

2.4 Invasive Species

Introduction

Invasive species – both plants and animals – are identified as one of the primary threats to maintaining native biodiversity world-wide. Invasive species move into areas where they have not evolved as part of the ecosystem, and are often aggressive species capable of taking over natural ecosystems, frequently with high rates of spread or of reproduction and a lack of natural predators. Defining what constitutes “invasive” species can be difficult, since species move naturally around the globe – from some perspectives, European settlers into the CVRD were the quintessential “invasive” species that facilitated many of the other cascading impacts on biodiversity in the region (dealt with in other sections of this report). This chapter focuses more specifically on those animal and plant species that were not historically present in this region.

Invasive Species in the Cowichan Valley Regional District

Invasive species tend to follow humans into new environments. European settlement brought a large number of invasive species to Vancouver Island – deliberately, through horticultural interest, and by the accidental movement of species. Since that time, invasive species have continued to arrive through various means – on ships with lumber, as garden exotics gone wild, and under their own steam. When we think of invasive species, we tend to think of the most obvious species (e.g., plants such as scotch broom or animals such as bullfrogs), but invasive species also include insects and diseases. Species that are “native” to a region can also be classified as problematic “invasive” species if, for environmental reasons (e.g., droughts or land disturbance), they become overly prevalent within a region (such as the mountain pine beetle which has killed more than 16 million hectares of forest in interior BC in the last decade).

Invasive species have significant ecological impacts. The combination of rapid colonization and lack of native predators tends to result in the rapid spread of these species, which can radically alter the ecology of an area. Ecological changes affect food supplies for other species, including the timing and availability of resources; they can also alter chemical processes within ecosystems, resulting in the loss of nutrients for other species and alterations to the entire successional pathway for communities. Many native species can be lost as a result.

Human disturbances such as changing original ecosystems, creating linear corridors (roads/powerlines) and compacting soil, all lead to increased opportunity for many invasive species. The impact of climate change on invasive species is also expected to be significant; drier conditions are expected to significantly increase the ease of colonization by novel species from other places, further increasing the pressures on today's ecosystems.

Invasive species are found in most of the different ecosystems present in or adjacent to the CVRD, including terrestrial systems, freshwater aquatic systems, the marine foreshore, and marine aquatic systems.

Measuring Invasive Species

Keeping tabs on the diverse array of potential invasive species is extremely difficult. Mapping of key species – usually obvious plants and some animals – occurs in some areas of high interest, such as some sensitive Garry oak ecosystems. The Coastal Invasive Plant Committee⁶³ tries to monitor and maintain complete information for plant species, including identifying focal species that should be a priority for action, but the task is very large. Once a species becomes ubiquitous it often stops being a focus of sampling. Comprehensive mapping for all species does not exist, though great efforts are being made in this direction, particularly for plant species. Some aquatic invaders (such as some fish species) are actively encouraged as sport fish, and are purposely moved between lakes. There is a lack of systematic review of aquatic invasive species (though efforts are currently underway). Marine exotics are also less of a focus, though a few key species are notable. Included in this report are the following indicators:

- > Number of invasive plant species and area affected
- > Some invasive animal species of interest

Invasive Plants

Indicator and Measures

This report looks at the number and area of invasive plant species within the Cowichan Valley Regional District.

Findings

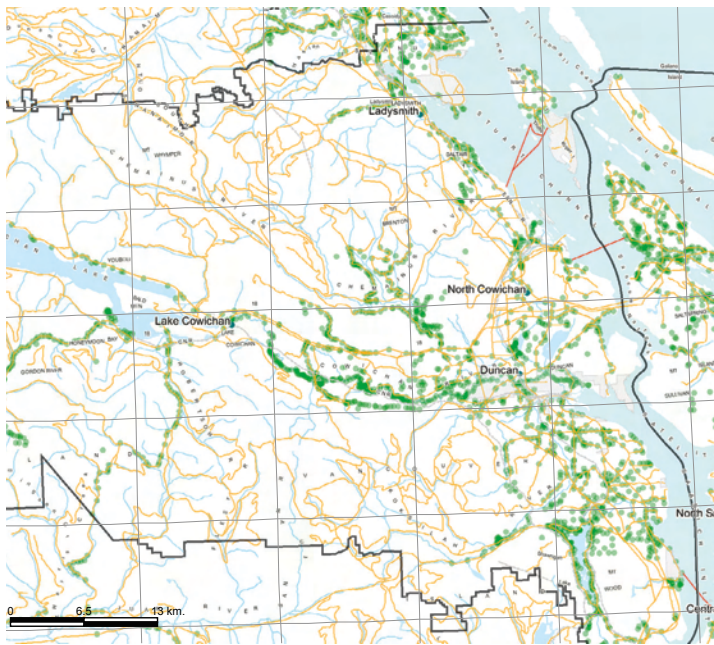
At least 30 invasive plant species are found within the CVRD region (Figures 2.21 and 2.22). According to the Invasive Alien Plant Program data (IAPP)⁶⁴, a total of approximately 909 ha within the CVRD are affected by invasive species, located on approximately 2,000 individual sites. These figures are known to under-estimate the total area affected by invasive species. The most significant species by area included in the database are Scotch broom, followed by oxeye daisy, St John's wort, Himalayan blackberry, bull thistle and Canada thistle. A large number of other species are noted in that database, and though they affect relatively small areas, they can have significant ecological consequences.

63 coastalinvasiveplants.com/invasive_plants.php

64 Invasive Alien Plant Program: www.for.gov.bc.ca/HRA/Plants/index.htm

The general distribution of invasive plant species is shown on Figures 2.21 and 2.22 by green dots representing specific areas where one or more invasive plant species have been mapped. The higher density on the east coast, compared with the west coast, is clear, as is the tendency to have highest densities along road and river systems. This is reflected in the dataset, with almost half of the mapped sites occurring in the Coastal Douglas-fir (CDF) zone, and the majority of the rest occurring in the dry portion of the Coastal Western Hemlock (CWH) zone (Figure 2.21).

FIGURE 2.21: Distribution of mapped invasive plant species – east side of the CVRD



Source: Invasive Alien Plant Program, accessed 2010.

FIGURE 2.22: Distribution of mapped invasive plant species – west side of the CVRD



Source: Invasive Alien Plant Program, accessed 2010.

TABLE 2.10: Number of mapped sites of invasive species, by biogeoclimatic zone

Biogeoclimatic zone	Number of sites
CDF mm	919
CWH mm 1	67
CWH mm2	13
CWH vm1	99
CWH xm 1	612
CWH xm 2	219
Grand Total	1929

Source: Invasive Alien Plant Program, accessed 2010.

Some of these invasive species are relatively benign garden species, but others are having (or have the potential to have) very significant ecological, economic and health impacts. The most obvious impacts are the loss of “space” and increased competition for native biodiversity, resulting in increased impacts to sensitive ecosystems such as Garry oak meadows, as well as a wide diversity of impacts throughout the food chain (from insect predators and pollinators to the provision of edible forage for ungulates). Other species, such as knotweeds, can result in higher levels of soil erosion, since they alter streamside stability compared with native riparian species.

The economic impacts of invasive species are significant – invasive plants are estimated to result in losses of \$50 million annually due to effects on agricultural crops in BC.⁶⁵ Knapweed alone is estimated to result in losses of \$400,000 a year due to impacts on hay production in BC. Species that colonize roadsides (such as broom) also affect critical infrastructure and maintenance costs. The true cost of economic impacts, however, is unknown – particularly the impacts on ecosystem services such as the provision of clean water, flood control in natural riparian ecosystems, or loss of species and ecosystem diversity where impacts are difficult to quantify.

⁶⁵ Invasive plant council of BC: www.invasiveplantcouncilbc.ca/invasive-plants-bc/invasive-plants-in-bc

A few invasive species are relatively isolated within the region at the present time, in terms of area or number of sites affected, but have the potential for significant ecological impacts. Specific isolated invasive species are: common gorse (drier sites), giant hogweed (which is major public health hazard⁶⁶), three species of knotweed⁶⁷(which affect many different habitats) and policeman's helmet (also known as Himalayan balsam, which affects riparian and moist areas).

FIGURE 2.23: Common gorse, giant hogweed, knotweed



Surveys by the Coastal Invasive Plant Committee show that giant hogweed has been found on seven sites, and gorse on 10 sites primarily within the Coastal Douglas-fir (CDF) zone, although distribution is understood to be much greater than existing surveys suggest. Giant knotweed has been found in small clumps, but also as continuous cover in a larger number of sites in the CDF and in the drier zones of the Coastal Western Hemlock (CWH) zone, primarily around Duncan, the Cowichan River and Maple Bay.

Bohemian knotweed is more common (with around 50 sites) primarily around the Cowichan River, while Japanese knotweed is most widespread (found on more than 100 sites from Shawnigan Lake to Cowichan River, Mill Bay and Cobble Hill). Policeman's helmet is a less well-known species of importance newly discovered on Vancouver Island, with four known locations within the CVRD. This species colonizes riparian areas; growing up to 3 m tall, it is an extremely invasive species with high seed production and rapid dispersal through hydrologic systems. As a result, it is often listed in the top-20 of invasive species.

66 Hogweed produces a noxious sap that can result in severe and painful burning and blistering when it comes into contact with skin. Hikers must take precautions not to brush against this dangerous plant that often grows alongside trails.

67 Lynne Atwood, Coastal Invasive Plant Committee, personal communication, 2009.

All of these species can quickly crowd out native vegetation, affecting native species and changing how important areas like riparian habitat function. In addition, smaller, apparently benign species such as the yellow iris can alter the availability and flow of water. Their very dense rhizomes raise the level of the land, turning riverine and marsh ecosystems into more terrestrial systems that favour different overstorey species.

Invasive Animals

Indicator and Measure

No systematic assessment of invasive animals is available. Some forest-specific information is available for species of interest to commercial forestry operations.

Findings

Many of the most ecologically significant invasive animal species are often not even considered as such. For example, house cats are one of the most prevalent and impactful invasive species, estimated to kill more than a billion small mammals and hundreds of millions of songbirds in North America annually. Cats – feral and house – are designated as one of the top-100 worst invasive species on the globe.⁶⁸ Similarly, domesticated dogs also have significant impacts – from the spreading of disease to the general disturbance of native species resulting in reduced populations. Other species such as the European starling, the European house sparrow, rats and grey squirrels have also become so ubiquitous in the ecosystem that they are not included on invasive species lists. In some areas however, these species can have significant impacts on native species. For example, starlings can have significant impacts on breeding sites for cavity nesting birds in natural habitat adjacent to more urban settings.

Other species, such as the bullfrog and green frog, are both invaders of ponds within the CVRD. The bullfrog – a native of eastern North America – was introduced for “farming” in the early 1900s. This large species is a significant predator for many native pond-dwelling species, including fish, native amphibians, snakes, and even ducklings.

68 IUCN, accessed 2010.

There are a variety of “introduced” fish species in various lake systems that have a variety of impacts on the native biodiversity. Species such as smallmouth bass can negatively affect native fish species and amphibians. One species of particular concern is the pumpkin seed sunfish (Figure 2.24), which is found in many bodies of water within the region. This species is a particular problem because it impacts native amphibians, and is thoughtlessly relocated by the public because it is an attractive species.

FIGURE 2.24: Pumpkin seed sunfish – attractive, but ecologically disastrous



Some species, such as slider turtles, have been released by the public (who bought them as pets), and appear to have become established in some areas. They have an omnivorous diet and their effects on native biodiversity are largely unknown. The extent of their range is also unknown.

Not all invasive species are obviously ecologically problematic. Some, such as the non-native eelgrass *Zostera japonica*, appear to function relatively similarly to the native species. However, long-term studies are lacking. The New Zealand mudsnail is a dramatic invader – radically changing aquatic environments in brackish habitats, sometimes occurring in densities of half a million individuals in a square metre. Currently, it is not found within the CVRD, but the potential for spread on recreational craft or fishing gear is ever-present. A recent new discovery of a population of mudsnails in Port Alberni, which spread northwards up the coast, shows the potential for the sudden spread of this and other invasive marine species.⁶⁹

69 Davidson et al., 2008.

Many areas of the province are seeing significant impacts on forests as a result of invasive species. A few species of concern are currently active within the CVRD – including the fir engraver beetle, which impacts grand fir within drier biogeoclimatic (BEC) zones (CDF and CWHxm1) and which appears to have been increasing in the last 5 years. Drier conditions, predicted with climate change, exacerbate the effect of this beetle on grand fir, making these trees more susceptible to attack. Also, the spruce weevil is currently active within the CVRD; it affects regenerating Sitka spruce.

As for pathogens, there are currently few exotic pathogens in BC's forests, though one – *Cryptococcus gattii* (a microscopic pathogen which is normally found in tropical or subtropical locales in Australia, Africa, India or South America) – was identified on Vancouver Island in 2001 and is known to be present in the Cowichan Region⁷⁰. With the potential to cause a human health risk, this species has unknown consequences for the broader ecosystem. With climate change, more invasions of this type are predicted in the future.

Summary

The most significant impacts to ecological systems worldwide are the combined effects of habitat loss due to human activities and invasive species.⁷¹ Human activities often promote other invasive species, and so the intertwining and cumulative effects often increase the overall impacts on biodiversity values.

The CVRD is home to a wide variety of invasive plant and animal species, and this list continues to grow through time. Ecological impacts are varied, but invasive species primarily exacerbate loss of habitat caused by development in the drier east-side areas of the region. Many of the sensitive ecosystems identified in Section 2.2 are particularly hard-hit by invasive species, including Garry oak ecosystems, riparian areas and wetlands.

The full scale of impact, however, is unknown. Knotweed, for example, likely affects how riverine systems function in response to moderate floods, but effects such as these remain largely unquantified. Climate change is expected to significantly increase the ease of colonization by novel species from other places⁷² – further increasing the pressures on today's ecosystems.

70 Robert F. Service, New Concerns About Deadly Fungus Found in Oregon, Science Magazine, April 2010. <http://news.sciencemag.org/sciencenow/2010/04/new-concerns-about-deadly-fungus.html>

71 Millennium Ecosystem Assessment, 2000.

72 Harvell et al., 2002.

Missing Information

Various agencies maintain databases on invasive species, particularly plants, due to their known economic impacts to agriculture and forestry. However, these databases are often out of date, and focus only on specific species. Great efforts are made to prioritize invasive species actions, however the full task of trying to deal effectively with the wide range and abundance of invasive species typically swamps the capacity of agencies. In the CVRD, this situation is exacerbated by the large area of private forest land, for which data are largely unavailable.

Most databases currently focus on plant species, however work is ongoing on Vancouver Island to compile a database of invasive aquatic species.

In largely rural settings such as much of the CVRD, the effects of accepted invasive species such as cats and dogs are significant but unquantified or managed.

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