



# menziesia

Winter 2010 NPSBC Native Plant Society of British Columbia www.npsbc.org Volume 15, Issue 1

## Native seed exchange gets royal attention

Seeds from six native BC species have a new permanent home in The Royal Botanic Gardens Kew's Millennium Seed Bank, thanks to the efforts of the Native Plant Society of BC in partnership with VanDusen Botanical Garden and the VanDusen Seed Collectors.

An exchange of seeds took place during the Vancouver visit of Camilla, the Duchess of Cornwall in November. The Duchess presented six varieties of native plant seed from the Millennium Seed Bank to VanDusen Botanical Garden director Harry Jongerden. In return, he presented the Duchess with the wild-collected BC native plant seed not currently in the MSB collection.

"Given Her Royal Highness' commitment to conservation and the environment, we hoped that a seed exchange would be an appropriate way to mark the occasion and highlight the important role botanic gardens play in plant conservation," said Mr. Jongerden. "This royal visit and the seed exchange mark the launch of a renewed focus by VanDusen on the conservation of BC's native plants. Along with RBG Kew, we wish to thank our partner, the Native Plant Society of British Columbia, and we all thank Her Royal Highness for facilitating this exchange of vitally important genetic material."

Dawn Hanna, NPSBC president, and Leslie Ingram, NPSBC member and VanDusen seed collector, procured the native plant seed, and VanDusen seed collector volunteers then packaged the seeds for transport. The species sent were:

- *Arbutus menziesii* (arbutus)
- *Aquilegia formosa* (western columbine)
- *Bidens amplissima* (Vancouver Island beggarticks)
- *Lilium columbianum* (tiger lily)
- *Dicentra formosa* (western bleeding heart)
- *Erythronium oregonum* (white fawn lily)

The Millennium Seed Bank is the largest ex situ plant conservation project in the world. The focus is on global plant life faced with the threat of extinction and plants of most use for the future. Working with a network of partners across 50

*Continued on page 2*



Harold Ma

**A gift of generations:** VanDusen Botanical Garden director Harry Jongerden presides over formal handover of native seeds. Also pictured, left to right, Iain Rosen, Maaïke Bos, Camilla, Duchess of Cornwall, Megan Leong and NPSBC representative Leslie Ingram.

### With a little help from our friends

Guests who attended the royal visit at VanDusen Botanical Garden received some special mementos of the day, courtesy of the Native Plant Society of BC and the VanDusen Seed Collectors. More than 100 guests received a packet of native seeds and a Douglas fir seedling, all suitable for planting, and an NPSBC brochure.

Many thanks to Leslie Ingram for her help in securing and packaging the seeds and to Patrick Wilson of Linnea Nurseries for the donation of Douglas fir seedlings. Thanks also to VanDusen Botanical Garden for the opportunity to showcase the NPSBC.

countries, the MSB has successfully banked 10 percent of the world's wild plant species. The MSB aims to save 25 percent by 2020, targetting plants and regions most at risk from climate change and the ever-increasing impact of human activities.

"Plant diversity is invaluable to humanity and conserving wild plant species in seed banks is one of the very many positive contributions botanic gardens can make to biodiversity conservation around the world," notes Dr. Paul Smith, head of Kew's Millennium Seed Bank.

The Native Plant Society of BC will be discussing future efforts to secure wild-collected BC native plant seed for the MSB with partners including VanDusen Botanical Garden, UBC Botanical Garden, the BC Ministry of Environment and others. Details to come in future issues of *Menziesia*. \*

## Welcome to our new members!

Jan Alexander (Vancouver)	Jeff Kingsley (Vancouver)
Joe Bennett (Vancouver)	Randal, Barbara & Claire Mindell (Vancouver)
Bruce & Lesley Bohm (Vancouver)	Nancy Noble (North Vancouver)
Margarite Cerqueira (Coquitlam)	Robert & Audrey Ostrom (Vancouver)
Quentin Cronk (Vancouver)	Nadine Robinson (North Van)
Michael Curtis (Vancouver)	Jan & Dan Phelps (Vancouver)
Aaron Gaffney (Vancouver)	Debora Taschuk (West Van)
Helen Gowans (Vancouver)	Raakel Toppita (North Van)
Lawrie Henrey (Gibsons)	

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*Feature articles are the sole responsibility of their authors. Opinions expressed therein are not necessarily those of the Native Plant Society of BC.*

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## Listserv

Subscribe to the NPSBC electronic list for information and discussion on native plants and habitats, current projects and upcoming events.

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TO SEND MAIL to the list, address your message to NPSBC-L@victoria.tc.ca

Send enquiries to the administrator at NPSBC-L-owner@victoria.tc.ca

# NPSBC

Native Plant Society of British Columbia

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The purpose of the Native Plant Society of British Columbia is to encourage knowledge, appreciation, responsible use and conservation of BC's native plants and habitats.

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# Canada's first golden paintbrush translocation takes place in Gulf Islands National Park

By Aimée Pelletier

**P**arks Canada is the lead agency responsible for the protection and recovery of over 40 species listed under Canada's Species at Risk Act (SARA) that inhabit Garry oak and associated ecosystems. One of the goals of the Garry Oak Ecosystem and Species at Risk Recovery (GOESARR) Project is to assist in the recovery of Garry oak species at risk by introducing some of these species to suitable sites in Gulf Islands National Park Reserve and Fort Rodd Hill National Historic Site. Although there is no substitute for ecosystem protection when it comes to conserving rare species, there are instances where translocation (introduction or re-introduction) of a rare species is the best option for endangered species recovery.

For example, the endangered golden paintbrush (*Castilleja levisecta*) is restricted to only two small island populations near Victoria and to nine populations in the United States. The Recovery Strategy for Multi-Species at Risk in Maritime Meadows Associated with Garry Oak Ecosystems in Canada identifies as a recovery goal for this species the establishment of at least seven new populations.

Surveys of potential golden paintbrush habitat in Gulf Islands National Park Reserve determined that a small island located off of D'Arcy Island at the southern extent of the park reserve, is the best available site for supporting a new population. Golden paintbrush seed was collected from a Canadian donor population near Victoria in August 2008 and entrusted to a local nursery for germination testing and propagation with fingers crossed that the seed would be viable (it was!). In early November a small team of hopeful biologists carefully transplanted 250 precious seedlings into experimental plots on the island. While several translocation attempts (some successful!) have been made in the



Photo: Nicole Kroker

**Blooming success:** Mature golden paintbrush (*Castilleja levisecta*) grows in a maritime meadow on Trial Island, near Victoria.

United States for this species, this will be the first experimental translocation attempt in Canada!

Unlike the rich and protected greenhouse environment where the seedlings have been raised, these tender shoots face a number of challenges in their new location, including torrential winter rains, potential trampling and/or grazing by river otters (*Lontra canadensis*) and Canada geese (*Branta canadensis*) that use the island, competition with invasive species and summer drought conditions.

Research indicates that the bottleneck for seedling survival after transplanting is the drought conditions they face during their first summer in the field. This is why a third of the transplanted seedlings will receive supplemental watering during the hot, dry summer months. Another third will receive supplemental fertilization in addition to water. A control group will receive neither water nor fertilizer. This design will assist us in filling some critical information gaps about the species' growth requirements.

The survival, growth, and reproductive output of the seedlings, as well as signs of trampling, herbivory, disease and competition with invasive species, will be monitored closely over the next several years to assess project success. If necessary, invasive species will be managed within the experimental plots and protective measures taken to exclude herbivores. It is hoped that the information gained from this small-scale experimental translocation will not only inform future translocation efforts to establish long-term persistent populations at this, and other Canadian locations, but may also help determine management options for existing populations, some of which appear to be in decline. Let's keep our fingers crossed that these tender green shoots make it through the many challenges ahead!

For more information on this project, contact Brian Reader (brian.reader@pc.gc.ca) or Aimée Pelletier (aimee.pelletier@pc.gc.ca).

Aimée Pelletier is a Parks Canada ecosystem scientist with the Coastal BC Field Unit in Victoria.

# Make a biodiversity resolution for the New Year

By Daniel Mosquin

The year 2010 has been declared the International Year of Biodiversity by the United Nations. Starting from the notions of both celebrating life on Earth and promoting the value of biodiversity, the United Nations hopes to spur individuals, communities, governments and businesses around the globe to take action.

Why preserve biodiversity? It's a question all of us would intuitively know some of the answers to, but to recap from a homocentric perspective: ecological goods and services used by humans measure in the billions if not trillions of dollars. These include, but are by no means limited to: provision of food, fuel, fibre, shelter, building materials, clean air, clean water, decomposition, climate moderation, weather moderation, soil renewal, pollination and inspiration.

Certainly, we are all aware of at least some threats to biodiversity. These range from overpopulation and overconsumption to habitat degradation, climate change and ocean acidification to pollution and exotic invasives to lack of political will.

Many of these threats require international, national or regional responses, often by government. Indeed, as most nations of the world have ratified the Convention on Biological Diversity (exceptions: Andorra, the Holy See, Somalia and the USA), governments are *obligated* to address these threats.

However, it is also incumbent upon individuals to tackle these threats as well. Beyond "reduce, reuse and recycle", what resolutions can individuals make to act for biodiversity? Below are eight governmental responsibilities outlined by the CBD and simple actions that you can take as an individual.

**1. Governmental responsibility:** *Identifying and monitoring the important components of biological diversity that need to be conserved and used sustainably*

**Individual Resolution:**

- Help Canada's Plantwatch program via the Native Plant Society of BC.
- Become a BC Ecological Reserve warden.

**2. Governmental responsibility:** *Establishing protected areas to conserve biological diversity while promoting environmentally sound development around these areas*

**Individual resolution:**

- Advocate for parks and conservation areas.



**Biodiversity blooms:** Numerous species (both plant and animal) live in this subalpine grove in Manning Provincial Park. *Photo: Dawn Hanna*

- Monitor development in the community.

**3. Governmental responsibility:**

*Rehabilitating and restoring degraded ecosystems and promoting the recovery of threatened species in collaboration with local residents.*

**Individual resolution:**

- Join community groups working on local restoration, e.g., Byrne Creek Streamkeepers, Jericho Stewardship Group.

**4. Governmental responsibility:**

*Respecting, preserving and maintaining traditional knowledge of the sustainable use of biological diversity with the involvement of indigenous peoples and local communities.*

**Individual resolution:**

- Learn the value of local biodiversity to local peoples as a stepping stone to further action.

**5. Governmental responsibility:** *Preventing the introduction of, controlling and eradicating alien species that could threaten ecosystems, habitats or species.*

**Individual resolution:**

- Join community groups working on eradication of alien species (e.g. Stanley Park Ecology Society's ivy pulls).

**6. Governmental responsibility:** *Controlling the risks posed by organisms modified by biotechnology.*

**Individual resolution:**

- Become informed and make consumer choices based on best-available knowledge of risks.

**7. Governmental responsibility:** *Promoting public participation, particularly when it comes to assessing the environmental impacts of development projects that threaten biological diversity.*

**Individual resolution:**

- Become involved – engage your local representatives on biodiversity issues.

**8. Governmental responsibility:** *Educating people and raising awareness about the importance of biological diversity and the need to conserve it.*

**Individual resolution:**

- Attend lectures, join additional local nature groups, read, volunteer at biodiversity organizations.

Both UBC Botanical Garden and VanDusen Botanical Garden are promoting the International Year of Biodiversity through lectures and other activities. The new Beaty Biodiversity Museum on the UBC campus will also be promoting the IYB when it opens in early summer.

The key point urged by the United Nations in declaring the IYB is this: "Biodiversity is Life. Biodiversity is Our Life."

*Daniel Mosquin is the education and technology manager for the University of BC Botanical Garden.*



# Garry Oak Ecosystems Recovery Team developing new restoration compendium

On Nov. 13, the Garry Oak Ecosystems Recovery Team's Restoration and Management Recovery Implementation Group held a workshop to invite input on the development of a new publication: the *Garry Oak Ecosystems Restoration Compendium*. Close to 40 participants from a variety of backgrounds in restoration attended.

The idea behind the compendium is to provide a resource for restoration practitioners, both professional and lay individuals, that enables them to undertake restoration of Garry oak ecosystems with the best possible chance of success.

There is a very high level of interest in restoring Garry oak ecosystems, but comparatively little information that is readily available for individuals interested in conducting restoration in the field.

Some information is in the scientific literature, some is in literature that is not peer-reviewed, but much of it is in the minds of individuals who have gained their knowledge through trial and error (local ecological knowledge). The aim of the compendium is to gather information from these various sources and make it readily available.

The compendium is aimed at both staff of government agencies, be they federal, provincial or local as well as private businesses, not-for-profit organizations and conservation-minded individuals.

Initially, the compendium will be an on-line version posted on the GOERT website. The option for a printed version will be evaluated subsequently, depending on demand and costs.

Some of the draft chapters are available on the GOERT website and authors are open to feedback on those chapters until Jan. 29. (Input will actually be accepted after this date, but may not be immediately incorporated.) Interested individuals should check the GOERT website for further announcements about another workshop or training session.

For now, the compendium includes chapters on:

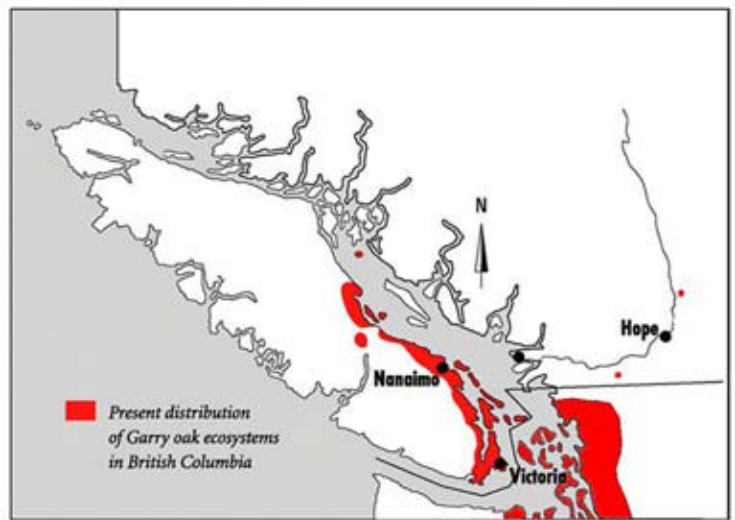
- Distribution and Description of Garry Oak and Associated Ecosystems
- Ecosystem Disturbance Regimes
- Species and Ecosystems at Risk
- Restoration Strategies
- Species Propagation and Supply
- Alien Invasive Species
- Outreach and Public Involvement
- Inventory and Monitoring

For a closer look at what's to be covered, you can check out the draft chapters on the GOERT website at [www.goert.ca/news/2009/12/19/compendium/](http://www.goert.ca/news/2009/12/19/compendium/) \*



Photo: Virginia Skilton

Garry oaks abound on the slopes of Mount Tzouhalem in Duncan.



# Get involved with the NPSBC

The Native Plant Society of BC is looking for a few good volunteers in order to offer a variety of opportunities to learn more about and conserve native plants and their habitats. Come on out, lend a hand, get involved and have even more fun!

## Membership coordinator

Your job: To keep the membership list up to date, send the occasional email and get the mailing list together for sending out four issues of *Menziesia*.

Your skills: You're a reliable and organized person, can use Excel and have a bit of time each month to keep the files up to date and send out emails as needed to the membership. Renewal time in January is probably going to be the busiest time of the year.  
Overall time commitment: About three to four hours per month.  
Interested? Contact Dawn at dawnhanna@telus.net or Leslie at la-ingram@shaw.ca for more information.

## Evening speakers assistant

Your job: To help set up and take down the Cedar Room at VanDusen for the evening presentations e.g. setting up chairs and tables, putting out tea and coffee, etc.  
Your skills: You're a reliable person who arrives at 6:15 p.m. for NPSBC South Coast presentations and helps do whatever needs to be done.  
Overall time commitment: About three hours a month, for Jan. to Apr. and Oct. to Dec.  
Interested? Contact Dawn at dawnhanna@telus.net for more info. \*

# Big sagebrush has big advantage

Adapted from an article by Bonnie Heidel in the Nevada Native Plant Society newsletter

The small flowers of big sagebrush (*Artemisia tridentata*) may lack flamboyance, but they give new meaning to the term "flower power". The flower parts of most plants are energy sinks that tap energy produced by the rest of the plant, but big sagebrush flower heads can photosynthesize on their own and can produce more energy than leaves, supporting their own growth and respiration.

Under well-watered conditions, big sagebrush flowers have some of the highest reported photosynthesis levels among all flowers. Well-watered conditions across Washington State early in 2009 resulted in a flower bonanza of big sagebrush, elevating activity after low-flowering levels during prior years of prolonged drought.

Big sagebrush flowers are late bloomers. Inflorescences emerge in late spring, but don't expand until summer and mature in fall. It is thought that vegetative growth in the spring separated from the reproductive growth in the fall avoids competing demands. The flowers are at work even when xylem water potentials plunge. This capacity to respond to infrequent rainfall and operate with limited moisture is an adaptation for fall flowering in an arid climate.

Big sagebrush has been interpreted as a likely colonizer over most western states in the Pleistocene, though palynologists are quick to note that it is not possible to identify *Artemisia* pollen to species. Big sagebrush may have been the "flower that won the west". \*



*Artemisia tridentata*

## References:

- Evans, R.D., R.A. Black and S.O. Link. 1991. Reproductive growth during drought in *Artemisia tridentata*. *Functional Ecology* 5(5): 676-683
- Welch, B. L. 2005. Big sagebrush: a sea fragmented into lakes, ponds and puddles. Available online at [www.fs.fed.us/rm/pubs/rmrs\\_gtr144.pdf](http://www.fs.fed.us/rm/pubs/rmrs_gtr144.pdf)



# Plants rise to winter's challenges

Story and photo by Eva Durance

When the thermometer dips below 0° C and I'm cozy inside my well-insulated house heated with gas furnace and wood stove, I marvel at the ability of plants to live through our northern winters. They have evolved a number of survival tactics, however, to ensure their species' reappearance year after year. In a manner similar to plants that survive extremes of heat, cold-adapted species have an evolutionary philosophy of not putting all their eggs in one basket.

Most annual species handle winter by individuals dying after setting seed, the shell of which protects the embryo within until spring's warmth and moisture induce it to germinate. Perennials, biennials, some so-called winter annuals, and evergreens, however, must have strategies to cope with below-freezing temperatures, desiccation of plant tissue from cold and wind, fluctuating temperatures, and intense sun that can scald living, but dormant, tissues above or below soil level.

Deciduous trees (and *Larix*, a genus of deciduous conifers) and shrubs shut down their metabolic processes, lose their leaves, and go into a dormant state with the sap flowing down to the roots. Coniferous trees and evergreen shrubs also go into a similarly dormant state, but retain their very cold- and drought-tolerant foliage which allows photosynthesis to continue longer than for the deciduous species. The bark of trees and shrubs (mostly cork) protects their living inner tissues from sun and wind damage.

Many evergreens (conifers and broad-leaf) native to cold climates grow fairly low to or hugging the ground which alone helps shelter them from desiccating wind. Larger nearby plants, rocks or other features nearby can assist too and low plants are more apt to be insulated by snow. Woody stems of shrubs also help prevent evaporation, and these plants tend to have densely packed stems and foliage (needles or leaves) that is very small, narrow, thick, waxy or hairy to help prevent evaporation, scald from the sun reflecting off snow, and wind desiccation.

Examples of the type of plant described above are bearberry or kinnikinnik (*Arctostaphylos uva-ursi*), Labrador tea (*Rhododendron groenlandicum*), buckbrush (*Ceanothus* sp.), tall Oregon grape (*Mahonia aquifolium*), big sage (*Artemisia tridentata*), shrubby penstemon (*Penstemon fruticosus*) and parsnip-leafed buckwheat (*Eriogonum heracleoides*).

Herbaceous plants that are not cold hardy die primarily because the water in the cells freezes, expands, and breaks the cells open much like a bottle in the freezer if you fill it completely. In winter-hardy



**Promise of spring:** Frost lingers on the lacy winter rosette of scarlet gilia.

plants that have above-ground overwintering parts, cell destruction is prevented in part by the water migrating in fall to the spaces between the cells where the freezing and expansion does much less damage. Such plants also produce high levels of sugars which act as antifreeze; this prevents damage to the roots as well as above ground parts.

Many herbaceous perennials such as balsamroot (*Balsamorhiza sagittata*), yellow bells (*Fritillaria pudica*) and desert parsley (*Lomatium* sp.) survive by retreating to their large, fleshy tuberous or bulbous underground parts from late spring onwards. Biennials take a more chancy route.

Biennials set seed one year on mature plants and produce a rosette of leaves the following spring. It's another full year before the new plant flowers. Native species that behave this way are the striking scarlet gilia (*Ipomopsis aggregata*), the spectacular golden blazing-star (*Mentzelia laevicaulis*), Holboell's rockcress (*Arabis holboellii*), a small, white-flowered species and yellow evening-primrose (*Oenothera villosa*). Giant mullein (*Verbascum thapsis*), a non-native species with tall stalks of yellow flowers, has a particularly large and striking velvety grey-green rosette.

There are advantages in cold climates to the way evergreens or biennials overwinter. The former use considerably less energy than deciduous plants since they don't have to grow new leaves each year while the latter get a jump start on the growing season. Unfortunately, a number of noxious weeds from elsewhere are hardy perennials, biennials or winter annuals, just one of the ways they out-compete less aggressive indigenous species.

These are only a few of the many complex and astonishing ways plants have evolved to survive northern winters, but the species which brave the blast still adorned with leaves have my particular admiration. Makes us look downright wimpy! ❄️

# The growing effects of climate change

Although a comprehensive agreement wasn't reached among the earth's nations during the recent UN Climate Change Conference in Copenhagen, the event did get our attention back on an issue that affects us all. While you may have heard a lot about emissions targets, carbon footprints and climate financing, there wasn't much of a focus on climate change and plants – even though plants are the foundation of life.

The following article is the first part of a summary of a presentation on plants and climate change given to the Native Plant Society of BC's South Coast group in January by Dawn Hanna, NPSBC president.

Climate change is a change in the statistical distribution of weather over periods of time that range from decades to millions of years. It can be a change in the average weather or a change in the distribution of weather events around an average (for example, greater or fewer extreme weather events).

Climate change is a naturally-occurring and continuous thing. Our climate has changed in the past and will change in the future. These days, though, when we speak of "climate change", it's used as shorthand for human-caused global warming. And even the most skeptical now accept that it is real. For example, Bjorn Lomborg, author of *The Skeptical Environmentalist*, oft cited by global warming naysayers, writes in his latest book *Cool It*: "Global warming is real and man-made. It will have a serious impact on humans and the environment toward the end of this century."

Without getting into the numbers, here are some key facts on global warming from the International Panel on Climate Change:

- Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level.

- The combination of observations and paleoclimate information shows

unprecedented changes in the climate system, both in amplitude and rate for hundreds to many thousands of years

- There is very high confidence, based on more evidence from a wider range of species, that recent warming is strongly affecting terrestrial biological systems, including such changes as earlier timing of spring events, such as leaf-unfolding, bird migration and egg-laying; and poleward and upward shifts in ranges in plant and animal species.

As most of us have realized by now, global warming does not mean that the temperature will rise uniformly throughout the world. The results are expected to be varied and unpredictable. Exactly how climate change will play out is the stuff of hypothesis – informed and learned hypothesis, but still no one knows the definitive outcome.

Now, onto plants. Without plants, there would not be life as we know it. We depend on plants for the air that we breathe, the food that we eat, the clothes that we wear, the houses we live in, the list goes on and on. In short, plant diversity is the foundation of all terrestrial ecosystems, and these provide the fundamental life-support systems upon which all life depends.

So, how can climate change affect plants and plant diversity?

Because individual plants, and therefore species, can only function physiologically, and successfully complete their life cycles under specific environmental conditions, changes to climate are likely to have significant impacts on plants from the level of the individual right through to the level of the ecosystem or biome.

There are many ways that a changing climate can affect plant life; here are some:



**Early bloomer:** British researchers have found that *Myosotis arvensis* (field forget-me-not) is flowering 15 days earlier than it used to.

## Effects of temperature

Increased temperature can increase plant growth up to a limit, beyond which death occurs. Temperature can also affect the phenology of a plant – i.e. when it leafs out, blossoms or blooms, bears fruit and sets seed.

A 2002 British study looked at the flowering times of 385 plant species in the 1990s and compared them with flowering times for the same species during 1954 to 1990. The study found that, on average, plants were flowering 4.5 days earlier in the 1990s than for the four previous decades. Further, 16 percent of the species flowered 15 days earlier.

"The timing of flowering is a key event for plants," noted the authors. "It affects their chances of pollination, especially when the pollinator (for example, an insect) is itself seasonal, and determines the timing of seed ripening and dispersal. Fruit set may be pollen limited at both the start and end of the flowering period. Flowering time also influences animals for which pollen, nectar, and seeds are



important resources, and earlier flowering also implies earlier activity in other processes (leaf expansion, root growth, nutrient uptake) that are important for niche differentiation among coexisting species and so will alter competitive interactions between species. Large changes in flowering date will therefore disrupt ecosystem structure.”

The study noted that annuals are more likely to flower early than congeneric perennials, and insect-pollinated species more than wind-pollinated ones.

A 2004 study in Japan found that early flowering plants in Japan advanced their flowering during a warm spring, but bumblebee queen emergence appeared unaffected by spring temperatures. The result: a decreased seed-set in bumblebee-pollinated plants.

Temperature can also affect plants in that some species require certain periods of cold-weather or heavy frosts to break dormancy. In England, *Ribes nigrum* (blackcurrant) requires heavy frost for proper bud burst. But mild winters have resulted in reduced harvests, fruit quality and juice yields. Two traditional varieties are expected to die out within 10 years due to climate change.

Closer to home, there are tree species that have certain chilling requirements. If those are not met, trees exhibit slower growth rates and are more subject to late spring frosts. For example, Douglas-fir (*Pseudotsuga menziesii*) has a chilling requirement of ~ 13 weeks with an average daily temperature below 5° C, so warmer winters may affect Douglas-fir viability and distribution, particularly along BC’s south coast.

#### Effects of water

Too little available moisture (e.g. drought) can stress plants. In response to prolonged water stress, a plant has different strategies. It may limit leaf production and/or drop its leaves. It may close the stomata on its

leaves to limit evaporation. The end result is that the plant has a reduced ability to carry out photosynthesis, which can ultimately lead to plant death.

Too much water can also be an effect of climate change, in places where the annual amount of precipitation increases overall or increases in heavier rain events. Some species cannot tolerate too much water; their leaves will wilt and roots will rot. In essence, the plant dies by drowning.



**Bigger and nastier:** A U.S. study found that more CO<sub>2</sub> made for a more robust – and more toxic – poison ivy.

#### Effects of carbon dioxide concentrations

Increased levels of carbon dioxide (CO<sub>2</sub>) in the atmosphere can increase plant productivity, so long as no other factors (such as water) are limiting. Increased levels of CO<sub>2</sub> may allow plants to become more water efficient (i.e. requiring less water for the same productivity). However, reduced water flow through the plant can reduce the cooling (air conditioning) effect of vegetation.

Nitrogen availability limits plant growth and thus capacity to uptake carbon and benefit from increased CO<sub>2</sub>. Nitrogen-fertilized soils emit nitrous oxide (N<sub>2</sub>O), a greenhouse gas with more than 200 times the warming potential of CO<sub>2</sub>.

Also, studies have shown that when there is increased CO<sub>2</sub> in the atmosphere that plants respond by either reducing the number of stomata (pores on the leaf surface that open and close to allow gas exchange between the plant and the atmosphere) or reducing how wide the stomata open or how long the stomata are open. This helps plants conserve water resources, but it also reduces the amount of plant transpiration (water evaporation) that we depend on for cooling.

And there can be other effects.

For example, a six-year study at Duke University in North Carolina showed that increased CO<sub>2</sub> in an intact forest ecosystem increases photosynthesis, water use efficiency, growth and population biomass of *Toxicodendron radicans* (poison ivy) and that the CO<sub>2</sub> growth stimulation exceeds that of most other woody species. Additionally, under higher CO<sub>2</sub> the plants produced a more allergenic form of urushiol. The study indicated that poison ivy will become both more abundant and more toxic in the future and adds to studies indicating that rising CO<sub>2</sub> may be responsible for the increased vine abundance that is inhibiting forest regeneration and increasing tree mortality around the world.

There are many more impacts that climate change can have on plants. One good source of information is the report *Plants and Climate Change: Which Future?* published by Botanic Gardens Conservation International. You can find it online at [www.bgci.org/climate/whichfuture/](http://www.bgci.org/climate/whichfuture/)

In the next issue, we’ll look at part two of the presentation: climate change forecast for BC and its impacts on our native flora. \*

# Early coastal bloomers defy wet and windy winter weather

Story and photo by Moralea Milne

While winter can still have us clasped to its wet and windy breast, there are some tough and hardy plants that dare to defy the vagaries of our weather. On sloping, open, rocky knolls on southern Vancouver Island and the Gulf Islands, they take advantage of any sun that manages to appear, the rocks acting as a heat sink, contributing to balmy conditions. The plants themselves have evolved as short, sturdy ground huggers that are well placed to withstand desiccating winds.

Depending on the weather of any particular year, the miniscule rusty-haired saxifrage (*Saxifraga rufidula*) can often be seen flowering in mid-February to early March, raising its stalks of crisp, white, five-petaled flowers with their bright red anthers above the shiny, leathery, toothed leaves.

Appearing with the saxifrage or soon after, often on the north side of rocky knolls, you can find the delicate and diminutive satinflower (*Olsynium douglasii*). Their petite, iris-like leaves hold up the flamboyant pinkish-purple, bell-shaped shiny petals, like so many balloons from which the air is slowly escaping. Blue-eyed Mary (*Collinsia parviflora*) is another of these tough but tiny harbingers of spring. Shaped like a minute, simplified version of the garden-variety snapdragon, blue-eyed Mary, as its name suggests, is a lovely, almost periwinkle blue with a white throat. You can sometimes come across many of them flourishing together, giving a soft hazy blue aspect to the hillside.

Chickweed monkeyflowers (*Mimulus alsinoides*), like blue-eyed Marys, are annuals, but these miniatures are brilliant yellow with a reddish brown blotch on their lower petal. They can occasionally be found in profusion, defying gravity, as they bloom in the steepest crevices that are seasonally rich with seepage.

Spring gold (*Lomatium utriculatum*), a slightly larger plant in the carrot family, also proclaims winter's end with a cheerful, yellow splendor that can last for weeks

on end. Indeed, the plants seem to bloom according to a personalized schedule that means some spring gold plants can be found blooming during many months. I have seen some in bloom in November through to June or even July, in the right conditions. The thickened taproots are said to be the wild carrot eaten by First Nations. Care should be taken to positively identify the plants as some members of the carrot family are extremely toxic (e.g. poison hemlock). However all of the *Lomatium* genus (of which spring gold is a member)

are edible. Generally the toxic carrot family plants like moist conditions, while the edible ones prefer dry, fast draining soils.

All of us who have driven past the famous St. Mary's churchyard in Metchosin know that this is also the season for shooting stars (*Dodecatheon hendersonii*) and fawn lilies (*Erythronium oregonum*). The vibrant pink flowers of the shooting stars closely resemble the cultivated cyclamen that is a

common house or garden plant and the

roundish, thick leaves show adaptation to early cold springs by lying close to the ground. The fawn or Easter lily almost carpets the churchyard with a sea of nodding white blooms that rise above two mottled fawn-like leaves. It is no wonder that we have visitors who make a special trek each year to capture, for a few moments, the beauty of this churchyard, a remnant of the grassy fields that once were common and the product of much attention from a committed group of caretakers.

Rocky knolls are not the only place to find early bloomers. There is a flowering currant on the left as you enter Devonian Regional Park that I have seen in cautious bloom as early as mid-February.

Treat yourself to a ramble during the wintery months and see what minute jewels you can find blooming right down there at ground zero. Wear some old jeans or rain pants so that you can kneel down and appreciate their exquisite beauty and adaptations. Just be sure to tread lightly and don't trample anything! \*

*This article originally ran in The Metchosin Muse.*



*Saxifraga rufidula*



# Use critical thinking to cut through the hype

When I worked at Simon Fraser University there was a standard joke that never failed to get a laugh. The joke went: If it is in print – it must be true. It is funny because the highly educated, critical thinkers at the university know that very often you can't believe what you read.

For photographers these days critical thinking is, well – critical. The digital photography literature is filled, to the point of saturation, with hype that is generally accepted without question and that is mostly wrong.

Time and again I see amateur photographers using heavy and very expensive “professional” cameras. They are convinced by the hype that they will get better pictures with such equipment – Wrong, Wrong, Wrong. Critically thinking about what features you need and how the weight of the camera will impact its usefulness will most often lead the amateur photographer to realize they can save a great deal of money by choosing a mid range camera that will do everything they need. My Nikon D90 does everything a D300 or D3 does, as far as my needs go, and costs a fraction of that of those models and weighs almost a pound less. Imagine trying to hold a camera/lens combination that weighs upwards of two pounds while you wait for the wind to drop so you can photograph that flower. For fast action such as flying birds it would be nice to have the faster framing rate of the other cameras but that small additional capability is not worth the extra cost and weight.

Question: What is the best thing about photography magazines?

Answer: The articles are written by professional photographers.



**Long's Lens**



Is bigger really better? Photography magazines can be a great source of information and a bewildering array of hype.

Question: What is the worst thing about photography magazines?

Answer: The articles are written by professional photographers.

I am a great proponent of photography magazines – I subscribe to half a dozen of them – because the photography of the professional contributors is inspirational.

The problem is that most professional photographers can't relate to the level of understanding of the amateur. As a long time professional photographer and teacher I have seen how confusing bad advice can be to amateurs who automatically accept what they read without critical thought. The fact is that many professional techniques require decades of daily shooting experience to be understood and applied successfully. The writers' own lack of critical thinking prevents them from realizing that the advice they are giving is unsuitable for anyone who doesn't have their years of experience.

A recent article about polarizing filters did a good job of describing the benefit of these filters – except for one thing. The writer assumed that everyone who read his article would, as he does, use a tripod. Anyone looking at a polarizing filter can see that it is very dark. Critical thinking

would lead one to quickly realize that not a lot of light is going to pass through. That fact means the filter is going to have a substantial effect on exposure. The loss of light is not significant for a tripod user but could make a disastrous difference to the hand holding photographer. The loss of light can lead to a shutter speed that is too low for hand holding and, consequently, a blurred photograph. The professional photographer/writer never mentioned this important aspect of shooting with a polarizer.

Published hype leads photographers to believe that the highest capacity, fastest and, incidentally, the most expensive memory cards are a must. Critical thinking shows that only sports photographers benefit from the high speed of such cards because most of us simply don't need to shoot at the maximum framing rate of our cameras. And high capacity cards put too many eggs in one basket. What if the card fails? What if the card is lost? Critical thinking leads to the conclusion that cheap, low capacity cards make the most practical sense – but be sure to have several of them.

A current photo magazine features a buyers guide to memory cards and lists five high-speed cards of 16 and 32

*continued on page 12*

# Autumn displays tied to insect herbivores

The swathes of beautifully coloured leaves produced by trees each autumn are one of nature's great displays. But why trees in Europe tend to produce yellow leaves, while those in America and eastern Asia produce red leaves, has remained an enigma.

Now scientists have published a theory that may explain the difference.

Red-leaved trees in America and Asia only exist because they and their insect pests managed to survive a series of ice ages long ago, suggest botanists Simcha Lev-Yadun of the University of Haifa-Oranim, Israel and Jarmo Holopainen of the University of Kuopio in Finland in the journal *New Phytologist*.

Lev-Yadun and Holopainen have proposed that the trigger for the difference first occurred millions years ago in the Tertiary Period. They suggest that temperate forests evolved from tropical plants during this time. Many young tropical trees produce red leaves they said, and old leaves in

the tropics are also often red-coloured. So temperate forests inherited the ability to produce red leaves.

But 35 million years ago, the world started to drastically cool and warm, as a series of ice ages covered



*Acer circinatum* (vine maple)

Photo: Daniel Mosquin, Arrangement: Dan Orits.

large swathes of Europe and North America. Plants could only survive in a few southerly refuges.

North America and East Asia have mountain ridges that run north to

south. As each ice age took grip, red-leaved trees migrated south along the mountain ridges into refugia where they survived, before migrating back north as the climate warmed.

In Europe, the mountain ranges run east to west. That meant that any red-leaved trees north of the mountains were trapped, and went extinct. The insects that had been engaged in a long evolutionary arms race with these trees also died out with them.

"The selective agents of herbivory that cause red leaves went extinct, resulting in lower selection for red leaves," said Lev-Yadun.

Thus, trees that recolonized Europe put less effort into deterring aphids from their leaves. As a result, European forests tend to produce glorious swathes of yellow each autumn.

"Red in a way is an old adaptation reflecting stresses from the Tertiary herbivorous fauna," said Lev-Yadun.

~ from *Earth News* on [bbc.co.uk](http://bbc.co.uk)

## Long's Lens, cont. from page 11

GB capacity all of which sell for \$300. No mention was made of the 2 GB, \$10 cards that are all that most of us need. Now that's hype.

The hype dictates that any amount of noise (grain) is unacceptable. Yet critical thinking leads directly to the question – what's so terrible about noise? If getting a great photograph requires the use of a high ISO and its unavoidably higher noise level are you going to pass up the opportunity and go home? The answer should be a resounding NO.

The most consistent published advice on how to obtain the best digital exposure involves using the histogram. The histogram is a graphic representation of the exposure that can be displayed on the camera's view screen. There are many problems with this method but proponents consistently ignore the single most important aspect. In a great many, even a majority, of outdoor situations it is simply too bright to see anything on the view screen let alone be able to interpret the histogram. Readers

of the photographic literature must apply their own critical thinking to see beyond the bad advice.

The literature relentlessly pushes the notion that RAW capture mode is the only way to get the best photographic result and that JPEG capture mode is a lossy and poor quality alternative. Critical thinking reveals that almost everything that is written in support of RAW and everything against JPEG is wrong. In fact RAW has very definite drawbacks and often results in poorer results than those obtained by JPEG. But virtually no one believes this. The hype is so powerful that no one questions it. No one is doing the objective side-by-side comparison of RAW and JPEG captures that critical thinking would deem necessary

Even highly experienced amateur photographers get caught by their own lack of critical thinking. I watched one such photographer hand holding a long telephoto lens and noticed that his camera was set in aperture priority exposure mode. I knew that, with that lens, aperture priority was a bad idea. I also knew that he would resent any

suggestion from me because of his long experience. However he later complained to me that he was getting too many un-sharp pictures. I then had an opportunity to explain to him that his attempt to set a small aperture to give extended depth-of-field forced the camera to select a shutter speed that was too low for safe hand holding of the long lens. Critical thinking on his part would have quickly led to the realization that shutter priority alone would provide the necessary control of the most important aspect of a hand-held exposure – shutter speed. Further, it would be realized that if extended depth-of-field was necessary then a tripod must be used to deal with the longer exposure times that would result from the required small aperture.

The Bottom Line: Don't believe anything you read, including this article, until you have thought it through and tested it for relevance to your situation. I don't ask you to believe me. My challenge is – do the test before you accept/reject what I and others are saying. ✱



# Coming events

NATIVE PLANT SOCIETY OF BC

## SOUTH COAST NATIVE PLANT STUDY GROUP

(A subgroup of the Native Plant Society of BC)

All meetings are held at 7 p.m. in the Cedar Room at VanDusen Botanical Garden, 5251 Oak Street (37th & Oak St.), Vancouver. Admission is free.

February 4

### The Secret History of Bracken Fern Randal Mindell

Bracken fern, *Pteridium aquilinum*, is one of the most widely distributed species on Earth. In BC, it is ubiquitous and thriving, occasionally overwhelming the landscape. In an attempt to paint this seemingly pedestrian plant in a more noble light, this talk will discuss the biological and cultural history of bracken, relating it to nearly 400 million years of evolution with details of taxonomy, ecology, morphology and reproduction.

*Randal Mindell is a botanist who specializes in the study of fossil plants from BC. He currently teaches in the Department of Earth & Ocean Sciences at the University of BC.*

March 4

### Women Botanists of Western North America

Linda Jennings

Learn a few rules of "sex" nomenclature and how to recognize if a plant is named after a male or female. Then, hear the stories about some of the earliest and most known North American female botanists such as Kate Brandegee, Alice Eastwood and Lilia Leech, their plant discoveries and how they changed our understanding of the botanical world.

*Linda Jennings is the Herbarium collection manager at the University of BC's Beaty Biodiversity Centre.*

April 1

### Hotspots for spring wildflowers Speakers TBA

Want to learn some of the best places to see fawn lilies, western trillium

and other spring wildflowers in BC? Native Plant Society of BC members will show images of spring wildflower species and share their knowledge about where and when to go for a great spring wildflower show.

## VICTORIA NATIVE PLANT STUDY GROUP

The speakers series is held at 7 p.m. at the University of Victoria's MacLaurin Building, Room D-116. Non-member drop-in fee is \$3. Please check the NPSG website at [www.npsg.ca](http://www.npsg.ca) for more events as information becomes available.

## NATURE VANCOUVER BOTANY SECTION

All meetings are held at 7:30 p.m. at the Unity Church, 5840 Oak St., Vancouver. Admission is free.

March 18

### Island ecosystems at risk Bruce Bohm

The Hawaiian Islands constitute the most isolated archipelago on Earth and, owing to their unique natural biota, are an ideal laboratory for the study of evolution. The richness of the flora can best be appreciated by noting that almost 90 percent of the native species occur nowhere else! But there is an evil upon the land. Almost half of the species listed in the Manual of the Flowering Plants of Hawaii are not Hawaiian natives, and amongst that half are some of the most aggressive weeds known. I will show some examples of the nastiest of alien species, comment on the impact of human activity on the islands' natural setting, and talk about efforts to undo some of the harm already done.

*Bruce Bohm is professor emeritus, UBC Botany Department from 1966 to 1999. He is the author of more than 200 scientific publications and four books including Hawaii's Native Plants.*

## VAN DUSEN BOTANICAL GARDEN

The Cedar Series Lectures are held at 7:30 p.m. in the Floral Hall. Tickets are \$10 for members, \$15 for non-members and are available in advance

from the administration office as well as the door.

February 11

### What's New, What's Hot & What's Not! Brian Minter

Plantsman, raconteur and gardener extraordinaire, Brian Minter will share his exceptional knowledge about the local horticultural industry. Be entertained and enlightened by one of the leading lights on the provincial scene. Learn about the hottest new plant introductions for 2010; about plants that retain an enduring public appeal; and those plants that have not outlived their 'best before' dates.

March 11

### Chasing Wild Orchids and Other Botanical Adventures in Western Australia

Ron Long

Western Australia is a vast area with an unbelievably diverse flora. Millions of years of geological stability has permitted continuous evolution to yield extraordinary diversity. The relationship of these plants with habitat, climate and insects has resulted in stunningly complex relationships. Ron uses hundreds of beautiful photographs to illustrate and discuss this fascinating part of the Australian continent.

April 8

### Across the Grain: The Nature of Wood Dr. Jack Fisher

Pine, mahogany, purpleheart, oak – they are all unique in their appearance. But what exactly makes the colour and grain in wood? Get a little insight into the inner workings of trees through the experienced eyes of a botanist and long-time wood-turner.

Other events

February 27

### Seedy Saturday

Floral Hall, 10 a.m. to 4 p.m.

Admission by donation.

A celebration of heritage seeds and fruit trees, native plants and home gardens featuring more than

*continued on page 14*

*Events, continued from page 13*

30 growers, seed companies and exhibitors and Heritage Seed Swap. Also includes family activities.

March 21

**Medicine Wheel Ceremony**

Noon to 3 p.m. at the First Nations' Medicine Wheel in the Canadian Heritage Garden.

You are invited to join elders from the First Nations community in a spiritual ceremony to mark the changing of the season. Wear clothing appropriate for the weather, bring a small stone to bless and leave at the wheel as well as a food item to share at the pot luck meal at the conclusion of the ceremony.

Information: Contact Marina Princz at [library@vandusen.org](mailto:library@vandusen.org) or 604-257-8668

**UBC BOTANICAL GARDEN**

**Events**

All events take place at the UBC Botanical Garden, 6804 SW Marine Dr.

**Courses**

Advance registration is required for all the courses below. For more information or to register, call (604) 822-3928 or email [botg@interchange.ubc.ca](mailto:botg@interchange.ubc.ca).

March 7, 9:30 a.m. to 4:30 p.m.

**Northwest Naturals Basket**

*Joan Carrigan*

Weave a basket with a selection of materials found in the Pacific Northwest, such as red cedar bark, willow bark, wild cherry bark, west coast sweetgrass and beargrass. A variety of weaving techniques and patterns will be covered including plaiting, variations of twining, and twill weave. 12 participants maximum, \$124/ members, \$134 non-members.

March 27 & 28, 10 a.m. to 4 p.m.

**Botanical Watercolour**

*Alison Watt*

Join botanical painter Alison Watt in the Garden Pavilion for this introductory course to botanical painting. The class will cover watercolour materials (brushes, paints, and paper) and basic watercolour techniques (mixing, glazing, wet-in-wet, masking). Special attention

will be given to the concerns of plant painting (greens, whites, darks, stems, leaves, etc.). 15 participants maximum. \$129 members / \$139 non-members.

April 17 and 18, 8 a.m. to 3:30 p.m.

**Garden Photography**

*Daniel Mosquin*

Join UBC Botanical Garden's Daniel Mosquin for this advanced beginner to intermediate level course on garden and plant photography. The class will combine indoor lectures on composition, lighting and subject with outdoor teaching on photography. Optional photo shoots in the evening on Saturday and early morning on Sunday will allow participants to photograph in the "golden hours".

**Free Seminars**

All seminars are held at the UBC Botanical Garden Reception Centre at 12 noon. Admission is free. Please reserve in advance by calling (604) 822-3928.

February 8

**Basics of Plant Propagation**

*Ingrid Hoff*

February 22

**Sports and Biodiversity**

*Daniel Mosquin*

March 8

**Biodiversity of Southern Alaska and Yukon**

*Daniel Mosquin*

March 22

**Cherry Blossoms of Vancouver**

*Douglas Justice*

April 12

**Changing Urban Landscape of Vancouver, 1880s to WWII**

*David Brownstein*

April 19

**Urban Biodiversity of Present Day Lower Mainland BC**

*Daniel Mosquin*

**VOLUNTEER OPPORTUNITIES**

**Jericho Park, Vancouver**

Second Sunday each month (Feb. 14, Mar. 14., Apr. 11)

9 a.m. to 1 p.m.

Help remove invasive plants and replant native plant species to restore and enhance habitat at Jericho Park in Vancouver. Tools and gloves provided. Meet at the wooden bridge over the pond. For more info, go to [www.jerichostewardship.ca](http://www.jerichostewardship.ca)

**Iona Beach Regional Park, Richmond**

Third Sunday each month

(Feb. 21, Mar. 21, Apr. 18)

10 a.m. to 1 p.m.

Help remove invasive plants and restore rare sand dune habitat at Iona Beach Regional Park in Richmond. Tools and gloves provided. Meet at the washroom building. For more info, go to [www.parkpartners.ca/partners/IonaBeach/iona.htm](http://www.parkpartners.ca/partners/IonaBeach/iona.htm)

**Have an event you'd like to submit?**

**Send details to the editor at [dawnhanna@telus.net](mailto:dawnhanna@telus.net)**

Mark your calendars for the

**Native Plant Society of BC**

Spring 2010  
AGM

being held in Duncan  
on May 1 & 2

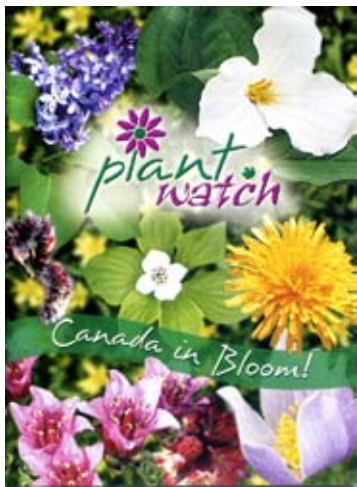
Join us for a day that includes:

- a tour of Somenos Marsh and Garry Oak Protected Area
- a tour of the Cowichan Garry Oak Preserve
- lunch at Maple Bay
- field trips to Mount Tzouhalem Ecological Reserve and/or Honeymoon Bay Wildflower Reserve

*Watch for details in the spring issue of Menziesia and on the website at [www.npsbc.org](http://www.npsbc.org)*



# PlantWatch volunteers needed



By Dawn Hanna and Patrick Wilson

**P**lantWatch is part of a national NatureWatch series of volunteer monitoring programs designed to help identify ecological changes that may be affecting our environment.

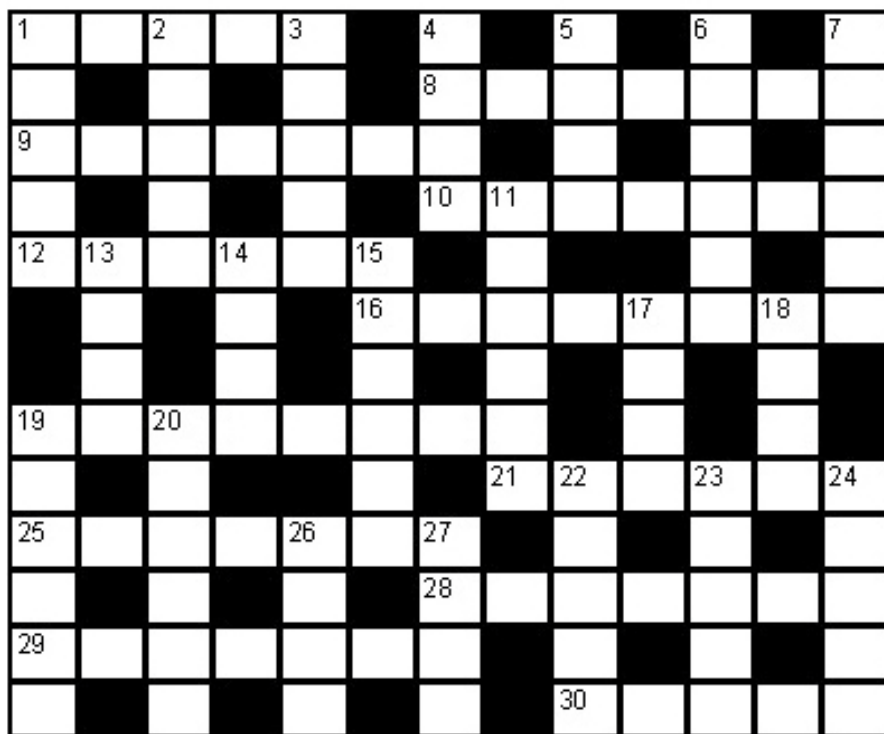
The PlantWatch program has been set up so that "citizen scientists" make observations, record flowering times for certain plant species and then submit that data for use by researchers (via Environment Canada).

The first step to getting involved is to peruse the PlantWatch website at [www.plantwatch.ca](http://www.plantwatch.ca) and see the plants that have been selected for BC. Thirteen of the 15 species are native to our province (the other two species are lilac and dandelion).

The website also has a section on How to PlantWatch that includes information on selecting a site, marking your territory and reporting your data.

The Native Plant Society of BC recently signed on as the BC coordinator for the PlantWatch program, so you can also contact Dawn Hanna (at [dawnhanna@telus.net](mailto:dawnhanna@telus.net)) or Patrick Wilson (at [edgewater\\_fortune@hotmail.com](mailto:edgewater_fortune@hotmail.com)) with any questions or comments you might have. \*

# Cannings' Cryptic Crossword



By Richard Cannings



## ACROSS

1. Serbia loses a blended currant genus (5)
8. Seized you and me, took confused prude (7)
9. Pandas swallow a thick flour paste (7)
10. Nora's back, holding very loud crocus product (7)
12. Footstool sounds strong and French (6)
16. Bush a tough, low-quality writer (8)
19. A cold each for yarrow (8)
21. Algae found in no stockyard (6)
25. Arctic is guiding light (7)
28. Water plant film splashed with oil (7)
29. Car I bought had deer inside (7)
30. Flower provides acid test for cured salmon (5)

## DOWN

1. Report loses right to plant again (5)
2. Disallow loud music in Rockies (5)
3. Back, for example, of the French marsh plant (5)
4. Muses drop eastern mess (4)
5. Backside litter pudding (4)
6. Steeple takes a flower (6)
7. European city found in mapping Dan skiing (6)
11. Pilot messed up Armani. (6)

13. Ancient city has one cold acid from bird poop (4)

14. Asian mountain apple (4)

15. It came back with hall inside primitive plant bodies (6)

17. Chickens found in even shoeings (4)

18. Salmon company, Santa spoke briefly (4)

19. Turbulent space has temperature appearance (6)

20. Duff singer messes hair left in (6)

22. Cattle mouth part of primula (5)

23. Fish for West End bun (5)

24. Clay stirred up unknown flower part (5)

26. Bury destroyed jewel (4)

27. Pornographic fungus (4)

*Answers on page 16*

## How it works

Every clue contains the definition of the answer plus a cryptic clue to the word or the letters that form it. Some examples:

1. Back an Oz IRA for snowbird destination? (7) Answer: ARIZONA (an Oz IRA backwards)

2. Echo loses hot, lethargic feeling for environmental study. (7) Answer: ECOLOGY (echo loses H (hot) + logy (lethargic feeling))

3. Mashed pea seed for fishing or diving (4,3) Answer: DEEP SEA (anagram of pea seed; watch for words like confused jumbled, crazy, mashed -- they often signal an anagram.)

4. Italian city sandwich (7) Answer: BOLOGNA (double meaning)

# Cryptic crossword answers explained

from puzzle on page 15



## ACROSS

- Ribes (anagram of Serbia without "a");
- Usurped (us + prude anagram);
- Panadas (pandas with "a" inside);
- Saffron (FF inside Nora's backwards);
- Tuffet (tough homonym + et);
- Hardhack (hard + hack);
- Achillea (a + chill + ea);
- Nostoc (hidden in NO STOCkyard);
- Polaris (Polar + is);
- Milfoil (film anagram + oil);
- Caribou (hidden in CARIBOUght);
- Phlox (Ph + lox).

## DOWN

- Repot (report without second 'r');
- Banff (Ban + FF);
- Sedge (e.g. + des, all backwards);
- Muss (muses loses E);
- Duff (triple meaning);
- Spirea (spire + a);
- Gdansk (hidden in mappinG DAN SKiing);
- Airman (Armani anagram);
- uric (Ur + i + C);
- Fuji (double meaning);
- thalli (it reversed with HALL inside);
- Hens (even letters of sHoEiNgS);
- Coho (Co. + Ho);
- Aspect (space anagram + T);
- Hilary (Hair anagram with L inside);
- oxlip (ox + lip);
- troll (T [end of wesT] + roll);
- calyx (clay anagram + x);
- ruby (bury anagram);
- smut (double meaning).

## Join the Native Plant Society of British Columbia

You'll receive **menziesia** four times a year and receive first notice of our presentations, workshops and field trips.

### Annual Membership fees

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- Student \$20
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