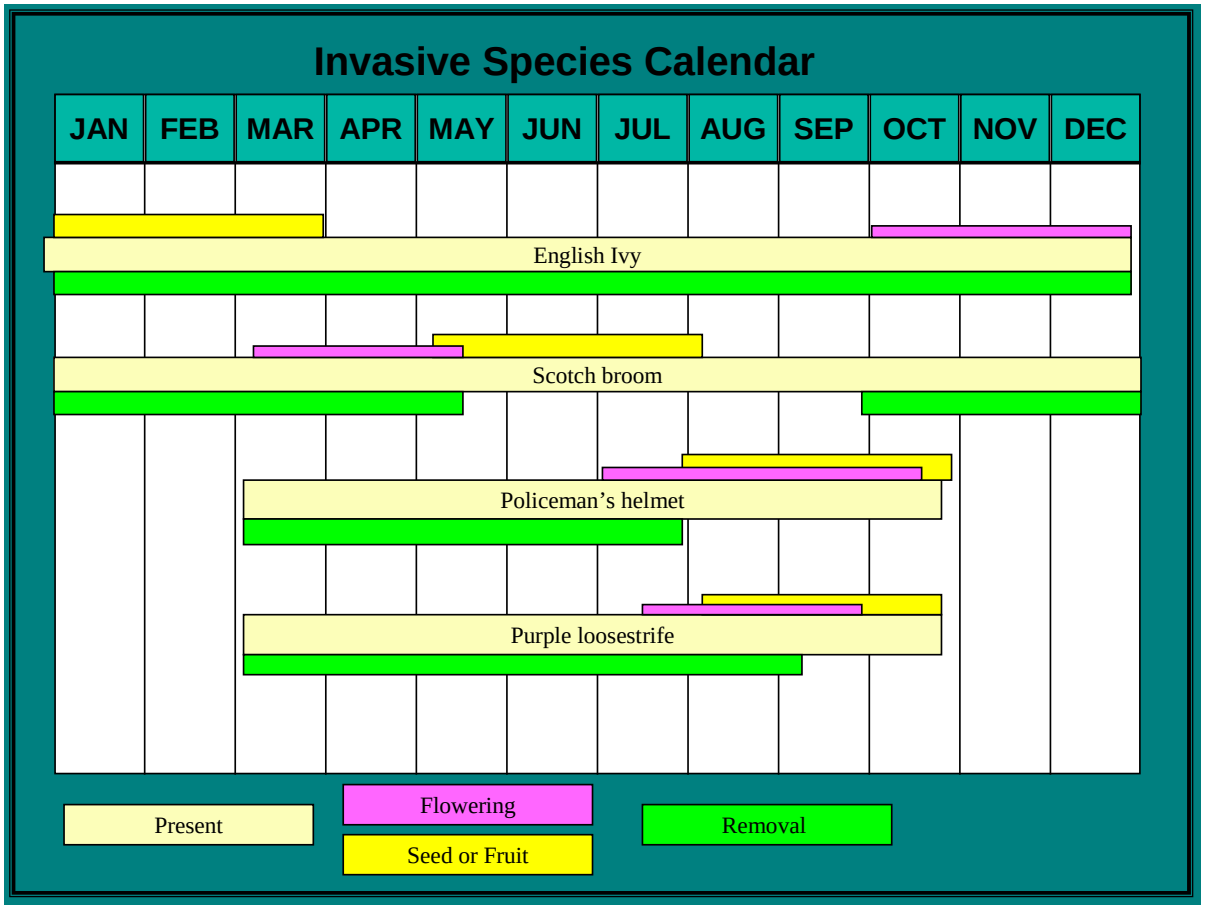
Target Species

Only species that can be safely removed through manual removal are targeted for removal by the Weedbusters program: These include: Scotch broom, English ivy, and policeman's helmet.

Weedbusters can play a role in shaping invasive species management by mapping and/or monitoring species that require special treatment. These include purple loosestrife, hops, reed canary grass, Japanese knotweed, Himalayan blackberry and yellow flag iris.

It's all about Timing

Timing of removal is important. Avoid removing plants when they are in seed to prevent accidental seed dispersal. Use the following calendar as a guide to determine the best time for removal.



English Ivy

English Ivy is a member of the Ginseng Family (Ariliaceae), native to Europe and Asia and widely introduced to temperate parts of the world. It has a long history as a garden plant, introduced to the Pacific Northwest in the late 1800's. Despite of its aggressive tendencies, it is still widely grown as a landscape plant.

English ivy poses a serious threat to native forests by eliminating native undergrowth and smothering trees. Ivy adds significant weight to trees, encourages rot by depriving bark of contact with air, sun and beneficial organisms. Ivy on trees also interferes with photosynthesis by covering leaves and stems and inhibiting new growth – particularly on deciduous trees. Ivy can kill a mature tree in 20 years.

Description:

There are two distinct growth stages – the juvenile form and the mature form.

Juvenile Form- (Up to 10 years)
Leaves: Deeply lobed, 3 – 5 lobes, light green, arranged alternately.
Stems: Young shoots and leaves are hairy.
Roots: Produces adventitious roots at nodes.
Flowers: No flowers on juvenile form.

Mature Form:
Leaves: Unlobed (or slightly lobed) dark green and leathery, arranged in a spiral.
Roots: Mature plants do not produce adventitious roots.
Flowers: Small greenish-white flowers in clusters, produced in fall.
Fruit: Dark coloured fruits mature in early spring. Fruit is toxic to many species, but is eaten by robins, starlings and blackbirds.
Seeds: Spread by birds. Seeds need scarification (through ingestion by birds) to germinate.

Ivy Management:

Park agencies and ecologists in the Pacific Northwest are becoming increasingly aware of the problems associated with English Ivy. Oregon recently enacted legislation to ban the sale of ivy, several communities in the United States have introduced special taxes and programs to eliminate ivy and Portland Parks has embarked on an ambitious volunteer program for youth called "No Ivy League." Locally, non-government organizations (NGOs) such as Evergreen and the Stanly Park Ecological Society have developed volunteer programs along with park agencies in North Vancouver and Vancouver to remove ivy from parks and natural areas.

Controlling English Ivy at Burnaby Lake:

Mapping and Monitoring: On a survey conducted in Feb 2004, Ivy was found at 12 locations throughout the park. The degree of infestation was characterized by the number of trees affected. Small outbreaks were limited to one or two trees – larger outbreaks involved as many as ten trees. A total of 68 trees were found to have ivy growing on them. (See map section for details) Weedbusters should identify areas that were missed in the survey, monitor areas that are cleared through work parties, and locate new outbreaks.

New outbreaks can be controlled by hand weeding. Roots can be pulled up by hand, and twisted to inhibit sprouting. Place roots in garbage bag and leave filled garbage bag near garbage can at trail entrance. Be sure to fill in a weed removal report. Ivy can be pulled up at any time of the year. New outbreaks take priority over established infestations.

Older established plants that climb trees can be cut at shoulder height using clippers, loppers or pruning saws. Do not attempt to pull down overhead vines. (You risk bring a branch down on your head). Remove vines between cut and ground level. Pull roots surrounding the tree to a circumference of approximately 6 feet. Do not work alone and wear gloves, ivy contains toxins that cause dermatitis in some individuals. Older vines can be left to compost naturally, but juvenile forms should be placed in garbage plants for removal from the park.

Work Parties: Ivy work parties are scheduled for the fall. Gloves and tools (shovels, pruners, loppers and pruning saws) will be supplied. Roots and vines will be loaded into a GVRD truck and taken to the Still Creek Compost Facility to be composted commercially.

Follow up: Areas that are cleared through work parties and/or group work should be checked the following spring and new growth should be removed. Check periodically through the growing season and remove new growth when it occurs. Fill in a weed watchers report each time you visit the area – even if no ivy is located. The GVRD Parks Research Technician will assess the site after one year to determine if more work is needed or if the area should be replanted with native species.

Safety First!
Always wear gloves when working on ivy. Toxins in the roots and stems may cause blistering in some individuals. Do not attempt to remove overhead vines. Wear goggles to protect eyes from dirt, dust and other particles. Work with a partner and call the office to let us know you plan to be working in the park.

Scotch Broom

Scotch Broom is a member of the Pea Family (Fabacea). A native of Europe, Scotch broom was first introduced to the West Coast of BC (Vancouver Island) in 1850 by Captain Walter Grant. Since that time it has greatly expanded its range – invading dry Gary Oak Ecosystems on the island and dry coastal areas on the mainland. Because of its tendencies to tolerate drought, poor soils and neglect, broom has also been widely planted as an ornamental shrub along highways and road sides. It is a prolific seed producer and seedlings are quick to establish on poor soils.

Broom often forms dense, monotypic stands that will persist over the long term as new seedlings are established and take root and replace older plants. The shrub displaces native vegetation and has very little wildlife value, resulting in reduced biodiversity. Broom changes soil chemistry by fixing nitrogen which can significantly alter ecosystems and affect succession. Broom also has chemical properties in the stems and leaves that can fuel wildfires resulting in forest fires that are more difficult to control.

Description:

A deciduous woody shrub up to 3 meters tall.

Stems: Dark green with waxy covering. Stems are angular and have an upright-erect growth pattern.

Leaves: Small, alternate three parted leaves with simple margins.

Flowers: Showy, bright yellow legume-like flowers. Abundant along the stems.

Fruit: Pea like pods that split open in later summer and eject the seeds up to three meters.

Seeds: A three-year-old plant produces up to 18,000 seeds per year. Seeds remain viable in the soil for up to 60 years.

Management of Scotch Broom:

Scotch Broom has been recognized as a serious threat to native ecosystems for several years. Land managers and conservation groups have been actively removing scotch broom from endangered Gary Oak ecosystems on Vancouver Island and the Gulf Islands. On the mainland, broom interferes with reforestation and natural succession. The threat to forest regeneration has prompted research into biological controls – which are currently being tested in Washington State. Locally, volunteer groups have begun removing broom from seashore areas where it proliferates and from open areas at higher elevations.

Managing Scotch Broom at Burnaby Lake

Mapping and Monitoring: Broom was mapped in Feb 2004. Infestation was worse on the south side of the park, along freeway trail and along Glencarin Drive. Most shrubs were in open areas, but a few were mixed with blackberry shrubs. Weedbusters should identify areas that were missed in the survey, monitor areas that are cleared through work parties, and locate new shrubs.

Small seedlings can be controlled by hand weeding. Roots can be pulled up by hand or pried out with a shovel. Place seedlings in garbage bag and leave filled garbage bag near garbage can at trail entrance. If only a few seedlings are pulled up they can be left in place to to compost naturally. Be sure to fill in a weed removal report. Seedlings can be pulled up at any time of the year.

Older established plants in open areas can be removed using a shovel and or weed wrench in spring before broom has set seed. Older plants that are mixed with blackberry can be cut back before seed set. Plants should be cut as close to the ground as possible – if it can be done safely. If only a one or two plants are removed, uprooted shrubs or cuttings may be left in place to compost naturally. When working around broom, try to avoid seed spread by wiping off boots and clothing before leaving an infested area. Remember – broom seeds are viable for 60 years!

Work Parties: Broom work parties are scheduled for the spring – before the broom has set seed. Gloves and tools (weed wrenches, shovels, pruners, loppers and pruning saws) will be supplied. As large quantities of broom could become a fire hazard if left in place, shrubs will be loaded into a GVRD truck and taken to the Still Creek Compost Facility to be composted commercially. Inspect boots and clothing for seeds before leaving the area to prevent seed transference.

Follow up: New seedlings are likely to sprout up in cleared areas. Check periodically and remove seedlings where they occur. Areas that are cleared through work parties and/or group work should be checked the following spring and new seedlings should be removed. Where broom has been cut back, check periodically through the growing season and remove new growth when it occurs. This will eventually starve the root system. Fill in a weed watchers report each time you visit the area – even if no broom is located. The Research Technician will

assess the site after one year to determine if more work is needed or if the area should be replanted with native species.

Safety First!
You should have training on safe operation of weed wrench and review the weed wrench directions before using this tool. Don't attempt to remove broom close to blackberry, unless you are sure you can manage without getting caught up in or cut by blackberry thorns. Work with a partner or group and call the office to let us know you plan to be working in the park. Wear goggles to protect eyes.

Policement's Helmet

Policeman's helmet or Himalayan balsam (*Impatients glandulifera*) is a member of the Impatients family. This annual, introduced from Asia, is sometimes sold as an ornamental. Each plant produces up to 800 seeds which readily germinate in moist soils along stream banks. In Britain, where the climate is similar to the Pacific Northwest, policemans's helmet is considered extremely invasive and is one of the country's 'top twenty' weeds.

In the Pacific Northwest, policeman's helmet is spreading rapidly along stream banks and riparian areas. It is capable of forming dense stands in summer, that die back in winter, leaving large bare patches that lead to increased erosion. Policeman's helmet is a prolific seed producers; seeds float and remain viable in water, allowing for dispersal along waterways.

Description:

General: Tall, lanky rapidly-growing annual up to 4 meters in height.

Stems: Hollow stems, up to 3 meters in height, with multiple nodes. Stems often have reddish tinge and roots may form from nodes.

Flowers: White, pink or purple flowers resemble an old-fashioned English policeman's helmet.

Seeds: Can produce up to 800 seeds. When touched mature seed pods explode, ejecting seeds up to 7 meters. This trait has earned the family the common name "Touch-me-not." Seeds remain viable for up to 18 months.

Leaves: Oblong to egg-shaped, serrated edges. Leaves are in whorls.

Management of Policeman's Helmet

Awareness of policeman's helmet as an invasive species in the Pacific Northwest is relatively new. Washington State recently added policeman's helmet to its noxious weed list and local land managers are beginning to address the problem. In the UK, policeman's helmet is on the top-ten list of noxious weeds and efforts are underway to eradicate it.

Early intervention and prevention is essential in eliminating policeman's helmet from watersheds and natural landscapes. Education may be the most important tool to land managers as many people are not aware of the problem.

Management of Policeman's Helmet at Burnaby Lake:

Mapping and Inventory: Policeman's helmet occurs along trails and waterways in Burnaby Lake. Policeman's helmet was partially mapped in 2004. Dense stands are found along the south shore trail, in the area adjacent to Wildlife Rescue, along Avalon trail and in the Equestrian area. It is common in wet areas and occurs along streams and ditches entering Burnaby Lake.

Removal: Policeman's helmet can be pulled as soon as it emerges form ground in May and June. No special tools are required as this plant is very easily uprooted. Every effort should be made to clear an area of policeman's helmet before it sets seed in late summer. As policeman's helmet can root from nodes, plants should be placed in garbage bags and left beside garbage cans at trail heads. The plants can then be disposed of in the trash or composted at a commercial facility. The plant is not suitable for home composting. It is essential to keep accurate records showing where plants have been removed, to document the extent of the problem, and assess the effectiveness of removal techniques.

Work Parties: Work parties are scheduled for June and July. Plants will be bagged and brought to the Still Creek Facility for commercial composting.

Follow Up: Seeds will persist for two seasons. Follow up after pulling in spring with second pulling in summer. Continue next season. After two seasons the Research Technician will assess the area to determine if more work is required or if the area should be rehabilitated by planting native species. Some areas will be selected for immediate reseeding with annual and perennial grasses. These areas will be monitored to determine the efficacy of reseeding.

Purple Loosestrife

Purple Loosestrife is a member of the loosestrife family (Lythraceae) native to Eurasia, Purple loosestrife was originally introduced to the Coast and Great Lakes Region from ship's ballast, but was later cultivated as a garden plant and as a nectar source for bee keepers. Loosestrife has now spread across North America and is found in 48 states and 10 provinces, where it poses a serious threat to wetlands.

Purple loosestrife is extremely aggressive, invading wetlands and sensitive ecosystems, where it replaces native vegetation. Loosestrife displaces wildlife by replacing native food sources and eliminating nesting sites for marsh birds and wildlife.

Description:

General: Herbaceous perennial, normally less tan one meter in height, but may reach heights of three meters. Multiple stems ending in dense clusters of magenta-flowers. Stems are square.

Flowers: Magenta flowers in July and August. Flowers are arranged in dense terminal clusters. 5 - 7 petals.

Leaves: Oblong, smooth leaves arranged opposite or in whorls of three.
Stems: Square stems, multiple branches.

Seeds: Prolific seed producer. A single loosestrife plant can produce up to 2.7 million seeds per year. Seeds are viable for 20 years or more.

Roots: Aggressive roots. Small piece of root remaining in ground will generate a new plant.

Managing Purple Loosestrife

Purple loosestrife is one of the best known invasive species. Ecologists across North American have monitored the spread of loosestrife and experimented with methods for removal. Cornell University estimates that purple loosestrife costs the US $48 Million annually in direct costs and economic losses.

Biological control has proven to be the most effective method for controlling established colonies of purple loosestrife. Three beetles have been approved for use in Canada to control purple loosestrife.

Managing Purple Loosestrife at Burnaby Lake:

A loosestrife eating beetle - *Galerucella calmeriensis* – was released several years ago at Burnaby lake and again in 2003 and 2004. The beetle has now become established at Burnaby Lake and loosestrife is definitely on the decline.

Mapping and Monitoring: Much of the purple loosestrife is in inaccessible areas of the park that make monitoring difficult. For the past two years the GVRD Parks Research technician has been monitoring the effect of biological controls introduced at Burnaby Lake by checking for predation of purple loosestrife by Galerucella beetles along the remote south shore. Beetles were successfully introduced to the south shore in 2003 and had over-wintered, mated and produced a second generation in 2004. By 2005 – loosestrife was no longer blooming on the south shore of the lake, where it had been rampant only two years ago.

Volunteers can help to monitor the success of the biological control program by mapping purple loosestrife and monitoring predation. “Shot holes” in the leaves of purple loosestrife indicate presence of adult beetles; “window paning” a condition where top layer of tissue is stripped from leaves indicates larval feeding. As Galerucella population builds, plants appear stunted, leaves and stems are disfigured and plant may produce short multiple stems. Flowering is reduced or nonexistent. At high population levels, leaves and stems are stripped or are not present at all. Areas that had loosestrife in the past (as evidenced by old flower stems) may be loosestrife-free. Weedbusters should report all loosestrife sightings, evidence of predation (shot holes, window-paning, stunted growth, Galerucella observed on plants etc).

Loosestrife and beetle populations may be dynamic. Beetle population can build up to explosive levels, completely defoliating plants and then crash as food is unavailable. Beetles may die off or enter diapause (the over-wintering stage) early, allowing loosestrife to recover. Monitoring outbreaks and loosestrife response over the long term, is an important part of the biological control program.

Biological Control: In July 2003, 3500 Galerucella beetles were released into Burnaby Lake. Another 4500 were released in 2004. Loosestrife declined significantly the following year. Regular monitoring is required to determine the long-term success of the program.

Hand Pulling: Isolated outbreaks of loosestrife, where no beetles are present, can be controlled by hand pulling. Individual plants along trails and wet areas can be pulled out by hand and disposed of in sealed garbage bags. Do not pull loosestrife if beetles are present in the area. Plants must be bagged and disposed of in garbage bags. Flower stems may be removed and placed in garbage bags before seed-set to prevent seed dispersal. Purple loosestrife should not be composted. as leaves, stems and roots that have not fully decomposed can re-generate and be spread to new areas. Report all loosestrife sightings and removals.

Safety First!

Purple loosestrife grows in water logged soils in sensitive areas. Do not attempt to inspect or remove loosestrife from sensitive areas where your safety or sensitive habitat could be compromised. Stay on trails.

European Hops

Hops *(Humulus* species) are a member of the Hemp family (Cannibaceae) There are two species in this genus: *Humulus lupilus* is the hop plant used in beer manufacture; *Humulus japonicus* is known to gardeners as an attractive ornamental vine. Both are diaceous – that is male and female flowers are borne on separate plants. *Humulus lupulus*, a native of Europe, was introduced to the Fraser Valley for the beer making industry and has since spread to adjacent forests and riparian areas.

Little information is available on the spread of hops, however, hops are increasing at Burnaby Lake and are now well established along the Southshore Trail where hops climb trees and choke out native vegetation.

Description:

General: Perennial herbaceous climbing vine up to 10 meters in height. Dioecious – male and female flowers are borne on separate plants.

Leaves: Leaves opposite, 3-5 lobed, palmate and finely toothed.

Stems: Slender twining stems, annual, often with stout hooked hairs. Hairs can cause severe irritation.

Roots: Horizontal and vertical roots. Vertical roots to a depth of 1.5 to 2.5 meters and horizontal roots spread out at a depth of 20-30 cm and giving rise to fibrous roots in the top layer of soil.

Flowers: Female flowers in catkin like structures called strobiles. When fully developed strobiles are about 3 – 5 cm long, oblong and rounded with overlapping yellow-green bracts. Male flowers in loose racemes up to 15 cm in length.

Management of Hops

Very little information is available on the control of hops. The Nature Conservancy suggests regular cutting at ground level to prevent flowering and seed set.

Management of Hops at Burnaby Lake

Monitoring and Mapping: Hops have not been mapped at Burnaby Lake, but antidotal evidence suggests that hops have increased dramatically in the last five years. Hops occur near the Glencarin parking lot and the area around Wildlife Rescue and are also found in the vicinity of the nature house. Volunteers are encouraged to report infestations to provide baseline data to monitor their growth and control.

Cutting: Wear gloves! Cut stems at ground level and remove vines from trees and shrubs where possible. Best time for removal is likely to be early summer as growth peaks and after flowering and during fruit production, when plants are most vulnerable. Place in garbage bags and dispose of in garbage.

Follow Up: Monitor, continue to remove new growth as it occurs. Regular removal will prevent flower and seed production and therefore prevent new infestations. No data is available on the effect of repeated cuttings over time – however, regular cutting during vulnerable periods may eventually exhaust root system.

Safety first!

Wear gloves and goggles! Hairs on stems will cause skin irritation, and hairs in eyes can be extremely painful. Do not attempt to remove hops that are mixed with blackberry.

Reed Canary Grass

Reed canary grass (*Phalaris arundinacea*) is a perennial, rhizomatous plant in the grass family (Poaceae/Gramineae). Its creeping rhizomes often form a thick sod layer which can exclude all other plants. Origin of reed canary grass (RCG) is debatable. According to some sources, reed canary grass was present on in the Pacific Northwest before settlement. However, reed canary grass, a Eurasian native, has been widely used as a forage plant in North America – and around the world. It has been selectively bred for high rates of growth, vigor and adaptability to a wide range of ecological conditions. There is no way to determine if the plant is a native or a hybrid species from Eurasia. Given the very aggressive nature of reed canary grass in natural ecosystems it is likely that the reed canary grass invading wetlands and parks is the non-native cultivar bred for its vigor and adaptability.

Reed canary grass invades wetlands, ditches, river floodplains, and wet meadow. Reed canary grass often chokes ditches and drainage swales, changing drainage patterns and encouraging flooding. It forms dense monotypic stands that can exclude all other vegetation. The tall fast-growing grass shades out sun-loving seedlings and the dense rhizomes prevent vegetation form taking root. Trees and shrubs planted in reed canary grass rarely survive.

Description:

General: Reed Canary Grass can grow up to 2 meters high. The general form is similar to bamboo.

Leaves: RCG has flat wide (2 cm) leaf blades. Leaf blades are up to 0.5 meters in length. Leaves are attached to stems with small clasping auricles.

Stems: Stems are hollow and up to 2 meters in height.

Roots: Creeping rhizomes that form a dense sod.

Inflorenscence: Panicles are compact and resemble spikes when immature, but become open and slightly spreading at maturity. When in full bloom (May to June), the inflorescence changes colour from pale green to dark

purplish, becoming straw coloured when fruits have developed and matured.

Management of Reed Canary Grass

There is no quick fix for reed canary grass. The nature conservancy recommends hand digging for small patches and tillage followed by flooding and replanting for large infestations. Most management practices for control of reed canary grass include the use of pesticides or burning – activities that are not appropriate for regional parks. Regular mowing helps to reduce the spread of reed canary grass, but will not eliminate it. GVRD Parks is exploring options for control of reed canary grass at Colony Farm Regional Park, where the grass has taken over former agricultural fields.

No control methods are in place for Burnaby Lake – but volunteers can help by mapping infestations and trampling (stomping) reed canary grass around newly planted trees and shrubs.

Japanese Knotweed

Japanese knotweed (*Polygonum cuspidatum*) is a member of the buckwheat family (Polygonaceae). Native to Asia, Japanese knotweed was introduced as a landscape plant in the early 1900's. Knotweed is unique –in that all plants that were introduced in North American and Europe are sterile (although some newer hybrid varieties (e.g. *Polygonum X bohemicum*) may produce viable seed. Japanese knotweed reproduces easily from root (rhizome) and stem fragments. Knotweed increases rapidly in established areas and can quickly colonize new sites when root or stem fragments are moved by water and or mechanical means. New infestations may occur through the movement of contaminated soil.

Japanese knotweed is an extremely aggressive plant that invades riparian areas and crowds out native vegetation. It has the potential to form large dense stands with little of no wildlife value.

Description:

General: Japanese knotweed is a tall spreading (up to 3 meters) perennial that dies back in winter.

Stems: Jointed bamboo-like stems are hollow and may appear reddish or speckled. Stems grow rapidly in spring and can reach 3 meters in height by June.

Flowers: Small white or greenish sterile flowers appear in July and August and grow in dense clusters from the leaf joints.

Leaves: Large smooth-edged leaves are heart shaped or spade shaped.

Roots: An extensive network of rhizomes which can spread up to 20 meters form the parent plant. Roots may be up to 2 meters deep. Stem and root fragments as small as 1 cm can maintain or start a new colony.

Management of Japanese Knotweed

Japanese knotweed is extremely difficult to eradicate – small fragments left in the ground or moved through the removal process can generate new colonies. Furthermore cutting around the plant may encourage lateral roots to sprout, resulting in renewed vigor and growth several meters form the parent plant. In England, where Japanese knotweed is a serious pest, knotweed fragments and contaminated soil are classified as an environmental contaminant and must be buried at least 3 meters deep. Researchers in England are currently looking for biological controls to reduce the spread of knotweed and researchers in Oregon are experimenting with non-standard methods of pesticide application (stem injection) to control knotweed.

Some community groups have begun removing knotweed from parks and sensitive areas in the GVRD and others are experimenting with alternative methods – such as covering ground with black plastic. The effectiveness of these methods have not yet been determined, and in some cases plant material inadvertently left on site has resulted in the formation of new colonies.

Management at Burnaby Lake

Mapping and Monitoring: Knotweed has not been mapped at Burnaby Lake , but it is known to occur along Glencarin drive, along Eagle Creek and sporadically throughout the park – mostly along ditches, streams and swales. Weedbusters can assist by mapping and measuring the extent of small outbreaks so that staff can monitor the rate of spread and develop site-specific prescriptions.

Volunteers should not try to remove knotweed from Burnaby Lake until mapping is completed and sites can be targeted for careful treatment. Once knotweed is mapped, small patches may be targeted for removal and disposal. Removal is likely to be a long term process requiring extensive monitoring as knotweed will sprout from root segments that are left in the ground. Root and stem fragments must be incinerated. Long term solutions may come out of research currently underway in the UK and Oregon.

Himalayan Blackberry

Contrary to the name, Himalayan blackberry (*Rubus discolor, Rubus armeniacus*) is a member of the Rose family and native of Western Europe . Himalyan Blackberry was introduced to the West Coast in the late 1880's as a cultivated crop plant. By 1945 it had naturalized along the West Coast and is now a common sight throughout the Lower Mainland, where it is spreading exponentially. It thrives in disturbed areas, often forming impenetrable thickets along roadsides, in pastures, clearings, creek gullies, riparian areas, fence lines and right of ways.

Himalayan blackberry can completely replace grasslands and meadows, and may take over riparian areas limiting biodiversity and changing the nature of the ecosystem. Once established, Himalayan blackberry can prevent the establishment of competing shrubs and trees and inhibit or prevent succession.

Description:

General: A robust, sprawling, woody perennial with heavily armed canes. Plants are more-or-less evergreen with leaves persisting in mild winters.

Stems: Canes are heavily armed with large thick prickles (thorns). Canes may reach 3 meters or more in height in mature plants. New canes grow off old wood, forming dense impenetrable thickets. Daughter plants may develop where canes touch the ground. Stems may reach ten meters or more before touching the ground. A single cane can produce a thicket 5 meters in diameter within two years.

Leaflets are arranged in 3's on side-shoots (secondary canes) and 5's on older canes. Leaflets are large, round to oblong and toothed. Leaves persist in mild winters.

Flowers: White flowers appear in summer. Flowers appear on new growth (secondary canes) which grow off of older (primary) canes.

Fruit: Dark red to purplish fruit in late summer and early autumn. Seeds are often spread by birds and mammals and may remain viable for several years. Seeds require sunlight to germinate.

Management of Blackberry

Control is normally a two phased process, removal of the above ground vegetation and killing or removing root crowns. Repeated cutting of above ground portion will eventually starve root system resulting in death of the plant.

Small outbreaks can be managed with hand tools, which is extremely labour intensive. Large infestations will necessitate the use of heavy equipment such as flail mowers and mulchers. Colony Farm and Tynehead Regional Parks have had success with repeated cutting of blackberry using a flail mower or mulching machine, however this method is not suitable for trail edges or woodland.

Recently, a rust fungus, believed to be *Phragmidium violaceum*, that attacks blackberries, was accidentally introduced to Oregon. The fungus has been used successfully as a biological control for Himalayan blackberry in Australia and New Zealand, where it reduced blackberry by approximately 50%. The fungus reduces the spread, growth and vigour of Himalyan blackberry. However, it could also impact native and/or commercial species. The US Department of Agriculture is monitoring the effect of the fungus on invasive, crop and native blackberry species – under controlled settings. So far, the fungus appears to be hosts specific, attacking only Himalayan blackberry, but more research is needed.

Rust on blackberry leaf (front)

Rust on blackberry leaf (back)

Management of Blackberry at Burnaby Lake:

No prescriptions have been developed for Burnaby Lake: Blackberry is well established along the freeway trail and is found along trail edges throughout the park. Weedbusters can map blackberry infestations and cut back new outbreaks when they occur.

In the future Weedbusters may be monitoring Himalayan blackberry for signs of fungal infection.

Yellow Flag Iris

Yellow flag iris (*Iris pseudacorus*) is a perennial plant in the Iris Family (Iridaceae). It was introduced as a garden pond plant and is now widely established in low elevation wetlands across North America. It has been planted as erosion control and or used to remove metals in sewage treatment plants in some parts of North America. Unfortunately, yellow flag is sometimes listed as a naturalized wetland plant and sold by native plant nurseries for use in wildlife gardens and restoration sites.

Yellow flag iris can be highly invasive, forming dense single species colonies in wetlands and marshes. Once established the thick tuberous rhizomes form mats that can prevent the germination and seedling growth of other species. Wildlife that are dependent on native species for food and shelter are displaced, reducing biodiversity and changing the nature of the marsh.

Description:

General: a robust clumping perennial with sword-like leaves and showy yellow flowers in summer. Yellow flag iris grows to a height of 0.4 to 1.5 meters tall.

Leaves: Sword like leaves, 10 to 30 mm wide and 50 to 100 cm in length. Leaves are grayish and area arranged in fan with leaf bases over lapping.

Flowers: Each inflorescence may have one to several large showy flowers. The flowers measure 8 – 10 cm in diameter and vary from pale yellow to almost orange. The 3 petal flowers are fused at the base forming a flaring tube with sepals spreading and bent. Fruits are elongated capsules with seeds arranged in three densely packed vertical rows.

Management of Yellow Flag Iris

Land managers and ecologists are just beginning to recognize yellow flag iris as an invasive species. Washington State recently added yellow flag to its list of noxious weeds because of its tendency to invade wetlands and waterways. The Cowichan Valley Naturalists have been successful in removing yellow flag from the Cowichan Marsh – first by removing flowers to prevent seed set and finally be digging out the rhizomes.

Management of Iris at Burnaby Lake:

Yellow flag iris has not been mapped, however, it is known to be widespread and found in low water areas, islands and along the shoreline of Burnaby Lake. Access to these areas is extremely difficult, making a removal program all but impossible. Due to the difficulties of removal and safety issues, volunteers should not try to remove iris form the lake. However, if plants are accessible flower stocks and/or heads can be removed to prevent seed set.

Glossary of Terms

Adventitious roots: A root that grows from somewhere other than the primary root, for example, roots that arise from stems or leaves.

Alternate: A leaf arrangement where leaves are singly, but alternately on the stem.

Annual: Living for only one year.

Auricle: Ear-shaped projection or appendage. The shape of the auricle – a lobe shaped appendage at the base of the leaf - is an identifying feature for many grass species.

Compound Leaves: Leaves with two or more leaflets attached to a single leaf stem. Blackberry has compound leaves with 3 or 5 leaflets.

Diapause: In invertebrates, a period of time when growth or development is suspended. Diapause may be obligatory part of a life cycle, for example the over-wintering stage for Galerucella beetles, or may be induced by environmental stresses such as a food shortage or a change in temperature.

Dioecious: Bearing male and female flowers on separate plants. Holly and hops are dioecious.

Herbaceous: A non-woody plant in which the upper parts dies back to the rootstock at the end of the growing season. Purple loosestrife is a herbaceous perennial.

Inflorescence: A flower cluster

Leaflet: In a compound leaf, the individual blades are leaflets.

Monoecious: Having male and female flowers on the same plant.

Nodes: The place where a leaf or branch is attached.

Opposite: Leaves in pairs on opposite sides of the stem – not alternate or whorled.

Panicle: A loosely branched, pyramidal flower cluster or inflorescence. The flowers of many grasses are arranged in panicles.

Perennial: persisting for 3 or more years, usually flowering each year.

Petal: One of the outer appendages of a flower, located between the outer sepals and the stamens. Petals often display bright colors that serve to attract pollinators.

Raceme: An unbranched inflorescence of stalked flowers blooming from the bottom up.

Rhizomes: Underground, often elongate stems, distinguished form roots by the presence of nodes, buds or scale-like leaves.

Scarification: The process of breaking down the hard seed coat to allow germination to occur. Natural scarification occurs when seeds pass through the digestive system of birds and other animals.

Sepals: Modified flower leaves on the outside of a flower, usually green.

Stamens: The male part of a flower that produces pollen.

Strobiles: A cone or catkin like flower, as the flowers of hops.

Whorl: An arrangement of appendages, such as branches or leaves, such that all are equally spaced around the stem at the same point, much like the spokes of a wheel or the ribs of an umbrella.

Part 5 - Resources, Maps and Forms

Resources

The internet contains a wealth of information on invasive species. The following sites provide excellent information on the threat of invasive species, their control and detailed information on specific invasives.

Invasives on the Web developed by the Nature Conservency's Wildland Invasive Species Team. This is a comprehensive site with an excellent photo library and detailed information (stewardship abstracts) on specific invasives. Geared to the land manager, this site provides numerous resources that can be used to develop an invasive species program, including management templates, educational resources, presentations, weed control manuals, and information on adaptive management. http://tncweeds.ucdavis.edu/index.html

Invasivespecies.gov is the web site for the U.S. National Invasive Species Council, which coordinates U.S. federal responses to the problem of invasive species. The site includes the impact of invasive species, U.S. government response, and specifies profiles. This is a gateway site with links to federal and state invasive species programs and activities. http://www.invasivespecies.gov

Weeds Gone Wild: Alien Plant Invaders of Natural Areas is a web-based project of the Plant Conservation Alliance's Alien Plant Working Group, that provides information for the general public, land managers, researchers, and others on the serious threat and impacts of invasive alien (exotic, non-native) plants to the native flora, fauna, and natural ecosystems of the United States. Provides detailed fact-sheets on specific invasives that include plant descriptions, native range, distribution and habitat in the U.S., management options. http://www.nps.gov/plants/alien/

King County Noxious Weed Control Program. Washington State has a well developed noxious weed program that includes plants that threaten natural areas. The site contains good information on invasives, such as policeman's helmet and knotweed, that effect natural areas in the Pacific Northwest. http://dnr.metrokc.gov/wlr/lands/weeds/

No Ivy League. Ivy Removal Project. A volunteer based program developed to "restore the native habitat of Forest Park (in Portland Oregon) by removing invasive plants, especially English Ivy, through youth development programs, environmental education, and community participation while promoting research, providing technical assistance, and seeking relevant societal changes." http://www.noivyleague.com/

E-Flora BC. On line resource atlas to native plants in BC also contains information on invasive species. The site is new and still under development but has a wealth of information on native species.

Invasive Plants of Southwestern British Columbia. Good source of information on invasives affecting the GVRD. Excellent photographs and control information. http://www.shim.bc.ca/atlases/invasivespecies/

Fraser Basin Council: Invasive Plant Strategy for BC www.fraserbasin.bc.ca/publications/documents/InasivePlantSpeciesFNL.pdf

Weeds BC: The focus in on agricultural weeds of BC. www.weedsbc.ca/resources

Ministry of Agriculture, Food and Fisheries: Pest Management Field Guide to Noxious and Other Selected Weeds of BC; Integrated Weed Management-An Introductory Manual; Biological Weed Control in BC. www.agf.gov.bc.ca/cropprot/weeds

Organizations dealing with invasive species

BCIT Fish, Wildlife, and Recreation – Watershed Pledge Program	604-432-8270
Evergreen Foundation – Stewards in the City Program	604-689-0766
Institute of Urban Ecology (Douglas College)	604-527-5400
Lynn Canyon Ecology Centre	604-981-3103
Naturescape B.C. – native plants	1-800-387-9853
Stanley Park Ecology Society – Ivy Busters	604-257-6907
Wetland Keepers (Abby Schwartz)	604-323-5207 or 604-435-2937

Appendix I: Monitoring Report

Name:_____ Date:_____

Species Found:_____

1. Location: Be as precise as possible. Include trail name, section, description (nearby vegetation, distinctive features, distance from trail head, bridge, culvert, etc). Mark on map.

_____

_____

_____

_____

_____

2. Is occurrence a discreet patch? Yes No
   If yes, approximate size of occurrence. (_____ m. long x _____ m wide)

3. Estimate number of individuals: _____

4. Is it in flower? Yes No
   Is it in fruit/seed? Yes No

5. Is there any evidence of herbivory? Yes No
   If yes, describe_____

6. Comments:_(notes on vigour, size and age of plant, recommended action, etc)

_____

_____

_____

7. Did you remove any plants? Yes No
   If so, how many?

Note: Use one report for each occurrence or infestation of a single invasive species.

Appendix II: Weedbusters Report

Date:_____ Species Removed _____

Crew Leader:_____

1. Was removal part of an authorized weed removal party?
If yes, number of participants_____

2. Location: Be as precise as possible. Include trail name, description (nearby vegetation, distinctive features, distance from trail head, bridge, culvert, etc). Mark on map. Include GPS coordinates where possible.

_____

_____

_____

_____

3. Removal Method: _____

4. Tools used: _____

5. Were plants in flower? Yes No
Were plants in fruit/seed? Yes No

6. Number (or volume) of plants removed. _____

7. How were plants disposed of: _____

8. Comments:(notes on vigour, size and age of plants, difficulties, etc)

_____

_____

_____

Note: Use one report for each species removed.