



INVASIVE SPECIES—BC'S UNWELCOME VISITORS

A FACT SHEET FROM THE CANADIAN PARKS AND WILDERNESS SOCIETY

Two hundred million years ago, the land mass of the world was joined together and plant and animal species were able to roam far and wide. After this land mass broke apart, species became restricted to fragments of land (continents), drifting further and further apart from one another. Over the course of time, species evolved to survive and flourish in their new homes. In more recent times, species are still moving, but the methods and consequences have changed drastically.

What are invasive species?

Species that arrive in an ecosystem where they did not evolve are considered “alien” or “exotic”. Exotic species usually have a reliable means of dispersal that allow them to cross vast expanses of land or water. If an alien species is able to adapt to its new environment and establish a population beyond its initial point of introduction, it is considered a naturalized component of the environment (Haber, 2001). Species that successfully establish themselves after introduction have most likely come from areas with a similar climate. For example, most exotic species in British Columbia have arrived here from other northern latitudes like Europe and Northeast Asia.

A naturalized species becomes invasive if it has “weedy” characteristics and develops a dense population that has the potential to displace native species. Weedy characteristics include those that enable the species to reproduce quickly, spread rapidly, and compete aggressively with other species (Haber, 2001).

CHARACTERISTICS OF A SUCCESSFUL INVASIVE SPECIES

- High reproduction rate
- Generalized
- Aggressive competitors
- Thrive in disturbed habitats
- Adapt well
- Good dispersers
- Absence of natural predators

How did they get here?

Species have been dispersing throughout the world for millions of years. As a result of this constant dispersal and subsequent evolution of species, British Columbia has developed some of the most biologically rich fauna and flora assemblages in the world.

The difference between historical introductions and introductions that have taken place in the last five hundred years, is the rate



and scale with which they take place. Before human travel was widespread, plants and animals arrived on foreign shores mostly by chance. They would swim across oceans, walk across continents, drift at the mercy of air and water currents, or hitchhike with other travellers until they settled in a new habitat. These newcomers faced a whole new set of rules to live by; new competitors to share food and homes with, and different predators to avoid. If they were lucky, they developed the means to deal with these new challenges, were able to find a mate, establish a new population, and continue to evolve in their new surroundings. It's quite clear that successful dispersal was not easy for these pioneering species.

Fast forward to the 18th and 19th centuries. Human immigrants were arriving in the New World at an unprecedented rate. With them they brought all the comforts of home, and a few unknown hitchhikers, including ornamental plants for their gardens, viruses and diseases, crop foods for cultivating, domestic animals, and some unwelcome passengers like rats, along with domestic cats to control the rat infestation. The ships that they sailed in carried huge ballasts of gravel and water containing the seeds or

propagules of plants species from the other side of the ocean. When the ships reached their destinations many foreign species escaped and made themselves at home in the New World.

The major difference between these two scenarios is the rate of introduction.

ECOLOGICAL IMPACTS OF INVASIVE SPECIES

- Competition and displacement of native species
- Predation
- Disease transmission
- Cross breeding
- Loss of biodiversity
- Extinction of native species

Before the advent of mass transportation and human movement by ship or plane, the number of new species that arrived was quite low. If two of the same species were to arrive at the same place within the same lifetime, it was a small miracle. Even if they managed to reproduce, native species were given the time they needed to adapt to this new competitor. When mass transportation of goods and people began in the last three hundred years, whole populations were introduced at one time

instead of one individual arriving by chance. As a result, the native populations had little chance to adapt, and were threatened through competition, disease transmission, and even cross breeding.

The consequences of an exotic species' introduction are very unpredictable due to the complex nature of ecosystems. Of approximately 3160 plant species present in Canada, 881 (28%) are introduced (Heywood, 1989). When unnatural species dispersal is combined with natural factors of habitat disturbance including fire, flooding, and the growing concern of global warming, it all adds up to potential disaster for native species. The United Nations has stated that the introduction of non-native species is the second greatest threat to biodiversity after habitat destruction. Considering that a successful invasive species has the potential to destroy an ecosystem, these two factors are closely linked.

British Columbia's economy is resource based and as a result, many landscapes have been altered by human use. Logging, mining, agriculture, and urbanization have left their imprints on the land, altering or destroying the natural habitat of many native species. Some of the last remaining natural refuges are found in British Columbia's park and protected areas system. Unfortunately, invasive species do not respect the boundaries that are drawn around parks and protected areas. The

biodiversity of these areas is faced with a serious threat. Even though resource extraction is not allowed in most parks, increased access to previously untouched areas is having an impact.

When an ecosystem is altered, it opens up habitat to other species that may be more suited or resilient to the changed conditions. For example, when an old growth forest is clear-cut, the formerly shaded forest ecosystem is altered into a disturbed and exposed area that will require decades (if not centuries) to return to a functional forest. Meanwhile,



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disturbed soils and open sunlight create the perfect opportunity for new species to move in and displace native species. It takes a hardy species to survive and establish here. They must be able to adapt quickly to this young dynamic ecosystem, reproduce quickly to establish a healthy population, and compete aggressively to maintain their niche in the ecosystem. Essentially, a welcome mat is laid out for invasive species at clear cuts.

Grasslands are particularly affected by the invasion of non-native species. These ecosystems provide habitat for over 1/4 of BC's threatened and endangered species. Invasive species represent the biggest threat to the conservation of grasslands in many of BC's parks and protected areas.

INVASIVE SPECIES CAN BE INTRODUCED IN A NUMBER OF WAYS

Natural dispersal

- Air and ocean currents
- Hitchhiking seeds — birds, bats, etc.
- Land-bridges

Intentional introduction

- Agricultural
- Ornamental i.e. scotch broom
- Hunting and sport (i.e., fish stocking)

- Pet trade
- Bio-technology (i.e., genetically modified species)

Unintentional human introduction

- Escapes from agriculture/aquaculture
- Hitchhiking seeds – (i.e., on the tires of ATVs or heavy equipment)
- Side effect of habitat alteration
- Ship ballast

After decades of fire suppression, overgrazing, abusive recreation, and development, these threatened ecosystems are in dire need of protection. Based on a recent report, done by the Grasslands Conservation Council of BC, many of BC's parks with grassland components are suffering serious consequences from the invasion of exotic species.

What is being Done?

It's clear that invasive species will not just disappear, but there are ways of controlling and reducing the effects on BC's parks and fragile ecosystems. One of the most common methods of control is to physically remove the species from its habitat (mechanical control). This may involve pulling plants from the root, mowing or trapping, and shooting invasive animal species. This is specific to the target species but becomes very labour intensive and often has minimal results. In the case of many invasive species, their high reproductive rate makes them very resistant to this type of control. In some

cases, chemicals such as herbicides, insecticides, and poison have been effective in controlling unwanted species. Unfortunately, it is difficult to restrict the effects to one target species and these toxic substances may have negative impacts on the entire ecosystem. Biological control is not toxic to the environment like chemical control is, but still has the potential for disastrous consequences. Biological control involves the introduction of a predatory species, virus, or bacteria to keep an invasive species population under control. In many cases, a predatory insect is introduced to target one specific plant species. This method has potential to backfire as it did in the case of the introduction of the cane toad in Australia. The cane toad was introduced as a predator to the cane beetle that had

arrived in Australia with the sugar cane fields. Unfortunately, the cane toad not only ate the cane beetles, but also feasted on anything else it could find, including many endangered native species. Its



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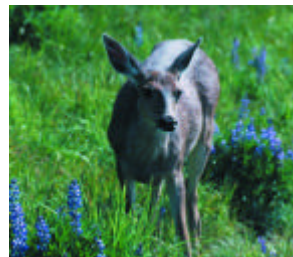
population exploded and it is now one of Australia's biggest ecological problems. The intentional introduction of any species must be done with extreme caution and be based on extensive research.

Besides mechanical, chemical, and biological control, there is another method that is becoming increasingly popular.

Ecological restoration is the process of assisting the recovery and management of ecological integrity (SER, 1996). This method has been used successfully in BC for watersheds, grasslands, and forested habitats. If ecological integrity is maintained in parks and protected areas, they can provide important reference ecosystems so that when an area is being restored, we know what it should look like in the end. Invasive species have been a major factor in the decline of many BC ecosystems and as a result, removal or control of these species is central to the success of the restoration. Because eradication of these species is near impossible, the focus is on controlling them and replanting native species while the ecosystem slowly heals itself and native species can become re-established. Restoration may also include the reintroduction of natural processes such as insect outbreaks, floods, fire cycles, and disease. Because our economy is so dependant on natural resources, we

PARKS IN BRITISH COLUMBIA — PAYING THE PRICE

- Churn Creek Protected Area – Diffuse Knapweed, Burdock, Leafy Spurge, Hounds Tongue and Cockle Burr have established healthy populations in this protected area. The Ministry of Forests has implemented a spray program to control these species.
- Kekuli Bay – an experimental prescribed fire was used to try to control the invasive species in this park but it was unsuccessful because the invasive species quickly re-established following the fire. A chemical control strategy is used instead.
- Lac Du Bois – well established populations of many invasive plant species, as well as the encroachment of forest species has resulted in an aggressive control program that includes mechanical, chemical, and biological control methods.
- Gwaii Haanas National Park Reserve – this island park is threatened by many invasive species including 11 species of land mammals (including deer and raccoons) and 25% of the plant assemblage.



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FIGHTING BACK — A RESTORATION APPROACH

One of the most threatened areas in BC is the Garry Oak ecosystem. Prior to settlement, this ecosystem covered the southeastern part of Vancouver Island as well as the Gulf Islands. This ecosystem thrives in organically rich soil and moderate climate that supports a diversity of habitat for plants and animals, including 93 at risk species. In the last 150 years, southern Vancouver Island has experienced an increase in urbanization and agriculture. Together with a combination of fire suppression and overgrazing by domestic animals, these factors have led to the degradation of this unique and fragile habitat. Current estimates suggest that only 1%-5% remains in a near-natural condition (Fuchs, 2001). These fragments of intact habitat are currently protected in areas such as John Dean Provincial Park and Ruckle Provincial Park. In recent years, the public has come to realize the importance of preserving the Garry Oak ecosystem and has initiated an effort to restore what is left of the Garry Oak back to its original state. Because the ecosystem has been so fragmented, this will be a challenging task.

Most of the restoration effort has focused on removing invasive species and replanting native plants. Local gardeners are encouraged to restore their own gardens back to a Garry Oak habitat by planting oak trees, native herbaceous plants, and removing invasive species including scotch broom. There has also been an attempt to restore fire cycles to the Garry Oak ecosystem to discourage the encroachment of Douglas fir communities. However, because this area is largely urbanized, prescribed fires must be very controlled to protect human lives and property.

Scotch broom has had a particularly large and visible impact on BC landscapes. In the early 1850s, scotch broom was planted in an ornamental garden in Sooke as a reminder of the owner's home in Europe. This seemingly harmless ornamental plant soon spread throughout Vancouver Island, across to the Gulf Islands, and eventually changed the landscape of countless roadsides in British Columbia. This scenario has been played out many times since. Most gardens these days are filled with an array of exotic species imported from around the world. Some may spread but have no ill effect on native flora, some may go on to follow the path of scotch broom, some may stay put in their clay pots on the patio. There is no sure way to tell what the outcome of introducing an exotic species may be. Unfortunately, in the case of scotch broom, there have been devastating consequences for some British Columbian ecosystems. Broom becomes established in disturbed areas with poor soil and acidifies the soil where it grows. It is adapted to conserve water, withstand harsh, dry conditions, and aggressively competes with native species to the point of exclusion. Broom has no natural enemies in BC, so the only method of control is to physically remove it from the soil. For more information, please see www.garryoak.bc.ca.

Nature Conservancy of Canada's Cowichan Garry Oak Preserve before scotch broom removal.



Nature Conservancy of Canada's Cowichan Garry Oak Preserve after scotch broom removal.



have traditionally suppressed disturbance regimes to protect certain ecological values. In the case of many of BC's grassland habitats, the suppression of fire has allowed tree species to encroach into rare grassland habitats and displace the ecosystem with a forested habitat.

WHAT CAN YOU DO?

- Plant your garden with native BC species
- Learn to identify invasive species and prevent them from going to seed
- Get involved – join your local community group and help with restoration efforts
- Clean shoes, equipment, etc. after leaving an infested area
- Join Canadian Parks and Wilderness Society – BC Chapter
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References

- Fuchs, M.A., 2001. Towards a Recovery Strategy for Garry Oak and Associated Ecosystems in Canada. Environment Canada/BC Ministry of Environment Lands and Parks
- Haber, Erich, 2001. Impact of Invasive Plants on Species and Habitats at Risk in Canada. Canadian Wildlife Service. <http://infoweb.magi.com/~ehaber/impact.html>
- Society for Ecological Restoration (SER), 1996. <http://www.ser.org/definitions.html>
- Vernon H. Heywood, "Patterns, Extents, and Modes of Invasions by Terrestrial Plants," in Biological Invasions: A Global Perspective, SCOPE 37, J.A. Drake et al., eds. (John Wiley & Sons Ltd., Chichester, U.K., 1989), p. 40.

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