

INVASIVE PLANTS- IMPACTS, PATHWAYS AND VECTORS, AND BEST PRACTICES

C. Hougen
S. Woods
J. McCaffrey
J. Romyn

Invasive Species Council of British Columbia
#104 – 197 North Second Ave.
Williams Lake, BC
V2G 1Z5

ABSTRACT

The Invasive Species Council of BC (ISCBC) is focusing on the mining industry to reduce the spread and introduction of invasive species. Degraded or altered areas of land are particularly vulnerable to invasive plant establishment. The key mining activities linked to invasive plant introduction are often directly related to the reclamation of mining sites. The most effective way of avoiding the substantial costs that invasive species management can have on mining companies is to regulate the practises that introduce them. Some of these practices include the use of unclean mobile equipment, contaminated seed mixes and infested soil or gravel. With the support of current legislation, it is possible to create and implement invasive plant best management practices for the mining industry, similar to those that were created for and are being utilized by the Ministry of Transportation and Infrastructure. There are a variety of “Weeds and Roads” programs offered by the ISCBC to establish best practises to avoid the introduction and spread of invasive plants. Similar programs can be offered to the managers and operational workers of mining companies. By working together to understand and enforce Best Management Practices (BMPs) that minimize the threats that invasive species pose on mining companies, economic and environmental costs can be avoided.

KEY WORDS: invasive, mining, reclamation, management, training, regulation.

INVASIVE SPECIES COUNCIL OF BRITISH COLUMBIA

The Invasive Species Council of British Columbia (ISCBC) is a registered charity whose vision is to have British Columbia’s (BC’s) landscapes, communities and businesses free of the negative impacts of invasive species. The ISCBC facilitates collaboration among all parties including governments, First Nations, business and communities to reduce the spread of invasive species. The ISCBC takes leadership towards invasive species prevention and management as well as education and awareness activities. These efforts work towards improving environmental health, decreasing economic losses and minimizing community impacts.

WHAT ARE INVASIVE SPECIES AND WHY ARE THEY A PROBLEM?

The ISCBC describes an invasive species as any non-native organism that causes economic or environmental harm and can spread quickly to new areas. Healthy ecosystems are an essential part of BC's natural diversity, and promote the health and well-being of residents and visitors. Invasive plants can threaten ecosystems, as they often displace native species and disrupt natural ecological processes. Invasive plants are capable of altering ecosystem functions which can reduce essential ecosystem services in which other species are dependent on. Degraded or altered areas of land are particularly vulnerable to invasive plant establishment. Invasive plants have limited to no competition and can often grow in a variety of growing conditions.

The economic impacts of invasive plants are a combination of increased management costs to control the particular species as well as the loss of resource productivity. For example, six species of invasive plants were estimated to produce combined financial impacts in BC of \$65 million in 2008. This is predicted to increase to \$129 million by 2020 with further spread (Frid et al. 2009). Invasive species also increase fire risks, pose health hazards and impact the native values of recreational areas.

MINING COMPANIES AND THE INTRODUCTION OF INVASIVE SPECIES INTO AN ECOSYSTEM

There are numerous pathways of introduction and vectors of spread for invasive plants. Pathways are the geographic routing by which invasive plants enter and move around BC. Vectors are the means by which invasive plants from a source population follow a pathway and spread to a new destination. Some mining activities provide key pathways of introduction and vectors of spread. These activities are often directly related to the reclamation of mining sites. Many of the species previously selected for reclamation have now been labelled as the most invasive in BC (Polster 2003). For example, orchardgrass (*Dactylis glomerata*) a common component found in mixes used in mine reclamation has been listed as one of the ten most harmful species to the endangered Garry oak ecosystems (Murray and Jones, 2002; Polster 2003). Mining sites offer ideal habitat for invasive plants, as invasive plants require some sort of disturbance in the landscape to establish a population (Polster 2003). In addition, sites undergoing reclamation provide areas of land that have little to no vegetative competition, disrupted native soil composition and are often fertilized to optimize plant growth (Polster 2003). The Provincial Weed Control Act outlines that invasive plants that are listed provincially become the landowner's responsibility to manage. This could potentially translate into obstacles for mining companies, restricting development or adding significant unplanned costs to the operation (Polster 2003).

BEST MANAGEMENT PRACTICES

The best way for mining companies to avoid the risks associated with invasive species is to proactively control or revise the practices that introduce them in the first place. Examples of these practices are described below.

1. Unclean Mobile Equipment

Mobile equipment that has been brought in from off-site should be thoroughly cleaned prior to the initial use on a mine site in order to ensure that machinery is not an introductory pathway for invasive plants. Pressure washing machines help wash away mud that may contain invasive plant seeds and/or other reproductive parts. Washing should be conducted in an area where invasive plant seeds cannot spread. Ideally, washing would take place at a concrete wash station designed with run-off collection. Disposal of run-off is dependent on the waste facility's disposal practices (composting, waste-to-energy, bag and bury, burn) closest to the mine site.

2. Contaminated Seed Mixes

Invasive plant seeds may be in common reclamation seed mixes used on mine sites. The cost to control invasive plants that are in seed mixes, such as Canadian thistle for example, is much less than eradicating the thistle once it has an established population (Polster 2003). Purchase seeds from companies that provide invasive-free seed mixes or that clearly list all of the species enclosed.

3. Infested Gravel or Soil

Invasive plant seeds can travel in gravel or soil brought onsite for reclamation. Similar to contaminated seed mixes, it is important to ensure the quality and source of soil used for reclamation purposes. Choose a provider that ensures the gravel or soil material has not been contaminated by invasive plant seeds.

By implementing Best Management Practices (BMPs) and adhering to existing invasive plant regulations, the mining industry can play an integral role in managing key invasive plant pathways and vectors and help reduce the environmental, economic and social impacts of invasive plants.

EXISTING INVASIVE PLANT REGULATIONS

Existing invasive plant legislation, such as the *Health, Safety and Reclamation Code for Mines in British Columbia (the Code)* and the *BC Weed Control Act*, need to be better understood and enforced.

Health, Safety and Reclamation Code for Mines in British Columbia

Reclamation standards that are described in *the Code* outline legally binding requirements for proponents who are issued permits under the *Mines Act* to adhere to. These include:

- “10.7.1 It is the duty of every owner, agent, and manager to institute and during the life of the mine to carry out a program of environmental protection and reclamation, in accordance with the standards described in this section”
- “10.7.7 On all lands to be re-vegetated, land shall be re-vegetated to a self-sustaining state using appropriate plant species”
- “10.7.8 On all lands to be re-vegetated, the growth medium shall satisfy land use, capability, and water quality objectives. All surficial soil materials removed for mining purposes shall be saved for use in reclamation programs unless these objectives can be otherwise achieved”

BC Weed Control Act

It is the duty of the occupier of the land to control invasive plants. In accordance with the BC Weed Control Act, “an occupier must control noxious weeds growing or located on land and premises, and on any other property located on land and premises, occupied by that person”.

It is the responsibility of the mining company to control invasive plants once established on their site. The cost to control, remove and monitor for invasive species can be substantial. The cost of practicing BMPs and training staff, in comparison, are minimal. Legislative backing provides further support for invasive plant best practices for the mining industry similar to those that were created for and being utilized by the Ministry of Transportation and Infrastructure (MOTI).

WHAT CAN MINING COMPANIE DO TO PROTECT THEIR INVESTMENTS?

Prevention is the most cost effective way to avoid the problems associated with invasive plants. In order to prevent invasive plant establishment, mining companies the ISCBC encourages the implantations of training programs that would give their employees the skills to identify invasive plants, and learn the best practices associated with their control. Programs that include training for operational staff to raise awareness about invasive species and the BMPs that are available to them will help reduce the risk that invasive species pose on mining companies and to BC ecosystems.

The ISCBC, in partnership with the MOTI, has created the ‘Weeds and Roads’ training program for maintenance staff and contractors focused on the prevention and control of invasive species during maintenance operations. The mining industry faces many of the same issues and challenges as the MOTI does along roads. Many parallels can be drawn between mining practices and BMPs previously developed for the transportation sector. For example, mine sites may encounter contaminated seed mixes and soil, unclean machinery, and the constant creation of disturbed sites and new roadways that offer unique pathways for invasive species.

“Weeds and Roads” programs are offered by the ISCBC to the MOTI. These training programs include a half-day and full-day program for operational staff in the field (‘tailgate session’) for operational staff. Tailgate sessions were specifically designed to be in the field, short and provide information for staff with limited time.

The ISCBC also offers a comprehensive 7-day program for under-employed resource workers looking to diversify their job skills. The 7-day program offers an in-depth focus on issues and solutions, provides identification training and tools, and prepares attendees for the prevention and control of invasive species.

Control techniques include pesticide application and an exam for certification. Instead of this program being offered to under-employed resource workers, it could be tailored to the mining industry and would be of value to mine managers, supervisors of operational staff, operational staff and contractors from the mining industry.

This comprehensive program is designed to be adapted regionally and highlight those species specifically present in particular mine sites or those threatening to enter the area. The program will help attendees

learn how to inventory invasive species and monitor their spread. The potential damage that invasive species can cause is outlined in detail, and the best practices of preventing this damage are explored. The program also describes the current control methods in place, using integrated pest management principles. An optional component offered by the 7-day training is to take the Industrial Vegetation and Noxious Weeds pesticide applicator exam to obtain certification for the chemical control of invasive plant species.

There are numerous resources available that can help managers and operational staff of mining companies identify invasive species and control further establishment. Across BC there are Regional Committees that can help identify invasive species and plan for the future. The Invasive Alien Plant Program (IAPP) is a provincial government database that tracks invasive species reported across the province. Mine workers may easily search for invasive species in their area and report on new establishments. This may facilitate early detection and rapid response actions. A free Apple 'app' called *Report a Weed* allows for the reporting of weed sightings at any location throughout BC. Reporting's are sent to BC plant specialists who will contact appropriate local authorities. *Report a Weed* could easily be made available to mining companies.

The establishment of invasive species on mine sites continues to grow as an issue for BC invasive species management. It is critical that invasive species organizations, industry, and the public work together to control the introduction and spread of invasive species. By working together to understand and adopt BMPs that minimize the threats of invasive species to mine sites, we can work towards improving environmental health, reducing costs and minimizing community impacts.

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