



IAP Reference Guide Part I - Understanding The Business



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IAP Reference Guide - Part I

Module 1.1: An Introduction

In this module, you will learn:

- Why this guide was developed;
- What you will learn by using this guide;
- Who this guide is intended for;
- What icons are used in this guide; and,
- How this guide is structured.

Why was this guide developed?

This Reference Guide should be used to support learners in understanding the business tasks relevant to the inventory, treatment, and monitoring of Invasive Alien Plants (IAP) as well as data entry and query in the Invasive Alien Plant Program and navigation and query in the Invasive Alien Plant Program - Map Display.

What will I learn?

Upon completion of this guide learners will be able to:

- explain why the Invasive Alien Plants Program exists and provide an overview of the program;
- identify applicable legislation related to invasive plants in BC;
- understand the various tasks involved in the inventory, treatment and monitoring of invasive plants including manual, chemical, and biological treatments;
- understand how to use the IAP Program – Data Entry to enter and query data for inventory, treatment and monitoring invasive plants including manual, chemical, and biological treatments; and,
- understand how to navigate, query, and display invasive plants and their treatments in B.C. in the IAP Program - Map Display.

Who is this guide for?

This guide is intended for organizations and individuals who are interested in invasive alien plant management.

It is important to note that the Reference Guide will be targeted to new program users but will also be a useful “on-the-job” resource to all individuals managing invasive plants.

What icons are in this guide?

The following icons are used in this guide to draw attention to important information and details.



This symbol denotes a tip. This is an important point that you should pay close attention to.



This symbol denotes a warning or caution.



This symbol highlights a reference to key legislation that you should be aware of.

How is this guide structured?

This guide is made up of the following parts:

- Part I: Understanding the Business
- Part II: Using the IAP Program – Data Entry
- Part III: Using the IAP Program – Map Display
- Part IV: Appendices

This guide is structured to be a useful “on-the-job” resource. Modules, in Part I of the guide, can be removed for field use if required.

Guide Structure	
Part I: Understanding the Business	<p>This part of the guide is useful for learners requiring information about the business processes and tasks performed within the IAP Program. This part focuses on:</p> <ul style="list-style-type: none"> • Program overview and intent • Preventative measures • Treatment guidelines • Analysis of sites and setting of priority • Inventory and monitoring • Understanding treatment methods and data collection <p>The key intention of this part is to describe the business of invasive plant management and the accompanying field activities that take place. Field activities and the subsequent data they generate need to be consistent in order to have consistent, comparable data in the IAP Program – Data Entry & Map Display.</p>
Part II: Using the IAP Program – Data Entry	<p>The primary focus of this part is the use of the IAP Program – Data Entry. In this part, explicit instructions are provided on how to use the program to enter, query, and extract attribute data.</p> <p>The IAP Program – Data Entry functions are to:</p> <ul style="list-style-type: none"> • Co-ordinate/share information generated by various agencies and non-government organizations involved in invasive plant management. • Receive, store, supply, and co-ordinate data for invasive plant management.
Part III: Using the IAP Program - Map Display	<p>The objective of this part of the guide is to explain how to use the IAP Program - Map Display. The focus is on:</p> <ul style="list-style-type: none"> • Access – available to the general public through the internet. • Explanation of data that is displayed. • Explanation of the program’s features. • Step-by-step instructions for obtaining different data/views & queries.
Part IV: Appendices	<p>The appendices include:</p> <ul style="list-style-type: none"> • Useful code tables and forms. • Additional reference material.

How to access the IAP Program – Data Entry & Map Display

What is an Agency?

The IAP Program – Data Entry & Map Display is designed to co-ordinate and manage invasive plant data in B.C. This has been accomplished by assigning records (data) to individual agencies. Each agency must assign an individual responsible for:

- Registering its agency for access to the IAP Program Data Entry & Map Display.
- Maintaining a current list of users from its agency whom have access to the application (i.e. individual's name and user role).
- Each agency must manage and keep current the IDIR's & BCeID's of the individuals working for them.
- Ensuring the integrity of the data its agency enters into the application

Sample Agencies:

- Ministry of Forests and Range
- Cariboo Regional District
- Thompson Nicola Regional District
- Ministry of Transportation and Highways
- North East Invasive Plant Council

What if I am a member of more than one Agency?

If you work for more than one Agency then you would have more than one BCeID for access (see below). Upon logon, you will be prompted to select the agency you wish to work under for that session in the application.

How do I access the IAP Program - Data Entry & Map Display?

To gain access to the IAP Program – Data Entry & Map Display, you must either be a staff member or contractor of MoFR or be part of a registered agency. Follow the steps outlined in the table below:

Employer	Step 1: Obtain an ID	Step 2: Request access to the application
<p>Provincial Government Agency (Ministry) - staff or contractor</p>	<p>You must have an IDIR ID</p>	<p>Submit your IDIR ID to forhisp.apphelp@gov.bc.ca and request access to IAP Program – Data Entry & Map Display. If you are responsible for a program compile all IDIR accounts and submit as a batch for your section to forhisp.apphelp@gov.bc.ca.</p>
<p>Other Agency</p>	<p>You must have a BCeID (also known as a “username”). This ID is provided to you by your Agency. Note: If you are a new Agency, navigate to: http://www.for.gov.bc.ca/his/esd/ & select the link titled “If your company does not have a BCeID please see BCeID Enrollment Process”</p>	<p>Now that you have a BCeID, you must request access to the application. Navigate to: http://www.for.gov.bc.ca/his/esd/ & select “If your company has a BCeID you can request access to Ministry of Forests and Range applications here”. Note: It is the responsibility of the Agency to ensure each IDIR / BCeID account and password are accurate and up to date. To assist with this, please refer to the instructions and suggestions outlined in the MoFR IAP web site at: http://www.for.gov.bc.ca/hfp/invasive/index.htm</p>

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Module 1.2: Understanding the IAP Program & Legislative Requirements

In this module, you will learn about:

- The IAP Program & its intent;
- Provincial legislative requirements; and,
- Federal legislative requirements.

Program Overview & Intent

What are Invasive alien plants?

Invasive alien plants are non-native plants that have found their way into British Columbia. They are both an ecological and economic problem for our province. Without the insect predators or plant pathogens that naturally control them in their native habitats, they can quickly spread out of control. In Europe, many of these plants evolved in an ecosystem filled with disturbance while our native plants evolved with minimal disturbance. These non-native plants may have an advantage over our native plants on disturbed sites. Often, they exhibit aggressive growth and out-compete crops and native plant species, adversely affecting economic and natural resources. The resulting invasion can reduce recreational and crop values, displace native vegetation (and therefore forage for wildlife and livestock), reduce biodiversity, and damage native ecosystems. Invasive plants are often referred to as “weeds” and are introduced and spread mainly by humans, as well as by wind, water, livestock, and wildlife.

Invasive plants do not constitute a separate biological category, however, they do have varying characteristics that permit them to rapidly invade new areas and out-compete native plants for light, water, and nutrients. Some of these characteristics include:

- Early maturation;
- Profuse reproduction by seeds and/or vegetative structures;
- Seed dormancy ensures periodic germination and prevents seedlings from sprouting during unfavorable conditions;
- Adaptations for spread with crop seeds, by natural agents, and by humans;
- Prickles, spines, or thorns that can cause physical injury and repel animals;
- The ability to parasitize other plants;
- Seeds that are the same size and shape as crop seeds, which makes cleaning difficult;
- Root or rhizomes with large food reserves;
- Survival and seed production under adverse environmental conditions; and,
- High photosynthetic rates.

Problems caused by invasive alien species have increased dramatically in recent decades, due in part to an increasing human population. Population growth leads to greater disturbance of the land, increased demand for food and fiber, overuse of public land for recreation and commercial production, increased international travel, and globalization of world trade. All of these encourage the introduction, establishment, and spread of invasive species.

The Invasive Plant council of BC defines invasive plants as: “Any invasive alien plant species that has the potential to pose undesirable or detrimental impacts on humans, animals or ecosystems.”

What is the intent?

The Ministry of Forests and Range' Invasive Alien Plant program is designed to minimize the spread of/or eliminate invasive alien plant species not native to North America which are threatening the province's forest and range resources. It is recognized that, once widely established in B.C., it is impossible to eradicate these invasive plants. In this case, the intent is to bring these plants into equilibrium with our native species at an acceptable economic and ecological level. The program is conducted using an Integrated Pest Management (IPM) approach, using all available tools at the program's disposal.

What is Integrated Pest Management?

IPM uses a combination of mechanical, chemical, and biological methods to control invasive plants. The long term objective of IPM is to control invasive alien plant problems through preventative measures and biological control. However, in the short term, IPM recognizes the need for both mechanical and chemical methods to ensure vegetation management in BC.

Who do we work with?

The program works cooperatively with provincial, national, and international governments and non-government agencies concerned with invasive alien plant control.

Provincial Legislative Requirements

There are numerous acts, regulations, policies, and guidelines which the Ministry of Forests and Range must comply with in the management of invasive plants in BC.



An overview of the most important Provincial Legislation is discussed below.

For additional information on Statutes and Regulations in BC, visit: <http://www.qp.gov.bc.ca/statreg/>

Provincial Acts

- **Forest and Range Practices Act (FRPA)** - FRPA governs how all forestry and range practices are conducted in BC. (For more information visit: <http://www.for.gov.bc.ca/tasb/legsregs/frpa/frpa/part5.htm#section47>)
 - Section 47 of this act states the following: "A person carrying out a forest practice or a range practice must carry out measures that are (a) specified in the applicable operational plan, or (b) authorized by the minister to prevent the introduction or spread of prescribed species of invasive plants."
- **Administrative Remedies Regulation** – this regulation specifies the remedies for contraventions of FRPA.
 - The maximum penalty for a contravention of FRPA section 47 is \$20,000.
- **Invasive Plants Regulation** – this regulation specifies which plants are classified by MoFR as invasive plant species in BC.
- **Forest Planning and Practices Regulation** – under FRPA, section 17 of this regulation states the following regarding invasive plants:
 - "For the purpose of section 47 [invasive plants] of the Act, a person who prepares a forest stewardship plan must specify measures in the plan to prevent the introduction or spread of species of plants prescribed in the Invasive Plants Regulation, if the introduction or spread is likely to be the result of the person's forest practices."
 - The maximum penalty for a contravention is \$10,000.

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- (For more information visit:
<http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/forplanprac/fppr.htm#section17>)
- **Range Planning and Practices Regulation** – under FRPA, section 15 of this regulation states the following regarding invasive plants:
 - “For the purpose of section 47 [invasive plants] of the Act, a range agreement holder who is required to prepare a range use plan must specify measures in the plan to prevent the introduction or spread of species of plants prescribed in the Invasive Plants Regulation, if the introduction or spread is likely to be the result of the holder’s range practices.
 - The maximum penalty for a contravention is \$10,000.
 - (For more information visit:
<http://www.for.gov.bc.ca/tasb/legsregs/frpa/frparegs/rangeplanprac/rppr.htm#section15>)
- **Weed Control Act** – outlines the obligation to control designated noxious weeds, not necessarily with pesticides, by the land occupier as designated by Ministry of Agriculture and Land (MAL), ‘Noxious weeds’ are those invasive plants designated as noxious in this Act. (For more information visit:
http://www.gp.gov.bc.ca/statreg/stat/W/96487_01.htm)
- **Integrated Pest Management Act** (formerly the **Pesticide Control Act**) – prohibits the application of pesticides, including herbicides, from Crown land except under a Pesticide Use Permit by a licensed pesticide applicator. Also lays out requirements for the handling, storage, disposal, and sale of pesticides. (For more information visit:
<http://www.env.gov.bc.ca/epd/epdpa/ipmp/pestact/index.html>)
- **Environmental Management Act** – outlines the process for appeals of pesticide use.
- **Wildlife Act** – establishes criteria for the protection of wildlife and wildlife habitat.
- **BC Transportation of Dangerous Goods Act** – provides information regarding the storage and transportation of pesticides.

Federal Legislative Requirements

There are numerous federal legislative requirements that must also be adhered to in the management of invasive plants.



An overview of key Federal Legislation is discussed below.

- **Plant Protection Act** – describes the requirements for the introduction of biocontrol agents into Canada.
- **Pesticide Control Products Act** – summarizes the registration and availability of pesticides. Prohibits application under unsafe conditions.
- **Migratory Birds Convention Act** – describes the requirements to protect migratory birds from pesticides.
- **Fisheries Act** – establishes criteria for the protection of fisheries and fish habitat from pesticides.
- **Transportation of Dangerous Goods Act** – provides information regarding the storage and transportation of pesticides (and other dangerous goods).

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- **Food and Drugs Act** – describes restrictions on pesticide use on livestock forage and where livestock will be consumed by humans.
- **Waste Management Act** – outlines procedures for the disposal of pesticide wastes.
- **Seeds Act** – An Act respecting the testing, inspection, quality, and sale of seeds. (For more information visit: <http://laws.justice.gc.ca/en/S-8/C.R.C.-c.1400/178415.html>)
 - **Seeds Regulation** – provides guidelines for the content of noxious weed seeds in crop seed, and transportation of crop seed in Canada.

Municipal By-Laws

There may be municipal by-laws which you must also comply with in the management of invasive plants in BC. Ensure you check with your local municipality for information about these.

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Module 1.3: Invasive Alien Plant Prevention

In this module, you will learn:

- The importance of encouraging prevention;
- What should be done to encourage prevention; and,
- What activities you should be aware of.

Public Awareness

Early detection is essential to slowing the spread of invasive plants. Early detection of invasive alien plant infestations can be enhanced by recruiting the public to report invasive plants as they appear. There is a much better chance of gaining control of invasive plants when their populations are small. An informed public that can identify invasive alien plant species can help prevent invasive plants from spreading or populations from building. There are many other people and agencies involved in invasive alien plant management, therefore, it is best to have a coordinated effort for building public awareness.

Encouraging Prevention

Did you know that prevention is the most economic and effective method of managing invasive plants? Prevention involves impeding dispersal and hindering establishment of invasive plants. Preventing weed spread to un-infested areas is an important aspect of invasive plant management. Recognizing new invasive plant problems and detecting them early can also simplify their control. Effective prevention requires an understanding of invasive alien plant biology and population dynamics.

Management practices that maintain the native vegetation in a vigorous, productive condition should be emphasized to deter the establishment and spread of invasive plants. In general, prevention can be achieved through modifications of cultural practices and an integrated approach to land use. Forest and range activities must be carried out in a manner that prevents the introduction or spread of invasive plants.

What can be done?

Minimize horticultural escapes

Most introduced ornamental plants that adorn our yards and gardens cannot survive outside cultivation. Plants that do become established outside of cultivation (i.e. invasive plants) often cause significant damage in natural areas. Sales of most known or potential invasive alien plant species are generally unregulated. Many invasive plants of the yard and garden are widespread and are generally not regulated in greenhouse or landscaping retailers. Attention should be given to the biology of garden plants prior to purchasing. Avoid aggressive and spreading species.

Minimize soil disturbance

It is imperative that an invasive plant resistant plant community is established through appropriate forest and range management. This can be encouraged by:

- Managing for a late seral plant community. While it is important to acknowledge that some invasive plants will still be able to establish in the late seral or potential natural community (PNC) plant communities, earlier seral stages are more susceptible to colonization by invasive plants;
- Managing grazing to prevent excessive soil disturbance at salt areas, watering sites, stock trails and corrals. Some disturbance is inevitable at these sites, so they must be checked frequently for invasive plants; and,
- Minimizing soil disturbance during road construction and maintenance.

Recall that sometimes land disturbance may be unavoidable. For example, forest fires in BC are often unavoidable. They disturb the land and create particular concerns with respect to invasive plants.

Areas that are repeatedly disturbed, such as recreation sites or livestock congregation areas, are susceptible to invasive alien plant invasion. The first step in reducing the risk of invasive alien plant infestation on these sites is to reduce disturbance through sound management. For example, salting and riding can distribute livestock over the range and reduce disturbance. Once these disturbances are reduced, vegetation can recover and make the site less susceptible to invasive alien plant invasion.

Act quickly to re-establish vegetation

Vegetation should be re-established on disturbed areas within two weeks of the disturbance. Use a seed mix which includes fast, early growing species of grasses and legumes that considers local site characteristics and objectives for the area. Considerations include methods, plant species, rates, timing, biogeoclimatic unit, soil types, slope, aspect and expected uses.



Did you know that all seed sold in Canada is subject to the federal **Seeds Act** and thus subject to tolerances for prohibited and primary noxious invasive plant seed?

Section 3(1) of the **Seeds Act** states:

3. (1) Except as provided by the regulations, no person shall:

(a) sell, import into Canada or export from Canada any seed unless the seed conforms to the prescribed standard and is marked and packed and the package labeled as prescribed, or

(b) sell or advertise for sale in Canada or import into Canada seed of a variety that is not registered in the prescribed manner.

Minimize invasive alien plant dispersal

Invasive plant seeds can be dispersed by wind, water, animals, people and machinery. Some invasive plants are also spread when root fragments are transported to new locations. The following techniques can assist in minimizing invasive plant dispersal:

Vector	Solution
Natural Vectors	<ul style="list-style-type: none"> • Many invasive plant species, such as several thistles, have specialized featherlike structures (pappus) attached to their seed coat. This pappus allows the seed to readily disperse by wind. • Seeds and root fragments are also carried by water. • Invasive plants should be killed before flowering, but, if treated after flowering, they should be dug up or clipped and the seed heads bagged to prevent seed dispersal. The refuse should be taken to land fills where the material will be buried deep and/or the surrounded area treated for escaped invasive plants.
Human Carriage	<ul style="list-style-type: none"> • Human transport of invasive plant seeds is a concern. Hikers, tree planters, and other forest or range workers should be encouraged to check clothing and equipment for invasive plant seeds. For example, Hound's-Tongue.
Livestock and Wildlife	<ul style="list-style-type: none"> • Both livestock and wildlife graze on some invasive plant species and seeds can be moved to new locations through digestive systems or when animals cache them for later use. Therefore, ensure seeds in the digestive system are allowed to pass through the animal before moving it to a non-infested area. This can usually be accomplished by holding the livestock for three days in an invasive plant free area. Examples of livestock include cattle, horses, working dogs, and pets. • Birds may also transport seeds. • Examples of frequently transported seeds include those of Burdock, Hound's-Tongue, and Sulphur Cinquefoil. • Ensure livestock is invasive plant-free when moving into a non-infested area. All seeds attached to the coat should be removed.
Vehicle	<ul style="list-style-type: none"> • Inspect the undercarriage of logging trucks and other vehicles and remove attached invasive plants prior to leaving an invasive plant infested area. • Before machinery moves into an invasive plant-free area, or livestock are trailed to an invasive plant free area consider spraying, mowing or hand pulling, along the route to be traveled into the invasive plant-free area. • For example, Knapweeds.
Horticulture	<ul style="list-style-type: none"> • Garden refuse can cause the spread of invasive plants, for example, Toadflax and Knotweed. • Avoid/remove and discard creeping rootstock ornamentals in a designated landfill. • Do not put invasive plants in the compost. • Remove problem plants before selling your property. • Avoid growing non-native herbal remedy plants. • Avoid using invasive plants in dried flower arrangements, for example, teasel. • Wildflower seed mixtures can contain a percentage of invasive plant seeds. In order to prevent their establishment and spread, consumers should buy mixtures that are free of invasive plant seed.
Soil & gravel transport	<ul style="list-style-type: none"> • Investigate which plant species exist at a site ahead of time and confine soil & gravel contaminated with invasive plants so it can be treated.
Road and Utilities Construction & Maintenance	<ul style="list-style-type: none"> • Where possible, limit road maintenance to the road surface to retain the vegetated areas along roads. • Ensure the gravel used for a road construction contains no invasive plant seed or rhizominous plant parts. • For example, Knotweeds.

What activities should you be aware of?

Examples of activities that may cause the introduction or spread of invasive plants include:

For Forestry

- road building and maintenance (propagating plant parts – roots, stems and seeds)
- building landings and skid trails;
- harvesting that exposes mineral soil;
- post harvest site preparation;
- movement of machinery related to the above activities; and,
- log hauling (seed dispersal).

For guidelines pertaining to invasive plants information to be included in operational plans as required by the *Forest and Range Practices Act*, refer to the Provincial Invasive Plant Guidelines in Part IV of this guide.

For Range

- grazing that creates early or mid seral plant communities;
- trampling around salting sites and other congregation areas;
- building of stock trails, water developments and corrals; and,
- herding livestock (trampling that creates exposed mineral soil and seed dispersal).

For Horticulture

- unrestricted importation and planting of potential invasive species; and,
- careless disposal of garden refuse.

For Recreation

- disturbance of soil by ATV's and other recreational activities; and,
- transport of invasive species attached to recreational vehicles (for example, Milfoil).

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Module 1.4: Planning of Invasive Alien Plant Programs

In this module, you will learn:

- How to plan for invasive plants; and,
- How to analyze sites and set priorities.

Planning for Invasive plants

The IAP Provincial Program is organized by agency which allows each agency to create a plan for its site(s).

What is an Agency?

The IAP Program – Data Entry & Map Display is designed to co-ordinate and manage invasive plant data in B.C. This has been accomplished by assigning records (data) to individual agencies. Each agency must assign an individual responsible for:

- Registering its agency for access to the IAP Program – Data Entry & Map Display.
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Sample Agencies:

- Ministry of Forests and Range
- Cariboo Regional District
- Thompson Nicola Regional District
- Ministry of Transportation and Highways
- North East Invasive Plant Council



Why is an invasive alien plant plan needed?

A plan is needed to clearly define the goals and objectives of the organization (or project) to manage invasive plants. Some aspects requiring definition are:

- Identification of invasive plants of concern.
- Assessment of the potential impact of invasive plants on the habitat.
- Devising strategies for each invasive plant species.
- Performing activities according to Integrated Pest Management principles.

What are the levels of invasive alien plant planning?

The following table describes the objectives of **Strategic Plans** vs. **Tactical Plans**.

Strategic Plans	Tactical Plans
 <ul style="list-style-type: none"> • Profile the invasive plants and state general mid and long-term goals. • Outline the purpose and principles for managing invasive plants. • Form a basis for the development or updating of tactical plans. • Are multi-year plans. 	 <ul style="list-style-type: none"> • Ensure that the work and resources required are understood and allocated appropriately to accomplish the goals. • Outline specific actions. • Specify both short and long-term goals. • Are consistent with strategic plans. • Are revised annually.

What are the steps for developing a plan?

There are six steps to follow when developing an invasive plant control plan. These are as follows:

- 1 Outline goals and purpose.
- 2 Compile existing information.
- 3 Assess information and define objectives.
- 4 Establish priorities based on the MoFR Regional Invasive Plant Categories and Priority Matrix.
- 5 Set activities (e.g. inventory, treatment, monitoring and extension) based on available resources.
- 6 Review and report results.

Assessing Sites & Setting Priorities

Assessing a site and ranking its priority for treatment is an important aspect of invasive plant control. This is a necessary step if funding or manpower is not sufficient to treat all invasive plants on all sites in a single season. MoFR uses the **Regional Invasive Plant Categories** and **Priority Matrix** to assess both invasive plants and sites and rank them across the 761,800 square kilometers of Crown Land (Lands and Sub-Surface Branch, MSRM 1997) for which the Ministry of Forests and Range is responsible. The matrix takes into account the invasive alien plant species' biology, its potential to spread, the geographic location, proximity to other similar infestations, and the susceptibility rating of the site. Each species is evaluated individually within the matrix. The method for ranking sites must follow three steps as described below.

Step 1 – Determine the Invasive Plant Category

Invasive plants have been placed into four separate categories reflecting invasiveness. Use the following links to identify which category the invasive alien plant fits in.

Forest and Range Practices Act:

http://www.qp.gov.bc.ca/statreg/reg/F/ForRangPrac/18_2004.htm

Weed Control Act:

http://www.qp.gov.bc.ca/statreg/stat/W/96487_01.htm

Step 2 – Determine the priority of the site

Invasive alien plant infested sites are also ranked according to priority. Use the following definitions to select the priority of the site:

Priority	Purpose or Intent
1 – Extremely High Risk	To stop the spread of invasive plants threatening currently un-infested, highly susceptible areas. These sites are less than or equal to 0.25 ha and there is a good expectation of control. These sites are isolated geographically from the main body of the infestation.
2 – High Risk	To stop the enlargement of sites in highly susceptible areas. These sites are less than or equal to 0.5 ha. Must have a reasonably good expectation of control.
3 – Moderate Risk	To stop the enlargement of sites that are greater than or equal to 0.5 ha in highly susceptible areas, or less than or equal to 0.5 ha in moderately susceptible areas.
4 – Low Risk	To stop the enlargement/contain sites greater than 0.5 ha in moderately susceptible areas.

Step 3 – Is action needed?

Now that you have determined the category of the invasive alien plant and the priority of the site, use the following matrix to set the level of activities you can accomplish. Work from the top of the table downward for mechanical and herbicide treatments and from the bottom upward for biological control treatment to the limit of available resources.

Category	Site Priority	
1	1	<p style="text-align: center;">Mechanical and Chemical Treatments</p>
1	2	
2	1	
1	3	
2	2	
2	3	
3	1	
3	2	
3	3	
4	All sites	

Treatment Objectives

It is important that the objective of the treatment is clearly understood prior to the actual implementation of the treatment. Although treatment objectives exist on a continuum based on plant invasiveness, geographic distribution and resources, for the sake of management programs, levels of treatment are divided into three levels. These levels are:

- Extirpation;
- Containment; or,
- Rehabilitation.

Extirpation

Extirpation of an invasive plant species equates to one hundred percent of all known sites of the target species, within the defined area, ideally being treated prior to seed set or seed development if seed drop is indicated as the main vector of spread.

In order to ensure extirpation success, the following additional activities must occur:

- Treated sites must be checked in at least a two-pass system.
- The area beyond the last treated plant must be checked for immature plants.
- There must be zero percent missed plants and zero percent surviving plants at the end of the growing season within the treated site.
- Annual monitoring must occur within and around the treatment sites.



Extirpation is the eradication of the invasive plant from a defined area.

Containment

Containment of an invasive alien plant species means that an invasive alien plant species will only be allowed to exist within a defined “containment” area. Therefore, one hundred percent of the invasive alien plant species beyond the containment boundary will be treated. The following activities must occur for effective containment:

- Treated sites must be checked in a two-pass system.
- The area beyond the last treated plant must be checked for the spread of the species.
- There must be zero percent missed plants and zero percent surviving plants at the end of the growing season within the treated site unless otherwise specified.
- Selected sites will be monitored for efficacy of treatment and annual monitoring around the treatment sites will occur.
- Seed pick up and dispersal sites within infested areas need to be identified and sometimes treated.
- Biocontrol agents will be used for containment when available if other means are not acceptable.

The Containment Lines Function can be used to filter data based on Containment Lines in the IAP Program – Data Entry. This is discussed in **Module 2.3 – Understanding Administrative Areas & Containment Lines** (see Part II of the Reference Guide).

Rehabilitation

Rehabilitation of infested areas will be through the use of good resource management practices and the encouragement of healthy biological control agent populations, where available, unless the use of other treatment techniques can be justified with a long-term cost/benefit analysis.

Additional Information

For additional information, refer to the following resources derived for Forest Investment Account Standards (available in Part IV of this guide):

- Control Measure Standards
- Vector Matrix Table

IAP Reference Guide - Part I

Module 1.5: Inventory & Monitoring

In this module, you will learn about:

- Understanding inventory standards;
- Recording inventory data; and,
- Finding additional resources.



The following data collection forms are discussed in this module:

- Site and Invasive Plant Inventory Record

How to Perform Inventory

Prior to prescribing invasive plant inventory surveys, one must first establish the objective of the survey. The survey results may be used to determine the distribution of a particular species in order to conduct:

- strategic, overall planning;
- planning control or treatment activities
- determining potential contract costs (associated with treatments, for instance); and
- research purposes, such as monitoring for spread and aggressiveness over time.

You may be inventorying areas where there is no historic invasive plant data, or you may be simply monitoring and updating previous survey data. Remember that invasive plant inventory data is often collected in conjunction with biological, mechanical and chemical control activities.

Pre-survey Inventory Organization

Once you decide on the location and species to be surveyed, it is important to review the characteristics of those target species. For example:

- biology
- size and growth form;
- distinguishing characteristics to discern it from other species;
- flowering period for the area;
- shade tolerances (full, partial, none);
- soil pH range and preferences (acidic, neutral, alkaline);
- salt tolerance
- soil moisture range and preferences (xeric, mesic, hydric, hygric); and
- soil texture (coarse, fine, organic).
- community type (BEC site series or plant association)

Prior to going to the field, decide on the level of detail that is required for the inventory. Maps for the area shall be used to assist with navigation or to accurately record data. A scale of between 1:5,000 to 1:250,000 is most appropriate for orientation and should depict roads, water bodies, utility corridors and land status features. It is also beneficial to have satellite imagery or orthophotos for areas where trails and other off-road areas will be visited. A scale of between 1:5000 to 1:20,000 is most appropriate for drawing spatial polygons (a closed spatial representation of an infestation).

A thorough review of existing invasive plant infestation information is important for determining the time that it will take to survey a particular area (or species) to a desired standard. Use the IAPP Map Display to highlight those species that may exist within an area of interest and select those layers best suited to the needs of the particular project. It may be necessary to print off several maps of one area at different scales to provide enough detail. Also, using the Site Selection Extract function, print off, in spreadsheet format, those species inventoried from past surveys.



When using a GPS unit to obtain site coordinates, ensure that the NAD 83 datum is selected. If using a field map to geo-reference sites, ensure that you have a scale large enough to collect coordinates within the accuracy required, by the standards you wish to meet.

The Checklist – Preparing the Equipment

The following is a checklist to help you to prepare for an inventory survey:

- pencils / pens
 - markers used for drawing infestations on maps should have a thin tip to increase the polygon boundary accuracy when digitizing.
- relevant maps
 - maps used for recording spatial polygons by drawing infestation boundaries should:
 - be up-to-date;
 - portray data accurately with known reference points;
 - have projections such as Universal Transverse Mercator (UTM) or Albers, for example, TRIM (preferred), Forest Cover or orthophoto maps;
 - have scales of 1:5000 up to 1:20,000; and
 - be in good physical condition, i.e. not wrinkled or torn so drawn lines are accurate.
- clipboard with:
 - Invasive Plant Inventory Record
 - Photoplot Form
 - plant species, jurisdiction, distribution and density code lists
- GPS Unit with extra batteries (procedures for validating GPS unit positional precision and accuracy can be found at http://ilmbwww.gov.bc.ca/bmgs/gsr/gsr_standards.htm#trafford)
- camera with extra film/memory card and batteries
- stadia rod.

Field Procedures

The procedures described in this section pertain to those inventories where only invasive plant survey or monitoring information is required. While biological, chemical and/or mechanical treatment measures may be incorporated into survey prescriptions, these procedures are explained in later modules.

Surveys can be conducted by truck, ATV, motorbike, bicycle, horse, or on foot depending on access to the area, the level of detail required and budget. It is recommended that you choose the method that will have the least impact on the land, for example, when conducting surveys over grassland areas it may be best to use horses or go on foot to reduce impact and disturbance. Most surveys can be conducted by one person if he or she is experienced, although having two individuals is safer and can make data collection easier. Some species like Rush Skeletonweed can be difficult to see and a lone driver may miss some plants.

Once the survey area is determined, travel those roads, trails and areas that are likely to be susceptible for invasion by your target species. Many dryland species tend to invade grasslands and forest openings while riparian species prefer lakeshores, ponds, sloughs, creeks, river edges,

marshes and seepage areas. A review of each species' biogeoclimatic zone/subzone preferences will also assist in determining where to focus your efforts, and experience with site series or plant associations is beneficial. Carefully survey those areas that have been recently disturbed or that receive disturbance on a regular basis as they are generally the preferred habitats of invasive species. Such areas may include:

- roadsides, ditches, pullouts and landings;
- recreation sites;
- areas where vehicle traffic and loading/unloading is common;
- openings in forest canopy;
- overgrazed and areas of heavy livestock and/or wildlife use;
- recent developments or construction sites where machinery has been present or working;
- burned areas;
- air strips;
- gravel pits, and,
- any other area that human activity or natural disturbance may increase the likelihood of invasive plant introduction and establishment.

Record the areas checked/surveyed so that future surveyors in the same area know where previous surveys have been completed. Compile a list of roads and areas surveyed using your GPS unit. The GPS can record a track log to continuously map where surveyors have traveled. Track logs can then be plotted on future maps to assist surveyors in covering all strategic areas over the course of several years. This is essential for those areas where control programs are actively containing a species from further spread and establishment.

Collecting the Data

When a target species is found, the information must be recorded on an Invasive Plant Inventory Record. If this is a new site, then information specific to the site must be recorded as well as data specific to the survey of the invasive plant species infestation(s). If the site is an existing site, then you only need to record the Site ID and data specific to the survey of any invasive plant infestation found.



If the surveyor(s) is unable to correctly identify a particular plant species as an “invasive alien”, it is recommended that a sample be taken for proper identification. Care must be taken not to spill any seeds or plant parts during collection and travel; a sealed paper or plastic bag works well.

As a general principle, invasive plant occurrences that are continuous, that is, where gaps between plants are less than 100 metres, are to be recorded as one site. Sites that exist at a distance greater than 100 metres apart, with no occurrences of any target species will be recorded as separate sites.

For sites greater than 0.2 hectares, record the spatial distribution of the target plants. This is done by using one of two methods:

- make an ocular estimate of the infestation and, using reference points on an approved paper map (see description of maps for recording spatial polygons above), draw the infestation on the map for digitizing later, or,
- capture the spatial data with your GPS unit by walking the perimeter of the site and downloading the created polygon.

A GPS UTM location is still required for those sites where a spatial polygon was created. Ideally, the co-ordinates are taken at the centre of the infestation or they can be derived as the centroid of a digitized polygon.

In situations where you come across extremely large infestations, e.g. greater than 5 hectares, and it is not practical to create a spatial polygon by walking the perimeter, give a best estimate of the total area, average density and distribution. Remember: 100m x 100m = 1 hectare.

You are likely to encounter sites where multiple species exist. In this situation, you may record these species on the same site, provided that they are similar in size and distribution. As a general rule, species may be recorded as separate sites if the area for each species is greater than 0.2 ha and there is a ten-fold difference in area between the two species. Species may also be recorded as separate sites of one or more species having small, point locations (less than 0.2 ha), while other species have larger areas for which you have collected spatial data (as per above description). This will allow someone trying to locate these sites in the future a more accurate description.

Invasive Plant Inventory Standard Methods

It is important that survey data collected in the field is to a standard that meets the needs of your program. There are three standards to which surveys may be conducted, depending on the level of detail required and the purpose to which the data will be used in the future. These are explained below:

Cursory	<p>These are surveys conducted during an initial visit to a site where the surveyor may or may not be fully aware of the prescribed control activities in that area. The data collection standard is not as great as with operational or precise surveys.</p> <p>Only the minimum mandatory fields are required for entry into the Invasive Alien Plant Program Application, including, but not limited to:</p> <ul style="list-style-type: none"> • UTM coordinates - a very small polygon (that looks like a point) will be subsequently auto-generated in Map Display within a 24 hour period (see Part III for more details). • Invasive alien plant species • Area – estimated area to be recorded in the Data Entry module. No digitized polygon data is recorded for this survey type. <p>Data collected from cursory surveys may be used to orientate others to a given site, but cannot be used for analysis or research purposes..</p>
Operational	<p>This survey standard provides a systematic process for acquiring accurate inventory data for the following activities:</p> <ul style="list-style-type: none"> • Containment and control activities; • Compliance and Enforcement needs; • Unit-based contract prescriptions; and, • Pest Management Plan reporting requirements. <p>Data that is collected to this standard can be used for analyses such as determining invasive plant spread rates or control program effectiveness.</p> <p>If conducting an operational survey for a site smaller than 0.2 hectares, it is not</p>

	<p>necessary to create a spatial polygon as the resulting polygon will ...(see Part III for more details).</p> <p>If conducting an operational survey for a site 0.2 hectares or larger, a spatial polygon representing the invasive plant infestation to within 20 meters of accuracy must be derived for the site. Twenty meters of accuracy is obtained by drawing polygon perimeters on maps with projections such as Universal Transverse Mercator (UTM) or Albers, for example, TRIM (preferred), Forest Cover or orthophoto maps with scales of 1:5000 up to 1:20,000.</p> <p>The required mandatory fields for an operational survey are those required by the Invasive Alien Plant Program, plus:</p> <ul style="list-style-type: none"> • Site Location; • Jurisdiction; • Distribution Code (1-9); and, • Density Code (1-4).
<p>Precise</p>	<p>This survey standard is designed for use in research and analysis where a high level of detail is required for analytical and statistical analyses. Some examples of use for this data in the future are in:</p> <ul style="list-style-type: none"> • determining rate of spread, risk determination and potential impacts of invasive plant populations; and, • evaluating impacts of biological control agents on invasive plant populations. <p>For spatial data collection, the perimeter of each infestation shall be walked and each polygon must be distinguished by a change in density greater than a factor of 2. Spatial polygons will be recorded as described in the Operational method above. The required mandatory fields are the same as those required by the Invasive Alien Plant Program, plus:</p> <ul style="list-style-type: none"> • Site location; • Distribution Code (1-9); • Density Code (1-4); • Biogeoclimatic characteristics; and, • Soil texture.

Photoplotting the Site

Another method of collecting baseline data and changes over time is through photoplots. A photo form is used to record the film number, photo numbers, distance from metal pin/stake/permanent land feature, and bearing of these photos. A single over-view photo may be taken at the site or for more extensive coverage to show a future change in the plant community, five photos are taken at the time of the release. At least one landscape photo is taken for the site. The pin/stake/permanent land feature should be visible within this photo. The purpose of this photo is to see overall changes to the landscape over time and to help relocate the site. Four cardinal photos are taken (north, south, east and west) each at 10m from the stadia rod/ pin/stake/permanent land feature looking back at the feature to include the plant community around it (or note a different distance on the Photoplot Record Form). Don't crouch or kneel to take photos since it makes it very difficult for photo retakes. Preferably, a "date back" camera should be used so the release and photoplot date appears on all photos.

SAMPLE



BRITISH COLUMBIA



PHOTOPLOT RECORD FORM



DATA ENTERED INTO INVASIVE ALIEN PLANT PROGRAM

ENTERED BY _____

TEMPORARY FIELD SITE # _____

SITE

DATE * (YYYY-MM-DD) _____

(ASSIGNED AT DATA ENTRY)

REFERENCE NO. - AGENCY ASSIGNED NO. _____

SITE ID _____

TREATMENT ID _____

PHOTOS TAKEN BY _____

LOCATION _____

PURPOSE

BIORELEASE

WEED/VEG INVENTORY

OTHER _____

IS THIS A PHOTO RETAKE?

YES

NO

FILM NUMBER _____

PHOTO NUMBER (PERTAINING TO FILM NUMBER) _____

PHOTOGRAPHER'S DISTANCE FROM PLOT CENTRE _____

CAMERA USED (EQUIPMENT NUMBER/NAME) _____

CAMERA FOCAL LENGTH

24MM

28MM

38MM

50MM

OTHER _____

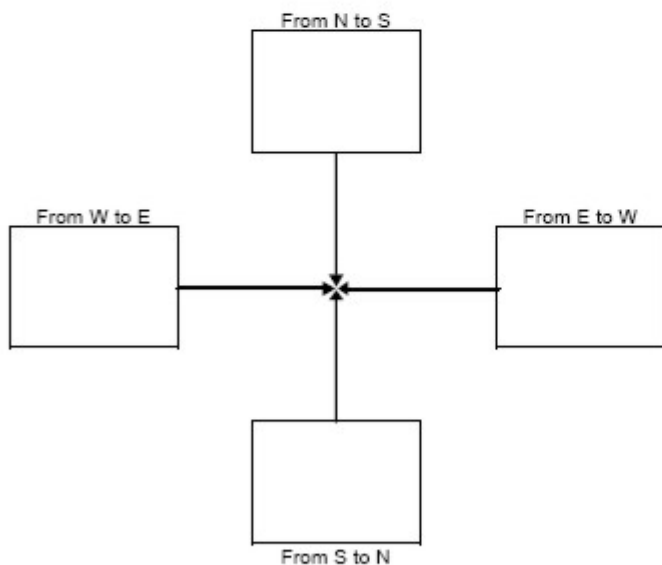
FILM TYPE

SLIDE

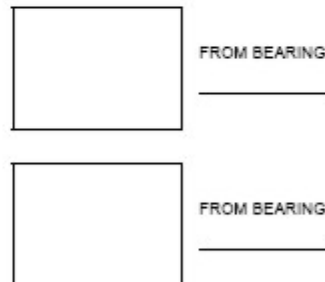
PRINT

DIGITAL

PERSPECTIVE PHOTOS (BEARING) *



LANDSCAPE PHOTOS (OVERVIEW)



VERTICAL (GROUND) PHOTO



COMMENTS

Stadia rod

In order to monitor changes in invasive plant height, a stadia rod (ranging pole) is erected within the photo. The stadia rod is placed right beside the pin/stake/permanent land feature. The stadia rod is very helpful for landscape photos because the wooden stake is not always visible. Line up the photo so that the top of the lens frame meets the top of the feature.

Storing Release Photos

The photos and negatives are often kept within the release file. The back of each photo is marked with the date (if not on the photo), the district (if required), and the direction of the photo. Photos are stored with the original file in the originating office, and scanned copies are entered into the IAP Program – Data Entry or supplied to others upon request. If photos have been taken with a digital camera, a digital archive system should be created with notation on the release record of their existence.

Collecting the Data



Site & Invasive Plant Inventory Record

Inventory is recorded on the “**Site & Invasive Plant Inventory Record**”. The paper record should be used to record inventory information when you are out in the field. When you return to the office, this data should be transferred from the paper record into the IAP Program – Data Entry. Part II of this guide will teach you how to enter information into the IAP Program – Data Entry. Each section of this form is explained below.



Part IV of this guide includes code lists which are helpful for filling out the form (i.e. Invasive Alien Plant Species Codes, Distribution Codes, etc.)

The mandatory sections on the form are marked with an “*”. These sections **must** be completed. All other sections are optional; however, it is highly recommended that you capture as much data as possible.

Sample Form

A sample form is found on the following pages. Please refer to Part IV of this guide to find a URL to a MoFR web site for a “print friendly” version of this form.

Freedom of Information Note:

When private information (i.e. Landowner name & phone number) is collected, it must be collected directly from the individual with their knowledge of your intentions, no exceptions. This information is being collected under section 26 (c) of the *Freedom of Information and Protection of Privacy Act* and is being used for the purpose of contacting private land owners in support of management of invasive alien plants. If you have any questions regarding the collection of this personal information, please contact the Privacy Section at 250-387-2227. If you have any questions regarding the use of this personal information, please contact forhisp.apphelp@gov.bc.ca.

SAMPLE



BRITISH COLUMBIA



SITE AND INVASIVE PLANT INVENTORY RECORD



DATA ENTERED INTO INVASIVE ALIEN PLANT PROGRAM ENTERED BY _____ TEMPORARY FIELD SITE # _____

SITE SITE ALREADY EXISTS <input type="checkbox"/>											
SITE CREATED DATE * (YYYY-MM-DD)		MAPSHEET		(ASSIGNED AT DATA ENTRY)							
				SITE ID							
				TREATMENT ID							
PAPER FILE ID	DISTRICT CODE	RANGE UNIT ID	PASTURE								
SURVEY AGENCY *			EMPLOYER								
SURVEYOR(S)			JURISDICTION								
GPS/UTM GRID											
ZONE *	EASTING *	NORTHING *	OR	LATITUDE *	LONGITUDE *						
BIOGEOCLIMATIC CLASS											
ZONE	SUBZONE	VARIANT	PHASE	SITE SERIES							
SITE CHARACTERISTICS			SITE SOIL TEXTURE								
SLOPE %	ASPECT	ELEVATION (M)	COARSE <input type="checkbox"/>	FINE <input type="checkbox"/>	ORGANIC <input type="checkbox"/>						
LOCATION/SITE											
LOCATION			COMMENTS								
INVASIVE PLANTS											
FOR DATA ENTRY ENTER EACH SPECIES SEPARATELY	AREA * (Ha)	DISTRIBUTION CODE	SURVEY TYPE			DENSITY (PLANTS/m2)	SITE PRIORITY	PROPOSED ACTIVITY			
			CURSORY	OPERATIONAL	PRECISE			M	C	B	NONE
PLANT SPECIES *			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PROPOSED HERBICIDE			PROPOSED BIOAGENT								
PLANT SPECIES			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	C	B	NONE
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PROPOSED HERBICIDE			PROPOSED BIOAGENT								
PLANT SPECIES			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	C	B	NONE
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PROPOSED HERBICIDE			PROPOSED BIOAGENT								
PLANT SPECIES			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			M	C	B	NONE
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PROPOSED HERBICIDE			PROPOSED BIOAGENT								
COMMENTS											

SAME DATE AS SITE? OR SURVEY DATE (YYYY-MM-DD) _____ (*An invasive plant survey date is mandatory.)

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NOTE: MANDATORY DATA FIELDS ARE INDICATED WITH *





MAP

SKETCH A WEED SITE MAP HERE, OR GLUE A SITE MAP HERE, OR ATTACH A SITE MAP TO THIS FORM.

IMAGE DETAILS

ID	DATE (YYYY-MM-DD)	PERSPECTIVE	REFERENCE NO.
----	-------------------	-------------	---------------

COMMENTS

Empty text area for comments.

Fields in this Form

There are various fields in this form. The following definitions will help you to understand how to use each field and its importance.

Data Entered into IAP Program	<p>What... Check-box. Check if the site details have already been entered into the IAP Program – Data Entry.</p> <p>Why is it important... Is a cue that the data exists electronically.</p>
Entered By	<p>What... Text entry.</p> <p>Why is it important... record the name of the individual entering the data on the form.</p>
Site Already Exists	<p>What... Check-box. Check if the site details have already been recorded.</p> <p>Why is it important... Eliminates the duplicate entry of sites.</p>
Temporary Field Site Number	<p>What... Text entry.</p> <p>Why is it important... the number assigned to polygons drawn on Trim/forest cover maps while in the field or the number assigned to individual forms while in the field with the intention of identifying this information to data that is later recorded/digitized in the office. It is strictly for field use and is not recorded for long-term use.</p>
Site Created Date	<p>What... Mandatory text entry.</p> <p>Why is it important... It is important to note the date the site was created.</p>
Time	<p>What... Mandatory text entry.</p> <p>Why is it important... It is important to note the time. Use the 24 hour clock.</p>
Mapsheet	<p>What... Text entry. (1:20,000 mapsheet for current location)</p> <p>Why is it important... Provides location of the site.</p>
Site ID	<p>What... Text entry. The site number from the field mapsheet or temporary number designated by the contractor which corresponds to the site drawn on the field mapsheet is recommended. The IAP Program – Data Entry automatically generates the Site Number at the time of entry.</p> <p>Why is it important... Provides the site with a unique identifier.</p>
Treatment ID	<p>What... Text entry. The IAP Program – Data Entry automatically generates the Treatment ID at the time of entry.</p> <p>Why is it important... Provides a unique identifier for the treatment.</p>
Paper File ID	<p>What... Text entry.</p> <p>Why is it important... This is useful information for cross referencing the paper and electronic files. The format of this field varies widely between agencies.</p>
District Code	<p>What... Text entry. Use the District Code.</p> <p>Why is it important... It is important for everyone to know what district the site falls within.</p>
Range Unit ID	<p>What... Text entry.</p> <p>Why is it important... Used as a MoFR administrative unit within stock ranges in some locations.</p>

Pasture	<p>What... Text entry.</p> <p>Why is it important... Used as a MoFR administrative unit within range units in some locations.</p>
Survey Agency	<p>What... Mandatory text entry. Record the appropriate agency.</p> <p>Why is it important... It is critical that the agency entering the plan is identified for future reference.</p>
Employer	<p>What... Text entry. Record the name of the employer.</p> <p>Why is it important... Identifies the employer that conducted the survey. This is important in case planners require additional information about the survey.</p>
Surveyors	<p>What... Text entry.</p> <p>Why is it important... Identifies the agency/ individuals that conducted the survey. This is important in case other program users require additional information about the survey.</p>
Jurisdiction	<p>What... Text entry. Obtain the information from the code sheet.</p> <p>Why is it important... Identifies the sites jurisdiction. This is the owner of the site.</p>
GPS/UTM Grid: Zone, Easting, Northing	<p>What... Mandatory text entry if the site was previously unknown or unrecorded and the “New Site” check-box has been marked and the New Site has been drawn on the map.</p> <p>Why is it important... Identifies the location of a new site.</p>
Latitude	<p>What... Mandatory (if Zone, Easting & Northing are not entered) text entry. Enter the geographic latitude (numeric).</p> <p>Why is it important... Identifies the geographic latitude of the site. It is important for everyone to know the exact location of the site.</p>
Longitude	<p>What... Mandatory (if Zone, Easting & Northing are not entered) text entry. Enter the geographic longitude (numeric).</p> <p>Why is it important... Identifies the geographic longitude of the site. It is important for everyone to know the exact location of the site.</p>
Biogeoclimatic Class: Zone	<p>What... Text entry. Represents large geographic areas with a broad homogeneous macroclimate in a biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
Biogeoclimatic Class: Subzone	<p>What... Text entry. Next level down in the biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
Biogeoclimatic Class: Variant	<p>What... Text entry. Subdivisions of subzones and one further reduction in climatic and geographic variability in the biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>

Biogeoclimatic Class: Phase	<p>What... Text entry. This is not a formal category in BEC. It shows extensive areas that do not contain zonal ecosystems. It is not frequently used but can be used to distinguish unique locations.</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
Biogeoclimatic Class: Site Series	<p>What... Text entry. This includes landscape positions producing a single plant association in the biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
<p>Note: The Biogeoclimatic Class must be a valid combination (according to the ministry) otherwise the data will not be accepted when entered into the IAP Program – Data Entry.</p>	
Site Characteristics: Slope %	<p>What... Text entry. The angle of the land from horizontal.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Site Characteristics: Aspect	<p>What... Text entry. A slope's orientation to the sun.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Site Characteristics: Elevation (M)	<p>What... Text entry. The height of land above sea level.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Site Soil Texture	<p>What... Text entry. Relates to the relative amount of sand, silt, and clay in a soil.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Location	<p>What... Text entry. (General location).</p> <p>Why is it important... Identifies the general location of the site for future reference.</p>
Comments	<p>What... Text entry.</p> <p>Why is it important... Comment may be useful for future reference by yourself or others.</p>
Land Owner	<p>What... Text entry.</p> <p>Why is it important... Provides the name of the individual who owns the land. This is useful for future reference.</p>
Telephone #	<p>What... Text entry.</p> <p>Why is it important... Provides the telephone number of the individual who owns the land. This is useful for future reference.</p>
Contact	<p>What... Text entry.</p> <p>Why is it important... Provides the name of the individual who should be contacted regarding any activities on the land. This is useful for future reference.</p>
Telephone #	<p>What... Text entry.</p> <p>Why is it important... Provides the telephone number of the individual who should be contacted regarding any activities on the land. This is useful for future reference.</p>

Invasive Plant Species	<p>What... Mandatory (enter at least one) text entry. Species code. See Part IV of this guide for additional information.</p> <p>Why is it important... It is critical that the Invasive Plant Species that this site was surveyed for is identified.</p>
Estimated Area (Ha)	<p>What... Mandatory Text entry.</p> <p>Why is it important... Provides planners with the area surveyed as measured in hectares.</p>
Distribution Code	<p>What... Text entry. Distribution code is a derived combination of density and plant cover. See Part IV of this guide for additional information.</p> <p>Why is it important... Provides planners with the distribution code of the species.</p>
Survey Type	<p>What... Check-box. Check the type of survey.</p> <p>Why is it important... Identifies the type of survey.</p> <p>Note: A survey is precise if the accuracy of the data collected is within 10m and the resulting polygon's invasive plant infestation has a difference in density no greater than a factor of two.</p>
Density (M²)	<p>What... Text entry.</p> <p>Why is it important... Provides planners with the density of the species as measured in plants per metre².</p>
Site Priority	<p>What... Text entry. Derived from the Site Priority Matrix as discussed in Module 1.4.</p> <p>Why is it important... Assists prioritization of sites for treatment.</p>
Proposed Activity	<p>What... Check-box. Check the type of activity proposed.</p> <p>Why is it important... Provides the recommended treatment as a result of the survey. This is available to planners.</p> <p>Note: You may also enter a Proposed Herbicide (if applicable) or Proposed BioAgent (if applicable).</p>
Comments	<p>What... Text entry.</p> <p>Why is it important... Comments may be useful for future reference by yourself or others.</p>
Same Date as Site? Or Survey Date	<p>What... Mandatory check-box. Data that tracks whether an inventory of a plant occurred on a site on the same day/year the site was created or on a different day/year.</p> <p>Why is it important... Provides an indication that there may be history that shows how long invasive plants have existed on the site and to what extent.</p>
<p>Image Details - Be sure to note the following details: ID, Date, Perspective, Reference No, and Comments.</p>	

Additional Inventory Resources

Sample Schedule A

A sample Schedule A for inventory contracts has also been included in Part IV of this guide. This will help you understand what services contractors are to provide and deliverables contractors are expected to complete.

IAP Reference Guide - Part I

Module 1.6: Treatment Methods Overview

In this module, you will learn:

- How to differentiate between the various treatment methods.

Understanding Treatment Methods

If prevention measures are not successful and invasive plants begin to establish on new sites, the plants must be treated, preferably prior to them setting seed. There are a number of treatments which can be applied to ensure the successful extirpation/treatment of these plants. The treatment selected and timing of implementation depends on various factors including the invasive alien plant species and location in the province.

This guide will discuss the three methods of treatment currently in practice in BC:



Mechanical



Chemical



Biological



This guide has selected the term “mechanical” to refer to all methods of treatment that are not defined as chemical and biological methods. You will notice that this is consistent with the use of the term “mechanical” in the IAP Program – Data Entry which is discussed in Part II of this guide.



Mechanical Treatment Methods

Mechanical treatment of invasive plants employs various techniques to:

- physically disturb invasive plants; or,
- to interrupt their reproduction by depleting root reserves through repeated cutting of the plant.

Mechanical control includes, for example, the mowing, hand pulling and cutting of invasive plants.

Mechanical control is discussed in more detail in Module 1.7 of this guide.



Chemical Treatment Methods

Treating invasive plants with chemicals (herbicides) can be very effective in some circumstances. Herbicides are used for spot treatments of invasive plants in British Columbia. The herbicide selected should depend on the:

- target invasive alien plant species; and,
- environmental and site factors.

Application of herbicides is governed by the Ministry of Water, Land, and Air Protection's *Integrated Pest Management Act*. The use of herbicides will be discussed in more detail in Module 1.8 of this guide.



Biological Treatment Methods

Another method commonly used to treat invasive plants is that of biological treatment. Biological control is the use of an invasive plant's natural enemies (i.e. insects and pathogens) to reduce its population below a desired level. There are two approaches to biological control:

- **Inundative** – this method uses mass application of an organism to attempt to eliminate an invasive alien plant from an area. It does not deal with the residual seed bank in the soil or prevent the invasive alien plant from establishing from another source at a later date.
- **Classical** – this method uses the invasive alien plant's natural enemies to establish a long-term balance between the biological control agent and the invasive alien plant.

The use of biological treatment methods will be discussed in greater detail in Module 1.9 of this guide.

IAP Reference Guide - Part I

Module 1.7: Mechanical Treatment & Monitoring

In this module, you will learn:

- The various types of mechanical treatments; and,
- How to record mechanical treatment & monitoring data



The following data collection forms are discussed in this module:

- Mechanical Treatment Record; and,
- Mechanical Treatment Monitoring Record



Mechanical Treatment Strategies

There are various strategies which can be implemented to control invasive plants through mechanical means. These include:

- **Burning:** burning is an effective strategy if seed production has already occurred. Burning allows some of the seeds to be destroyed. The effectiveness varies depending on the duration and intensity of the heat and the maturity and location of the seeds.
- **Cultivating or Tilling:** soil tillage attacks the invasive alien plant's survival mechanisms therefore preventing seed production and depleting current seed reserves in the soil.
- **Digging:** digging invasive plants used to cut the plant below the reproductive root (below where the plant sprouts from).
- **Hand Pulling:** hand pulling of invasive plants is practical for small invasive alien plant patches or individual plants. Plants should be pulled when the soil is moist and prior to seed production.
- **Mowing:** the mowing strategy is acceptable if there are too many invasive plants to hand pull and cultivation is impractical or impossible. It is best to mow prior to seed production and as close to the ground as possible.
- **Mulching:** mulching is effective because it excludes light from the tops of the invasive plants until the reserve food supply in the roots is depleted, starving the invasive plants.
- **Note:** Grazing is also a mechanical treatment strategy but is not tracked in the IAP Program – Data Entry. This has similar affects to mowing. The removal of invasive alien plant top growth by the grazing animals prevents seed formation and gradually weakens underground parts.

Collecting the Data



Mechanical Treatment Record

The mechanical treatment of invasive plants must be recorded on the “**Invasive Plant Treatment Record**”. The paper record should be used to record information when in the field. At the office, this data should be transferred from the paper record into the IAP Program – Data Entry. Part II of this guide will demonstrate how to enter information into the IAP Program – Data Entry. Each section of this form is explained below.



Note that this form is also used to record the Chemical Treatment of invasive plants. Therefore, it is discussed again in the next module of this guide.

Sample Form

A sample form is found on the following pages. Please refer to Part IV of this guide to find a URL to a MoFR web site for a “print friendly” version of this form.

SAMPLE



INVASIVE PLANT CHEMICAL & MECHANICAL TREATMENT RECORD



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Mechanical Treatments Mandatory Fields: Date of Treatment Agency Jurisdiction Site ID OR UTM Zone, Easting & Northing Species 1 Treatment Method Area Treated
Chemical Treatments Mandatory Fields: All fields indicated in Mechanical Treatments PLUS: Certified Applicator and Number Application Time Temperature Windspeed Herbicide Application Rate Amount of Chemical Used



MAP

SKETCH MAP (INDICATE NORTH)

IMAGE DETAILS

ID	DATE	PERSPECTIVE	REFERENCE NO.
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COMMENTS

Fields in this Form - Treatment

There are various fields in this form. The following definitions will help you to understand how to use each field and its importance in the program.

Data Entered into IAP Program - Data Entry	<p>What... Check-box. Check if the site details have already been entered into the IAP Program – Data Entry.</p> <p>Why is it important... Is a cue that the data exists electronically.</p>
Entered By	<p>What... Text entry.</p> <p>Why is it important... Records the name of the individual entering the data on the form.</p>
Treatment Date	<p>What... Mandatory text entry.</p> <p>Why is it important... It is important for everyone to know when the treatment was applied to the invasive alien plant.</p>
Agency	<p>What... Mandatory text entry. Record the appropriate agency.</p> <p>Why is it important... It is critical that the agency performing the treatment is identified for future reference.</p>
Employer	<p>What... Text entry. Enter the name of the employer.</p> <p>Why is it important... Identifies the employer that conducted the treatment. This is important in case anyone requires additional information about the treatment.</p>
Certified Applicators	This field is not applicable to mechanical treatments.
Cert. Number	This field is not applicable to mechanical treatments.
Supervisor Signature	This field is not applicable to mechanical treatments.
Other Applicators	This field is not applicable to mechanical treatments.
Cert. Number	This field is not applicable to mechanical treatments.
Jurisdiction	<p>What... Mandatory text entry. Obtain the information from the code sheet.</p> <p>Why is it important... Identifies the sites jurisdiction. This is the owner of the site.</p>
District Code	<p>What... Text entry. Use the District Code.</p> <p>Why is it important... It is important for everyone to know what district the site falls within.</p>
Mapsheet	<p>What... Text entry. (1:20,000 mapsheet for current location).</p> <p>Why is it important... Provides location of the site.</p>
Range Unit	<p>What... Text entry.</p> <p>Why is it important... Identifies if the site is part of a Range Unit. Use a MoFR administrative unit within stock ranges in some locations.</p>

Module 1.7 – Mechanical Treatment & Monitoring

Activity	<p>What... Mandatory check-box. Check the type of treatment.</p> <p>Why is it important... It is important to name the activity recorded.</p>
New Site	<p>What... Check-box. Check the box if the site has not been previously recorded on the field mapsheet. UTM, Easting and Northing are mandatory on new sites as well as location and temporary site number drawn on the filed mapsheet. A new site is one which is at least 100 meters of space with no target invasive plants away from the last site.</p> <p>Why is it important... identifies if the site has been previously treated.</p>
Site ID or Paper File ID	<p>SITE ID: Mandatory (or UTM Zone, Easting, Northing)</p> <p>What... The IAP Program - Data Entry automatically generates the Site Number at the time of entry.</p> <p>Why is it important... Provides the site with a unique identifier.</p> <p>PAPER FILE ID:</p> <p>What... Text entry.</p> <p>Why is it important... This is useful information for cross referencing the paper and electronic files. The format of this field varies widely between agencies.</p>
UTM Zone, Easting, Northing	<p>What... Mandatory (or Site ID) text entry field if the site was previously unknown or unrecorded and the “New Site” check-box has been marked and the New Site has been drawn on the map.</p> <p>Why is it important... Identifies the location of a new site.</p>
Not Found	<p>What... Check-box. Check the box if no target species are found growing on the site. All other information, other than Site Number, is not required.</p> <p>Why is it important... Identifies whether target species have been found on the site.</p>
Time of Application	<p>What... Text entry.</p> <p>Why is it important... Identifies the time you arrived at the site.</p>
Species #1	<p>What... Mandatory text entry field. Use the two letter Species Codes.</p> <p>Why is it important... Identifies the IAP Species being treated.</p>
Species #2 & #3	<p>What... Text entry field if there is more than one target species treated on a site.</p> <p>Why is it important... Identifies the IAP Species being treated (if there are multiple).</p>
%	<p>What... Text entry field. This is the corresponding percentage of each target species adding to a total of 100 (i.e. 75% Spotted Knapweed and 25% Sulphur Cinquefoil would be: SK 75 SC 25).</p> <p>Why is it important... Identifies the percentage of each target species being treated on a site.</p>
Distribution Code	<p>What... Text entry. Distribution code is a derived combination of density and plant cover. See Part IV of this guide for additional information.</p> <p>Why is it important... Provides the distribution code of the species.</p>
Area Treated (Ha)	<p>What... Mandatory text entry.</p> <p>Why is it important... Identifies the estimated area of the site that was actually treated.</p>
Temperature (C)	<p>This field is not applicable to mechanical treatments.</p>
Wind Speed (Km/h)	<p>What... Text entry.</p> <p>Why is it important... Provides climate conditions (useful for Herbicide Treatments).</p>

Module 1.7 – Mechanical Treatment & Monitoring

Wind Direction	<p>What... Text entry.</p> <p>Why is it important... Provides the direction of the wind.</p>
Treatment Method	<p>What... Mandatory text entry. Control used to manually or chemically treat site from code sheet.</p> <p>Why is it important... Provides the various methods available when treating the site mechanically.</p>
Herbicide Used	This field is not applicable to mechanical treatments.
Application Rate (L/ha)	This field is not applicable to mechanical treatments.
Amount Used (L)	This field is not applicable to mechanical treatments.
Pass #	<p>What... Text entry. 1, 2, or 3 depending on the number of treatments prescribed on a site in one growing season.</p> <p>Why is it important... Identifies the treatment pass.</p>
Location or Road Name	<p>What... Text entry. (Road System Name or general location).</p> <p>Why is it important... Identifies the roads near the site for future reference.</p>
Comments	<p>What... Text entry.</p> <p>Why is it important... Comments may be useful for future reference by yourself or others. These are especially helpful if the site is hidden or if there is special information that should be highlighted.</p>
Image Details - Be sure to note the following details: ID, Date, Perspective, Reference No, and Comments.	



Mechanical Treatment Monitoring Record

The effectiveness of each mechanical treatment varies. Therefore, the monitoring of sites and the capture of monitoring information can be helpful to the long term successful treatment of a site. Mechanical treatment monitoring information is recorded on the “**Chemical or Mechanical Monitoring Record**”. At the office, this data should be transferred from the paper record into the IAP Program - Data Entry. Part II of this guide will demonstrate how to enter information into the IAP Program - Data Entry. Each section of this form is explained below.



Note that this form is also used to record Chemical Treatment Monitoring of invasive plants. Therefore, it is discussed again in the next module of this guide.

Sample Form

A sample form is found on the following pages. Please refer to Part IV of this guide to find a URL to a MoFR web site for a “print friendly” version of this form.

SAMPLE



BRITISH COLUMBIA



CHEMICAL OR MECHANICAL MONITORING RECORD



DATA ENTERED INTO INVASIVE ALIEN PLANT PROGRAM

ENTERED BY

TEMPORARY FIELD SITE #

RECORD I

INSPECTION DATE * (YYYY-MM-DD)	MAPSHEET	(ASSIGNED AT DATA ENTRY)			PAPER FILE ID
		SITE ID	TREATMENT ID	MONITORING ID	

ACTIVITY * CHEMICAL MECHANICAL SURVEYOR NAME *

TARGET PLANT SPECIES * COMPLIANCE EFFICACY RATING (1-9)

COMMENTS

RECORD II

INSPECTION DATE * (YYYY-MM-DD)	MAPSHEET	(ASSIGNED AT DATA ENTRY)			PAPER FILE ID
		SITE ID	TREATMENT ID	MONITORING ID	

ACTIVITY * CHEMICAL MECHANICAL SURVEYOR NAME *

TARGET PLANT SPECIES * COMPLIANCE EFFICACY RATING (1-9)

COMMENTS

RECORD III

INSPECTION DATE * (YYYY-MM-DD)	MAPSHEET	(ASSIGNED AT DATA ENTRY)			PAPER FILE ID
		SITE ID	TREATMENT ID	MONITORING ID	

ACTIVITY * CHEMICAL MECHANICAL SURVEYOR NAME *

TARGET PLANT SPECIES * COMPLIANCE EFFICACY RATING (1-9)

COMMENTS

FS 1263 HSP 2006/06

NOTE: MANDATORY DATA FIELDS ARE INDICATED WITH *



Fields in this Form - Monitoring

There are various fields in this form. The following definitions will help you to understand how to use each field and its importance in the program.

Data Entered into IAP Program - Data Entry	<p>What... Check-box. Check if the site details have already been entered into the IAP Program – Data Entry.</p> <p>Why is it important... Is a cue that the data exists electronically.</p>
Entered By	<p>What... Text entry.</p> <p>Why is it important... record the name of the individual entering the data on the form.</p>
Temporary Field Number	<p>What... Text entry.</p> <p>Why is it important... the number assigned to polygons drawn on Trim/forest cover maps while in the field or the number assigned to individual forms while in the field with the intention of identifying this information to data that is later recorded/digitized in the office. It is strictly for field use and is not recorded for long-term use.</p>
Monitoring Date	<p>What... Mandatory text entry.</p> <p>Why is it important... It is important for everyone to know when the monitoring occurred.</p>
Mapsheets	<p>What... Text entry. (1:20,000 mapsheet for current location).</p> <p>Why is it important... Provides location of the site.</p>
Site ID	<p>What... Text entry. The site number from the field mapsheet or temporary number designated by the contractor which corresponds to the site drawn on the field mapsheet is recommended. The IAP Program - Data Entry automatically generates the Site Number at the time of entry.</p> <p>Why is it important... Provides the site with a unique identifier.</p>
Treatment ID	<p>What... Text entry. Generated by the IAP Program – Data Entry.</p> <p>Why is it important... Is a unique identifier for the treatment.</p>
Monitoring ID	<p>What... Text entry. Generated by the IAP Program – Data Entry.</p> <p>Why is it important... Is a unique identifier for the monitoring activity.</p>
Paper File ID	<p>What... Text entry.</p> <p>Why is it important... This is useful information for cross referencing the paper and electronic files. The format of this field varies widely between agencies.</p>
Activity	<p>What... Mandatory check box.</p> <p>Why is it important... Identifies if the monitoring activities are being conducted for a Chemical or Mechanical treatment.</p>
Surveyor Name	<p>What... Mandatory text entry.</p> <p>Why is it important... Identifies the individual(s) that conducted the survey. This is important in case other program users require additional information about the survey.</p>

Module 1.7 – Mechanical Treatment & Monitoring

Target Plant Species	What... Mandatory text entry field. Use the two letter Species Codes. Why is it important... Identifies the IAP Species that was treated and is now being monitored.
Compliance	What... Text entry. Enter Yes or No. If no is entered, explain the non-compliance and actions required. Why is it important... Identifies whether the contractor has met the contract or Pest Management Plan or Pesticide Use Plan.
Efficacy Rating	This field is not applicable to mechanical treatments.
Comments	What... Text entry. Why is it important... Used to provide any comments about the monitoring activities.

IAP Reference Guide - Part I

Module 1.8: Chemical Treatment & Monitoring

In this module, you will learn about:

- Herbicide regulation; and,
- How to record herbicide treatment & monitoring data.



The following data collection forms are discussed in this module:

- Chemical Treatment Record; and,
- Chemical Treatment Monitoring Record.



Herbicides

The chemical control of invasive plants, with herbicides, can be extremely effective. Recall that herbicides are defined as chemicals formulated to kill plants, especially those which are invasive plants. However, herbicides can pose danger if not properly handled, transported, and applied. Therefore, their use on Crown Land is carefully controlled.



- Pesticides are regulated by the federal *Pest Control Products Act*.
- The application of herbicides on Crown Land is regulated through the provincial *Integrated Pest Management Act*. All herbicide applications on Crown Land must be carried out under the direct supervision of a certified pesticide applicator.

The Handbook for Pesticide Applicators and Dispensers is a resource available to assist with the safe handling of pesticides. This is available from the Ministry of Finance, Office Products Centre.

Calibration

Calibrations provide a method for applicators to practice and maintain accurate application rates under all herbicide spraying conditions. This ensures only a minimal amount of herbicide is applied in order to control target species. Applicators and equipment should be calibrated regularly following instructions in Part IV of this guide.

Herbicide Selection

There are many herbicides which are registered for use to control noxious invasive plants in BC. The selection of an herbicide is dependent on site characteristics, target invasive plant species and objectives. The methods for determining which herbicides to use are referenced in the applicable Pest Management Plan.

Collecting the Data



Chemical Treatment Record

Chemical control of invasive plants with herbicides must be recorded on the “**Invasive Plant Mechanical & Chemical Treatment Record**”. The paper record should be used to record information when in the field. At the office, this data should be transferred from the paper record into the IAP Program - Data Entry. Part II of this guide will demonstrate how to enter information into the IAP Program - Data Entry. Each section of this form is explained below.

Sample Form

A sample form is found on the following pages. Please refer to Part IV of this guide to find a URL to a MoFR web site for a “print friendly” version of this form.

SAMPLE



INVASIVE PLANT CHEMICAL & MECHANICAL TREATMENT RECORD



DATA ENTERED INTO IAPP

ENTERED BY _____ PCP # _____

TREATMENT DATE _____	AGENCY _____	EMPLOYER _____	CERTIFIED APPLICATORS _____	CERT. NUMBER _____	OTHER APPLICATORS _____	CERT. NUMBER _____
JURISDICTION _____	DISTRICT CODE _____	MAPSHEET _____	RANGE UNIT _____			

ACTIVITY	New Site	Site ID	CR	Project File ID	UTM Zone	Easting	Northing	No. Found	Time of Application	Species 1	%	Distribution Code	Species 2	%	Distribution Code	Species 3	%	Distribution Code	Area Treated (sq)	Temperature (C)	Windspeed (km/h)	Wind Direction	Treatment Method	Herbicide Used	Application Rate (L/ha)	Amount Used (L)	Pass	COMMENTS
<input type="checkbox"/> CHEMICAL <input type="checkbox"/> MECHANICAL <input type="checkbox"/> SURVEY ONLY	<input type="checkbox"/>							<input type="checkbox"/>																				
		LOCATION OR ROAD NAME/Nm																										
		COMMENTS																										
<input type="checkbox"/> CHEMICAL <input type="checkbox"/> MECHANICAL <input type="checkbox"/> SURVEY ONLY	<input type="checkbox"/>							<input type="checkbox"/>																				
		LOCATION OR ROAD NAME/Nm																										
		COMMENTS																										
<input type="checkbox"/> CHEMICAL <input type="checkbox"/> MECHANICAL <input type="checkbox"/> SURVEY ONLY	<input type="checkbox"/>							<input type="checkbox"/>																				
		LOCATION OR ROAD NAME/Nm																										
		COMMENTS																										
<input type="checkbox"/> CHEMICAL <input type="checkbox"/> MECHANICAL <input type="checkbox"/> SURVEY ONLY	<input type="checkbox"/>							<input type="checkbox"/>																				
		LOCATION OR ROAD NAME/Nm																										
		COMMENTS																										
<input type="checkbox"/> CHEMICAL <input type="checkbox"/> MECHANICAL <input type="checkbox"/> SURVEY ONLY	<input type="checkbox"/>							<input type="checkbox"/>																				
		LOCATION OR ROAD NAME/Nm																										
		COMMENTS																										

Mechanical Treatments Mandatory Fields: Date of Treatment Agency Jurisdiction Site ID OR UTM Zone, Easting & Northing Species 1 Treatment Method Area Treated
 Chemical Treatments Mandatory Fields: All fields indicated in Mechanical Treatments PLUS: Certified Applicator and Number Application Time Temperature Windspeed Herbicide Application Rate Amount of Chemical Used



MAP
SKETCH MAP (INDICATE NORTH)

IMAGE DETAILS

ID	DATE	PERSPECTIVE	REFERENCE NO.
COMMENTS			

Fields in this Form - Treatment

There are various fields in this form. The following definitions will help you to understand how to use each field and its importance in the program.

Data Entered into IAP Program - Data Entry	<p>What... Check-box. Check if the site details have already been entered into the IAP Program – Data Entry.</p> <p>Why is it important... Is a cue that the data exists electronically.</p>
Entered By	<p>What... Text entry.</p> <p>Why is it important... Records the name of the individual entering the data on the form.</p>
Treatment Date	<p>What... Mandatory text entry.</p> <p>Why is it important... It is important for everyone to know when the treatment was applied to the invasive alien plant.</p>
Agency	<p>What... Mandatory text entry. Record the appropriate agency.</p> <p>Why is it important... It is critical that the agency performing the treatment is identified for future reference.</p>
Employer	<p>What... Text entry. Enter the name of the employer.</p> <p>Why is it important... Identifies the employer that conducted the treatment. This is important in case anyone requires additional information about the treatment.</p>
Certified Applicators	<p>What... Mandatory text entry. It is mandatory to have at least one certified applicator.</p> <p>Why is it important... Identifies the individual/organization applying the herbicide (for example, herbicide sprayer).</p>
Cert. Number	<p>What... Mandatory text entry. It is mandatory to have at least one certified applicator with a certificate number.</p> <p>Why is it important... Identifies the certificate number of the applicator. All applicators working on Crown Land must possess a certificate.</p>
Supervisor Signature	<p>What... Text entry. Supervising certified applicator.</p> <p>Why is it important... Legal requirement under Pest Management and Use Plans.</p>
Other Applicators	<p>What... Text entry.</p> <p>Why is it important... Identifies additional individual/organizations applying the herbicide.</p>
Cert. Number	<p>What... Text entry.</p> <p>Why is it important... Identifies the certificate number of the additional applicator. All applicators working on Crown Land must possess a certificate.</p>
Jurisdiction	<p>What... Mandatory text entry. Obtain the information from the code sheet.</p> <p>Why is it important... Identifies the sites jurisdiction. This is the owner of the site.</p>

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District Code	<p>What... Text entry. Use the District Code.</p> <p>Why is it important... It is important for everyone to know what district the site falls within.</p>
Mapsheet	<p>What... Text entry. (1:20,000 mapsheet for current location).</p> <p>Why is it important... Provides location of the site.</p>
Range Unit	<p>What... Text entry.</p> <p>Why is it important... Identifies if the site is part of a Range Unit. Use a MoFR administrative unit within stock ranges in some locations.</p>
Activity	<p>What... Mandatory check-box. Check the type of treatment.</p> <p>Why is it important... It is important to name the activity recorded.</p>
New Site	<p>What... Check-box. Check the box if the site has not been previously recorded on the field mapsheet. UTM, Easting and Northing are mandatory on new sites as well as location and temporary site number drawn on the filed mapsheet. A new site is one which is at least 100 meters of space with no target invasive plants away from the last site.</p> <p>Why is it important... identifies if the site has been previously treated.</p>
Site ID or Paper File ID	<p>SITE ID: Mandatory (or UTM Zone, Easting, Northing)</p> <p>What... The IAP Program - Data Entry automatically generates the Site Number at the time of entry.</p> <p>Why is it important... Provides the site with a unique identifier.</p> <p>PAPER FILE ID:</p> <p>What... Text entry.</p> <p>Why is it important... This is useful information for cross referencing the paper and electronic files. The format of this field varies widely between agencies.</p>
UTM Zone, Easting, Northing	<p>What... Mandatory (or Site ID) text entry field if the site was previously unknown or unrecorded and the "New Site" check-box has been marked and the New Site has been drawn on the map.</p> <p>Why is it important... Identifies the location of a new site.</p>
Not Found	<p>What... Check-box. Check the box if no target species are found growing on the site. All other information, other than Site Number, is not required.</p> <p>Why is it important... Identifies whether target species have been found on the site.</p>
Time of Application	<p>What... Mandatory text entry.</p> <p>Why is it important... Identifies the time you arrived at the site.</p>
Species #1	<p>What... Mandatory text entry field. Use the two letter Species Codes.</p> <p>Why is it important... Identifies the IAP Species being treated.</p>
Species #2 & #3	<p>What... Text entry field if there is more than one target species treated on a site.</p> <p>Why is it important... Identifies the IAP Species being treated (if there are multiple).</p>
%	<p>What... Text entry field. This is the corresponding percentage of each target species adding to a total of 100 (i.e. 75% Spotted Knapweed and 25% Sulphur Cinquefoil would be: SK 75 SC 25).</p> <p>Why is it important... Identifies the percentage of each target species being treated on a site.</p>
Distribution Code	<p>What... Text entry. Distribution code is a derived combination of density and plant cover. See Part</p>

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	<p>IV of this guide for additional information.</p> <p>Why is it important... Provides the distribution code of the species.</p>
Area Treated (Ha)	<p>What... Mandatory text entry.</p> <p>Why is it important... Identifies the estimated area of the site that was actually treated.</p>
Temperature (C)	<p>What... Mandatory text entry.</p> <p>Why is it important... Identifies the temperature of chemical treatments.</p>
Wind Speed (Km/h)	<p>What... Mandatory text entry.</p> <p>Why is it important... Provides climate conditions (useful for Herbicide Treatments).</p>
Wind Direction	<p>What... Text entry.</p> <p>Why is it important... Provides the direction of the wind.</p>
Treatment Method	<p>What... Mandatory text entry. Control used to manually or chemically treat site from code sheet.</p> <p>Why is it important... Provides the various methods available when treating the site mechanically.</p>
Herbicide Used	<p>What... Mandatory text entry. Herbicide used on site as per code sheet.</p> <p>Why is it important... Identifies the herbicide applied to the site.</p>
Application Rate (L/ha)	<p>What... Mandatory text entry.</p> <p>Why is it important... Identifies the quantity of active ingredient that was applied (L/ha).</p>
Amount Used (L)	<p>What... Mandatory text entry.</p> <p>Why is it important... Identifies the amount of the herbicide used on one site.</p> <p>Note: If more than one species is being treated, determine the amount of herbicide applied to each species using the Species %.</p>
Pass #	<p>What... Text entry. 1, 2, or 3 depending on the number of treatments prescribed on a site in one growing season.</p> <p>Why is it important... Identifies the treatment pass.</p>
Location or Road Name	<p>What... Text entry. (Road System Name or general location).</p> <p>Why is it important... Identifies the roads near the site for future reference.</p>
Comments	<p>What... Text entry.</p> <p>Why is it important... Comments may be useful for future reference by yourself or others. These are especially helpful if the site is hidden or if there is special information that should be highlighted.</p>
<p>Image Details - Be sure to note the following details: ID, Date, Perspective, Reference No, and Comments.</p>	



The following fields are legal requirements under a MWLAP Pesticide Management Permit (PMP):

- Area Treated
- Temperature
- Wind Speed
- Herbicide
- Treatment Method
- Application Rate
- Amount Used
- Delivery Rate



Chemical Treatment Monitoring Record

Monitoring is recommended for at least 10% of the treated sites. Monitoring records the efficacy of the treatment and may record any injury to non-target species and other treatment impacts of interest.

Chemical treatment monitoring information is recorded on the “**Chemical or Mechanical Monitoring Record**”. The paper record should be used to record information when in the field. At the office, this data should be transferred from the paper record into the IAP Program - Data Entry. Part II of this guide will demonstrate how to enter information into the IAP Program - Data Entry. Each section of this form is explained below.

Sample Form

A sample form is found on the following pages. Please refer to Part IV of this guide to find a URL to a MoFR web site for a “print friendly” version of this form.

SAMPLE



CHEMICAL OR MECHANICAL MONITORING RECORD



DATA ENTERED INTO INVASIVE ALIEN PLANT PROGRAM

ENTERED BY _____

TEMPORARY FIELD SITE # _____

RECORD I

INSPECTION DATE * (YYYY-MM-DD)	MAPSHEET	(ASSIGNED AT DATA ENTRY)			PAPER FILE ID
		SITE ID	TREATMENT ID	MONITORING ID	

ACTIVITY * CHEMICAL MECHANICAL SURVEYOR NAME *

TARGET PLANT SPECIES * COMPLIANCE EFFICACY RATING (1-9)

COMMENTS

RECORD II

INSPECTION DATE * (YYYY-MM-DD)	MAPSHEET	(ASSIGNED AT DATA ENTRY)			PAPER FILE ID
		SITE ID	TREATMENT ID	MONITORING ID	

ACTIVITY * CHEMICAL MECHANICAL SURVEYOR NAME *

TARGET PLANT SPECIES * COMPLIANCE EFFICACY RATING (1-9)

COMMENTS

RECORD III

INSPECTION DATE * (YYYY-MM-DD)	MAPSHEET	(ASSIGNED AT DATA ENTRY)			PAPER FILE ID
		SITE ID	TREATMENT ID	MONITORING ID	

ACTIVITY * CHEMICAL MECHANICAL SURVEYOR NAME *

TARGET PLANT SPECIES * COMPLIANCE EFFICACY RATING (1-9)

COMMENTS



Fields in this Form - Monitoring

There are various fields in this form. The following definitions will help you to understand how to use each field and its importance in the program.

Data Entered into IAP Program - Data Entry	<p>What... Check-box. Check if the site details have already been entered into the IAP Program – Data Entry.</p> <p>Why is it important... Is a cue that the data exists electronically.</p>
Entered By	<p>What... Text entry.</p> <p>Why is it important... record the name of the individual entering the data on the form.</p>
Temporary Field Number	<p>What... Text entry.</p> <p>Why is it important... the number assigned to polygons drawn on Trim/forest cover maps while in the field or the number assigned to individual forms while in the field with the intention of identifying this information to data that is later recorded/digitized in the office. It is strictly for field use and is not recorded for long-term use.</p>
Monitoring Date	<p>What... Mandatory text entry.</p> <p>Why is it important... It is important for everyone to know when the monitoring occurred.</p>
Mapsheet	<p>What... Text entry. (1:20,000 mapsheet for current location).</p> <p>Why is it important... Provides location of the site.</p>
Site ID	<p>What... Text entry. The site number from the field mapsheet or temporary number designated by the contractor which corresponds to the site drawn on the field mapsheet is recommended. The IAP Program - Data Entry automatically generates the Site Number at the time of entry.</p> <p>Why is it important... Provides the site with a unique identifier.</p>
Treatment ID	<p>What... Text entry. Generated by the IAP Program – Data Entry.</p> <p>Why is it important... Is a unique identifier for the treatment.</p>
Monitoring ID	<p>What... Text entry. Generated by the IAP Program – Data Entry.</p> <p>Why is it important... Is a unique identifier for the monitoring activity.</p>
Paper File ID	<p>What... Text entry.</p> <p>Why is it important... This is useful information for cross referencing the paper and electronic files. The format of this field varies widely between agencies.</p>
Activity	<p>What... Mandatory check box.</p> <p>Why is it important... Identifies if the monitoring activities are being conducted for a Chemical or Mechanical treatment.</p>
Surveyor Name	<p>What... Mandatory text entry.</p> <p>Why is it important... Identifies the individual(s) that conducted the survey. This is important in case other program users require additional information about the survey.</p>

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Target Plant Species	<p>What... Mandatory text entry field. Use the two letter Species Codes.</p> <p>Why is it important... Identifies the IAP Species that was treated and is now being monitored.</p>
Compliance	<p>What... Text entry. Enter Yes or No. If no is entered, explain the non-compliance and actions required.</p> <p>Why is it important... Identifies whether the contractor has met the contract or Pest Management Plan or Pesticide Use Plan.</p>
Efficacy Rating	<p>What... Text entry. Use the following Efficacy Rating.</p> <ul style="list-style-type: none"> • 10 – 100% efficacy • 9 – 90% to 99% efficacy • 8 – 80% to 89% efficacy • 7 – 70% to 79% efficacy • 6 – 60% to 69% efficacy • 5 – 50% to 59% efficacy • 4 – 40% to 49% efficacy • 3 – 30% to 39% efficacy • 2 – 20% to 29% efficacy • 1 – 0% to 19% efficacy <p>Why is it important... Identifies the Efficacy Rating of herbicide treatment. The Efficacy Rating is the percent mortality achieved on a treated site according to the above scale. This scale is not to be confused with the ECW Scale.</p>
Comments	<p>What... Text entry.</p> <p>Why is it important... Used to provide any comments about the monitoring activities.</p>



Treatment records are held for three years and are available for inspection.

IAP Reference Guide - Part I

Module 1.9: Biological Treatment & Monitoring

In this module, you will learn about:

- Determining Suitability of Release Sites;
- Collecting & Shipping Biological Control Agents;
- Releasing Biological Control Agents;
- Documenting the Release of Biological Control Agents;
- Establishment Monitoring; and,
- Documenting Monitoring Activities.



The following data collection forms are discussed in this module:

- Biological Control Release Record; and,
- Biological Agent Dispersal Record.



Biological Control Activities

There are four key activities that make up the process of effective Biological Control. These are:

- Determining suitability of release sites;
- Collecting and shipping biological control agents;
- Releasing biological control agents; and
- Monitoring biological control agents.

Each of these activities is discussed below.



Determining Suitability of Release Sites

Selecting the Site

When you select a site, you need to ensure it will promote the success and longevity of the bioagent. The site should meet Agency needs from a program and logistical standpoint (i.e. travel distance, land tenure, and accessibility). It must be conducive to agent survival and establishment.

Below are suggested criteria, based on past successes, that you should consider when selecting a release site:

Criteria	
Invasive Alien Plant Density	<ul style="list-style-type: none"> • Generally, sites should be chosen that have a dense invasive alien plant infestation with a suitable number of plants. • The preferred average estimated plant density should be greater than 5 plants per metre².
Size of Infestation	<ul style="list-style-type: none"> • The site does not necessarily need to be very large (e.g. hectares and hectares), small patches may be ideal for biological control agents that are abundant. The minimum size for a bioagent release is generally 100m². • Small patches may also be ideal at sites where the plants are likely to spread and no other treatment options are available. • However, when choosing between two optimum sites, the larger site is usually preferable. • Ensure that the release site is large enough to support a viable insect population with potential for natural dispersal.
Long-term stability	<ul style="list-style-type: none"> • Sites should be chosen if they are unlikely to be disturbed. • Disturbance factors to avoid include mowing, spraying, digging, construction, flooding, logging, road building, trampling, and vandalism. As a particular bioagent becomes more readily available (i.e. widely distributed and/or increased collection numbers), this consideration is less important.

Module 1.9 – Biological Treatment & Monitoring

Criteria	
Habitat Suitability	<ul style="list-style-type: none"> • Some invasive alien plant populations have a potential to crash. Sites with all bolting plants should be avoided. Infestations containing a variety of stages of growth (i.e., variety of plant sizes in early spring) are necessary to maintain a host population. • Little is known about habitat requirements for new agents so sites of various characteristics are often chosen for initial releases of primary agents. • As more releases are performed and monitored, the habitat requirements of biological control agents are revealed. • Species-specific suitability should be considered for such factors as biogeoclimatic zone, elevation, aspect, canopy closure, microclimate, and soil preferences. • Presence of other vegetation may have some affect on site suitability. Moss, for example, may maintain cooler soil temperatures, which may be undesirable for some root-feeding insects.
Tenure	<ul style="list-style-type: none"> • Sites on Crown Land have priority over those on other jurisdictions, especially for relatively new or rare agents. • Other suitable locations may be land under the jurisdiction of other agencies with the goals of controlling invasive plants and establishing/maintaining working relationships. Release sites might be located in or close to relevant municipalities with the goal of future cost-effective collection sites. An example is a municipal water reservoir that is long term and most activity, particularly herbicide spraying, is prohibited. • However, when a particular bioagent species is well established and more available, and the agency or landowner is agreeable and supportive of long-term biocontrol, releases can be completed on private and other jurisdictional properties.
Agent Presence	<ul style="list-style-type: none"> • Due to bioagent dispersal, some insects may find their way to a site before you do. Presence of insects should be assessed before a release is carried out. If the inspect species is already present, fill out a Dispersal Form (mentioned later in this guide) and consider releasing the shipment at another, uninhabited site to maximize program benefit. • This might include root-pulling, looking for emergence holes, assessing feeding damage, or looking for adults.
Bioagent Dispersal	<ul style="list-style-type: none"> • Most biological control agents will disperse on their own to some degree. • It is not cost-effective to release biological control agents at sites in close proximity if the agent will travel there on its own within a year or two. • Ideally, large-scale dispersal mapping for a bioagent will assist in determining gaps in populations, distance the agent will disperse on its own (e.g. rate per year per habitat type) and habitat limitations.
Accessibility	<ul style="list-style-type: none"> • In many cases, remote sites are an excellent option for biocontrol since they often do not receive any other method of control and may have potential to spread. • However, when it is desirable to monitor a site frequently or to try to re-collect agents from a site, accessibility becomes a factor to consider.

Summary of the steps to follow for site selection

After you have given thought to the above criteria, follow these suggested steps to select your site:

- 1 **Plan release site locations prior to requesting agents.** Release sites should be pre-selected the fall or spring prior to release of agents. This avoids 'drop and dash' releases and promotes overall invasive alien plant management planning. Consider the following:
 - Objective of the release. Is it invasive alien plant control or rearing of insects for the purpose of future collection?
 - Suitability of the site to the agent.
 - Size of the invasive alien plant stand. Is the invasive alien plant infestation large enough to support a viable population of insects?
 - Stage of plant growth at both the **collection** site and **release** site. Ideally, both sites should be at the same growth stage to ensure that the insect's life cycle will synchronize with the host plant's phenology.
 - Proximity of the release site to other releases of the same agent. Do **not** release biocontrol agents within 100 m of an existing population of the same insect species. This strategy will promote a broad geographic distribution of the insects.
- 2 **Determine tenure and stability of land management.**
- 3 **Make sure the site will not be disturbed after release.**
- 4 **Check the IAP Program - Map Display, iMap/Mapview and previous release records and maps** to ensure no prior release of the agent has been made at a potential site. An unofficial rule is that a distance of 1 km constitutes a separate release.
- 5 **Monitor plants at potential site** to ensure the agent is not already present through natural dispersal.
- 6 **Check the immediate vicinity** of the proposed release site for bird colonies, ant hills and wasp nests to avoid excessive predation.
- 7 **Take GPS co-ordinates and/or mark selected release sites with a stake** so that it may be relocated to monitor insect progress and invasive alien plant population decline.

Collecting & Shipping Biological Control Agents

Collection

The second stage of biological control is collecting the biological control agents that will later be released on a site. There are various methods, dependent on the insect, which can be used to collect biological control agents from the field. Examples of these can be found:

- In the Field Guide to the Biological control of Weeds in British Columbia (Powell et al 1994); and,
- on the Ministry of Forests and Range' web site at <http://www.for.gov.bc.ca/hfp/invasive/intro.htm>.

The biological control agents are first collected using field collection apparatus/containers. Next, they are transferred into 1 litre containers with a mesh opening in the lid. The target invasive plant is placed in the containers to provide feed and a place for the insects to cling. Below is a checklist which will help aid the collection of biological control agents.



Mesh screens on the storage lids are critical to allow ventilation and to prevent a build up of condensation that can drown the insects. (For *Cyphocleonus achates*, use metal mesh in the lids as the weevils chew through nylon mesh.)

Checklist: Collecting Biological Control Agents



- ✓ Select a dry day for collection – collection in the rain should not be attempted as the leaves retain a lot of moisture and the hoses of the aspirating units would continually get clogged with mud or debris and sweep net walls will become moist again possibly injuring insects if they stick to the net. Tipping the insects off the plants onto paper towel (or first onto your hand) to remove moisture is suggested for some agents. Generally, allow plants to dry before aspirating, however, the soil can be slightly moist. In this case, regularly check for clogged hoses or moist sweep nets. Tap the ends of aspirating hoses frequently to remove any build-up and feed sticks in to the hose if necessary to check the passage and dislodge dirt.
- ✓ Use just the right amount of plant material - do **not** use too much plant material as excessive condensation may be produced. If there is moisture in the containers, care should be taken as the insects can either drown in small amounts of water or their elytra (wing covers) or wings can be damaged when they get stuck to the wall of the containers.
- ✓ Remove any early flower heads before placing the invasive plant into containers.
- ✓ Ensure containers are kept cool and out of direct sunlight.
- ✓ Ensure insects are stored in appropriate quantities - if the insects are to be kept for any length of time before releasing, they should be stored in quantities of 100/container or less depending on the insects' size. Weevils will need to be transferred to clean containers every two days and supplied fresh plant material for foraging.



Biological control weevils can be sexed to get equal numbers of males and females for shipment by looking for characteristics similar to those used for sexing the large weevil *Cyphocleonus achates* (*Cyphocleonus achates* (Knapweed root weevil) – Operational Field Guide 1998). However, a strong hand lens or a microscope and a method of slowing the smaller weevils down, such as putting them in a cooler or refrigerator, to investigate the shape of their abdomens is needed. **This is not practical for field work so generally it is not done.**



The CAB IIBC September 30, 1994 Quarterly Report on Weeds notes that continual yearly collection of insects from a site will cause a significant decline in their numbers and refraining from collecting for a year or more may be necessary to allow the population to recover. For most agents, depending on operational goals, it may be worthwhile to rotate collection sites from year to year to sustain their insect populations.

Shipping

Collected insects are shipped to new release sites in 1 litre bulk food containers. When readied for field delivery, insect numbers in containers may be combined to make quantities of 200/container depending on the size of the insects or whether the insects can be transferred between containers – moths are very difficult to transfer between collection containers.

Containers

When shipping agents, you must ensure the containers are appropriate. Use the following checklist to assist you:

Checklist:

Transporting Containers of Biological control agents



- ✓ Have containers been clearly marked with the correct number of insects and date and place of collection so information can be transferred to release forms? See the discussion under Releasing Biological Control Agents for the number of insects to release.
- ✓ Are containers packaged into carefully sealed boxes to avoid insect escape during shipment?
- ✓ Are the biological control agents traveling a long distance? Should cold packs be used?
The cold packs are used to keep the insects cool and reduce their activity if they are traveling any distance. Cold packs are wrapped first in plastic bags to contain the majority of condensation and then in newspaper or paper toweling to prevent further condensation from building up inside the containers and damaging or drowning the insects.
- ✓ Have spaces that have been left between containers been packed with foam chips, newspaper etc.?
This is to prevent the containers from shifting and causing undue stress to the agents and/or the accidental removal of the lids. The agents must be shipped quickly via courier or bus to release locations.
- ✓ Are the shipping containers well ventilated and do they contain sufficient plant material to feed the insects during transport?
- ✓ Have all flower heads been removed and left at the site? Generally they should not be an issue as they should not be forming at the time of shipping.
- ✓ Is the shipping address correct? Has it been confirmed that someone will be receiving the shipment?

Releasing Biological Control Agents

Biological control agents (bioagents) are commonly used in BC to control the spread of invasive plants. To ensure efficient and optimal effectiveness, it is crucial for everyone to follow standard release and monitoring protocols. In this section, you will learn about:

- Marking the site;
- Using Maps;
- Using Photoplots;
- Releasing the bioagent;
- The Checklist: Preparing the Equipment; and,
- Completing the Documentation.

Marking the Site

Prior to widespread availability of Global Position System (GPS) units, marking sites was important for future monitoring. However, in many provincial locations, these units may make this task unnecessary. The decision to mark a site should take into account the accuracy of the GPS unit as this factor may vary for a variety of reasons such as:

- Level of technology of the unit;
- Satellite coverage availability depending on where the satellites are located, for example, often poor readings are attained over the noon hour;
- Interference with satellite signals in narrow valleys, tree canopy coverage, etc.; and,
- Location in the province. For example, northern parts of the province experience less accurate readings than in the south.

If the decision is to mark a site for re-location, the following may be used:

- A metal pin (for permanent marking)
- A white stake (for temporary – possibly several years – visual marking)
- A bio-release sign (for public awareness – optional)

Metal pin

When relocating, the exact point of release is critical for future assessments. A metal pin (at least 30 cm long) with a 5 cm square plate welded on top is used to mark the release site. The pin is hammered into the ground until it is flush, so that even if the area is mowed the pin will still be in place. The top of the pin is painted with blue tremclad paint at the time of the release, before the insects are released on the site. The metal pin is essential for releases of all primary and early secondary biological control agents (e.g. *Mogolones cruciger*). The metal pin is optional for releasing late secondary and tertiary biological control agents (e.g. *Agapeta zoegana*, *Cyphocleonus achates*, *Larinus minutus*, *Mecinus janthinus*).



Blue is preferred as it is a good visible colour in natural environments.

White Stake

A white wooden stake (about 0.5 m) is used to mark the site of release. It is placed within 10 cm of the metal pin, or at the point of release. Agency (for example “MoFR”) the bioagent (four letter code), date of release, and number of insects released is written on the stake with a large permanent marker. The number of insects released should be underlined.

If a new release is done at an old site, the same stake can be used and the new release information can be written on the back of the original white stake. Otherwise, a new stake should be put on the site. If you find that the writing is fading on a wooden stake, try to copy over it identical to what it had before (for the purpose of photo retakes). Often, wooden stakes are rotting and need to be replaced after several years. If this is the case, the old site number(s) can be written on one side of the stake, and the new release information can be written on the other side.

Bio-Release Sign

If the site is in a location that is at risk of being disturbed by human activity, a sign can be beneficial. These signs can be stapled or nailed to a longer stake (1.2 m) or nearby post (fence post, telephone pole (with permission)), and put near the release. These signs seem to help if an area has the possibility of being sprayed, mechanically disturbed, etc. Signs also help raise public awareness of biocontrol.



Note that the signpost is **not** a substitute for the release stake.

Mapping the Site

As mentioned in the previous section, it may not be necessary to include a drawn site map; however, they are beneficial as they include helpful details for finding a site, particularly if the GPS co-ordinate was not accurate at the time of the initial reading or at the time of re-visiting the site to monitor. The more information on the site map, the better. Details such as roads, culverts, signposts, fences, railways, telephone poles and houses make the release much easier to re-locate if the stake goes missing. Site maps are drawn with north to the top of the page, and sometimes require re-drafting once back at the office.

One to two tie-points for the release are always included. The distance to the tie-points and the compass bearings are noted on the site map. If telephone poles are used, note the pole number. If no obvious tie-point exists, paint a blue dot on a rock outcrop, or other feature. If possible, the tie-point should be no further than 50 m from the release stake. The GPS co-ordinate of the object used as the tie-point should be recorded on the site map.

Additionally, a portion of a map, such as a Forest Cover or Trim Map may be included with the release record for future re-location. Depending on the site's characteristics (i.e. is it difficult to find?), this may be used in addition to or in conjunction with, a drawn site map.

An Example - TRIM Map(s) for the Site

A TRIM Map is an example of a map which could be used for the site map. Here is what it would include:

- A 1:20 000 TRIM map of the location of the release, photocopied onto 8½ by 11 (or 8 ½ by 14).
- The map sheet number should be written on this map. If possible, the section of the map photocopied should include an obvious landmark (preferably the nearest named geographic feature such as a lake, road, or town).
- For remote release sites, a copy of the relevant section of a 1:50 000 or 1:250 000 map of the release location should also be included.

Photoplotting the Site

Another method of collecting baseline data and changes over time is through photoplots. A photo form is used to record the film number, photo numbers, distance from metal pin or stake, and bearing of these photos. A single over-view photo may be taken at the site or for more extensive coverage to show a future change in the plant community five photos are taken at the time of the release. At least one landscape photo is taken for the site. The pin and stake should be visible within this photo. The purpose of this photo is to see overall changes to the landscape over time and to help locate the point of release. Four cardinal photos are taken (north, south, east and west) each at 10m from the release looking back at the stake to include the plant community around the stake. Don't crouch or kneel to take photos since it makes it very difficult for photo retakes. Preferably, a "date back" camera should be used so the release and photoplot date appears on all photos. A "Photo Form" is available in Part IV of this guide.

Stadia rod

In order to monitor changes in invasive alien plant height, a stadia rod (ranging pole) is erected within the photo. The stadia rod is placed right beside the metal pin. The stadia rod is very helpful for landscape photos because the wooden stake is not always visible. Line up the photo so that the top of the lens frame meets the top of the stadia rod.

Storing Release Photos

The photos and negatives are often kept within the release file. The back of each photo is marked with the release number (if known), the date (if not on the photo), the agent, the district (if required), and the direction of the photo. Photos are stored with the original file in the originating office, and scanned copies are entered into the IAP Program – Data Entry or supplied to others upon request. If photos have been taken with a digital camera, a digital archive system should be created with notation on the release record of their existence.

Releasing the Agents

Has the preparatory work been completed?

Before any biocontrol agents can be released there is preparatory work that needs to be completed at the site. Make sure that all paperwork, photos, site maps, measurements, etc. are completed before opening any lids, otherwise people will be treading on insects.

Insects should be stored in a cool place (e.g. cooler or fridge) before they are released. On the day of the release, keep the insects in the cooler or place them in the shade when release site information is being collected.

The metal pin should be painted first to allow time for the paint to dry prior to releasing the insects. Shake the insects gently out of the container on the ground right beside the release stake. For moths, gently pull the tissue/plants from the container and shake it.



Insects are released after all information from the site is gathered so they are not accidentally stepped on or disturbed.

Has the number of biocontrol agents been determined?

The optimum number of biocontrol agents for release is dependent on the size of the target invasive plant infestation. Releases of 100, 200, 400, 600 and 800 have been used at previous MoFR sites. The decision for optimum numbers to release will be in part dependent on the number of insects available to collect. Generally, the minimum number of insects for a release of *Agapeta zoegana* and *Cyphocleonus achates* is 100 and for *Larinus sp.* is 400. However, the number released depends on the site and the availability of insects.

Summary of the steps to follow for bioagent release

The following are some suggested steps to follow when making an insect release:

- 1 **Mark the release site with a semi-permanent stake** to assist relocation efforts for follow-up agent establishment and invasive alien plant impact monitoring.
- 2 **Fill out the 'Biological Control Release Record'** that is shipped with the insects **accurately** and **completely**. Information on the forms is fundamental to further analysis of the program. A completed paper copy of the Release Record is kept in the originating office. The forms are then collated in the **IAP Program – Data Entry**. The record is discussed later in this module.
- 3 **Create accurate site maps complete with permanent tie points**. This is essential for future monitoring of the release site.
- 4 **Take photographs**. They have proven to be useful tools to both relocate the release site and to provide an ocular comparison of the site over time. See the above section on "Photoplotting the Site".
- 5 **Gently release the insects** (once the paper work is completed) at one location by the stake. They will disperse themselves from this initial release point. It is more difficult for insects to propagate if they are spread over a large area.

Additional Considerations:

- Initial releases for the season should be made in similar latitudes (or altitudes) or further south than collection sites to ensure temperatures are conducive to agent establishment. As northern and upper elevation release sites warm, they can receive insects. Once northerly temperatures begin to drop, releases should be directed south again to provide for the longest possible establishment season.
- If more than one collection site is available, it is preferable to redistribute biocontrol agents into habitats similar to those they are acclimatized to.

Before re-releasing at a site the Agency plan needs to be reviewed, i.e. can agents be spared for re-release at a site that may or may not be conducive to the agents' survival when they could be placed at a new site?

The Checklist – Preparing the Equipment

The following checklist will help you to prepare your equipment for the bioagent release tasks just described.

Checklist: Equipment for Releasing Agents 

<input checked="" type="checkbox"/> Metal pins (optional)	<input checked="" type="checkbox"/> Camera
<input checked="" type="checkbox"/> White stakes	<input checked="" type="checkbox"/> Extra film or memory cards
<input checked="" type="checkbox"/> Sledgehammer	<input checked="" type="checkbox"/> Extra camera batteries
<input checked="" type="checkbox"/> Blue Tremclad spray paint	<input checked="" type="checkbox"/> GPS unit
<input checked="" type="checkbox"/> Large permanent black marker	<input checked="" type="checkbox"/> Extra batteries for GPS
<input checked="" type="checkbox"/> Clipboard with: - Release form - Site Map form - Photoplot form - Distribution codes	<input checked="" type="checkbox"/> 3 m piece of string
<input checked="" type="checkbox"/> Pens & Pencils	<input checked="" type="checkbox"/> Stadia rod
	<input checked="" type="checkbox"/> Compass
	<input checked="" type="checkbox"/> Clinometer
	<input checked="" type="checkbox"/> Watch
	<input checked="" type="checkbox"/> Relevant maps

Collecting the Data



Biological Control Release Record

The release of a bioagent must be recorded on the “**Biological Control Release Record**”. The paper record should be used to record information when in the field. At the office, this data should be transferred from the paper record into the IAP Program – Data Entry. Part II of this guide will demonstrate how to enter information into the IAP Program – Data Entry. Each section of this form is explained below.

Sample Form

A sample form is found on the following pages. Please refer to Part IV of this guide to find a URL to a MoFR web site for a “print friendly” version of this form.

Freedom of Information Note:

When private information (i.e. Landowner name & phone number) is collected, it must be collected directly from the individual with their knowledge of your intentions, no exceptions. This information is being collected under section 26 (c) of the Freedom of Information and Protection of Privacy Act and is being used for the purpose of contacting private land owners in support of management of invasive alien plants. If you have any questions regarding the collection of this personal information, please contact the Privacy Section at 250-387-2227. If you have any questions regarding the use of this personal information, please contact forhisp.apphelp@gov.bc.ca.

SAMPLE



BRITISH COLUMBIA



**BIOLOGICAL CONTROL AGENT
RELEASE & MONITORING RECORD**



DATA ENTERED INTO INVASIVE ALIEN PLANT PROGRAM <input type="checkbox"/>		ENTERED BY		TEMPORARY FIELD SITE #		
SITE <input checked="" type="checkbox"/> SITE ALREADY EXISTS						
TREATMENT DATE * (YYYY-MM-DD)	TIME *(24 hr.)	MAPSHEET		(ASSIGNED AT DATA ENTRY)		
				SITE ID	TREATMENT ID	
PAPER FILE ID	DISTRICT ID	RANGE UNIT ID	PASTURE			
AGENCY *		JURISDICTION		CLASSIFIED AREA		
EMPLOYER			APPLICATOR			
GPS/UTM GRID SAME AS SITE? <input type="checkbox"/> IF NO, THEN ENTER CO-ORDINATES BELOW						
ZONE *	EASTING *	NORTHING *		OR	LATITUDE * LONGITUDE *	
LOCATION/SITE			COMMENTS			
LOCATION						
COMMENTS						
BIOGEOCLIMATIC CLASS						
ZONE	SUBZONE	VARIANT		PHASE	SITE SERIES	
TARGET PLANT SPECIES						
TARGET PLANT SPECIES *	AREA (Ha)	DISTRIBUTION CODE	SURVEY TYPE		DENSITY (PLANTS/M ²)	
				CURSORY	OPERATIONAL	PRECISE
				<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
BIOLOGICAL CONTROL						
BIO AGENT CODE *	BIO AGENT SOURCE			COLLECTION DATE (YYYY-MM-DD)		
BIOAGENT STAGE						
ADULT	EGG	PUPA	LARVAE	OTHER	ALL	RELEASE QUANTITY *
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
COMMENTS						

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NOTE: MANDATORY DATA FIELDS ARE INDICATED WITH *





MAP

SKETCH A WEED SITE MAP HERE, OR GLUE A SITE MAP HERE, OR ATTACH A SITE MAP TO THIS FORM.

IMAGE DETAILS

ID	DATE (YYYY-MM-DD)	PERSPECTIVE	REFERENCE NO.
----	-------------------	-------------	---------------

COMMENTS

BIOLOGICAL MONITORING

AGENT DESTROYED? <input type="checkbox"/>	INSPECTION DATE (YYYY-MM-DD)	TIME (24 Hrs.) :	SPREAD	
			BEARING 1 (DEGREES)	DISTANCE 1 (DEGREES)
SURVEYORS			BEARING 2 (DEGREES)	DISTANCE 2 (DEGREES)
MONITORING ID	PLANT COUNT		BEARING 3 (DEGREES)	DISTANCE 3 (DEGREES)
BIOAGENT COUNT	DURATION OF COUNT (IN MINUTES)		BEARING 4 (DEGREES)	DISTANCE 4 (DEGREES)

GPS/UTM GRID SAME AS SITE? IF NO, THEN ENTER CO-ORDINATES BELOW

ZONE *	EASTING *	NORTHING *	OR	LATITUDE *	LONGITUDE *
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TARGET PLANT SPECIES

TARGET PLANT SPECIES	AREA (Ha)	DISTRIBUTION CODE	SURVEY TYPE			DENSITY (PLANTS/M ²)
			CURSORY <input type="checkbox"/>	OPERATIONAL <input type="checkbox"/>	PRECISE <input type="checkbox"/>	

BIO AGENT PRESENCE * YES (IF YES, THEN SELECT INDICATOR BELOW) SAME UTM AS SITE?

- FOLIAR FEEDING DAMAGE SEED FEEDING DAMAGE LARVA(E) PRESENT OVIPOSITION MARKS
 ROOT FEEDING DAMAGE ADULTS PRESENT PUPA(E) PRESENT EXIT HOLES/TUNNELS EGGS PRESENT

COMMENTS

Fields in this Form – Biological Control Release Record

There are various fields in this form. For additional information on Invasive Alien Plant Species Codes & Bioagent Codes, see Part IV of this guide.

Data entered into IAP Program - Data Entry	<p>What... Check-box. Check if the data has been entered electronically.</p> <p>Why is it important... Identifies if the data has been entered into the IAP Program – Data Entry.</p>
Entered By	<p>What... Text entry.</p> <p>Why is it important... record the name of the individual entering the data on the form.</p>
Temporary Field Site #	<p>What... Text entry.</p> <p>Why is it important... the number assigned to polygons drawn on Trim/forest cover maps while in the field or the number assigned to individual forms while in the field with the intention of identifying this information to data that is later recorded/digitized in the office. It is strictly for field use and is not recorded for long-term use.</p>
Site Already Exists	<p>What... Check-box. Check if the site details have already been recorded.</p> <p>Why is it important... Eliminates the duplicate entry of sites.</p>
Treatment Date	<p>What... Mandatory text entry.</p> <p>Why is it important... It is important for everyone to know when the treatment was applied to the invasive plant.</p>
Time	<p>What... Mandatory text entry.</p> <p>Why is it important... It is important to record the time of the release of the biological agent. This data will be useful for determining variations in the effectiveness of an agent.</p>
Mapsheet	<p>What... Text entry. (1:20,000 mapsheet for current location).</p> <p>Why is it important... Provides location of the site.</p>
Site ID	<p>This is assigned at the time of data entry into the IAP Program - Data Entry.</p>
Treatment ID	<p>This is assigned at the time of data entry into the IAP Program - Data Entry.</p>
Paper File Id	<p>What... Text entry.</p> <p>Why is it important... This is useful information for cross referencing the paper and electronic files. The format of this field varies widely between agencies.</p>
District Code	<p>What... Text entry.</p> <p>Why is it important... Identifies the district (of the Ministry of Forests and Range) which the site falls within.</p>

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Range Unit ID	<p>What... Text entry.</p> <p>Why is it important... Identifies if the site is part of a Range Unit. Used a MoFR administrative unit within stock ranges in some locations.</p>
Pasture	<p>What... Text entry.</p> <p>Why is it important... Identifies if the site is part of a Pasture.</p>
Agency	<p>What... Mandatory text entry. Select the appropriate agency.</p> <p>Why is it important... It is critical that the agency entering the treatment is identified for future reference.</p>
Jurisdiction	<p>What... Text entry.</p> <p>Why is it important... it is important that the proper jurisdiction for the site is selected. This provides information about who is responsible for the site (site owner) and is useful for future reference.</p>
Classified Area	<p>What... Text entry.</p> <p>Why is it important... Identifies if the treatment is for collection or research purposes.</p>
Applicator	<p>What... Text entry.</p> <p>Why is it important... Identifies the person who released the biological control agents at the site. This person works for the contractor.</p>
Contractor	<p>What... Text entry.</p> <p>Why is it important... Group hired by the Agency to carry out the work.</p>
Employer	<p>What... Text entry. Enter the name of the employer.</p> <p>Why is it important... Identifies the employer that conducted the treatment. This is important in case additional treatment information is required.</p>
UTM: Same as Site	<p>What... Mandatory check-box (otherwise, enter UTM Zone, Easting, Northing OR Latitude, Longitude).</p> <p>Why is it important... This box must be checked if the UTM Zone, Easting, and Northing are identical to the site. It is important for everyone to know if the release site is identical to the original site.</p>
UTM: Zone	<p>What... Mandatory text entry.</p> <p>Why is it important... Provides UTM zone of the release site.</p>
UTM: Easting	<p>What... Mandatory text entry.</p> <p>Why is it important... Provides the UTM Easting coordinate of the release site.</p>
UTM: Northing	<p>What... Mandatory text entry.</p> <p>Why is it important... Provides the UTM Northing coordinate of the release site.</p>
Latitude	<p>What... Mandatory (if UTM Zone, Easting Northing has not been entered). Text entry. Enter the geographic latitude (numeric).</p> <p>Why is it important... Identifies the geographic latitude of the release site. It is important for everyone to know if the release site is identical to the original site.</p>

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Longitude	<p>What... Mandatory (if UTM Zone, Easting Northing has not been entered). Text entry. Enter the geographic longitude (numeric).</p> <p>Why is it important... Identifies the geographic longitude of the release site. It is important for everyone to know if the release site is identical to the original site.</p>
Location	<p>What... Text entry.</p> <p>Why is it important... Used to describe the location of the site.</p>
Comments	<p>What... Text entry.</p> <p>Why is it important... Used to describe the location of the site.</p>
BEC Zone	<p>What... Text entry. Represent large geographic areas with a broad homogeneous macroclimate in a biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
Subzone	<p>What... Text entry. Next level down in the biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
Variant	<p>What... Text entry. Subdivisions of sub zones and one further reduction in climatic and geographic variability in the biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
Phase	<p>What... Text entry. This is not a formal category in BEC. It shows extensive areas that do not contain zonal ecosystems. It is not frequently used but can be used to distinguish unique locations.</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
Site Series	<p>What... Text entry. This includes landscape positions producing a single plant association in the biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
<p>Note: The Biogeoclimatic Class must be a valid combination (according to the ministry) otherwise the data will not be accepted when entered into the IAP Program - Data Entry.</p>	
Land Owner	<p>What... Text entry.</p> <p>Why is it important... Provides the name of the individual who owns the land. This is useful for future reference.</p>
Telephone #	<p>What... Text entry.</p> <p>Why is it important... Provides the telephone number of the individual who owns the land. This is useful for future reference.</p>
Contact	<p>What... Text entry.</p> <p>Why is it important... Provides the name of the individual who should be contacted regarding any activities on the land. This is useful for future reference.</p>

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Telephone #	<p>What... Text entry.</p> <p>Why is it important... Provides the telephone number of the individual who should be contacted regarding any activities on the land. This is useful for future reference.</p>
Slope %	<p>What... Text entry. The angle of the land from horizontal.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Aspect	<p>What... Text entry. A slope's orientation to the sun.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Elevation (M)	<p>What... Text entry. The height of land above sea level.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Site Soil Texture	<p>What... Text entry. Relates to the relative amount of sand, silt, and clay in a soil.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Target Plant Species	<p>What... Mandatory text entry.</p> <p>Why is it important... Provides the invasive alien plant which is to be treated.</p>
Area (Ha)	<p>What... Text entry.</p> <p>Why is it important... Provides planners with the area surveyed as measured in hectares.</p>
Distribution Code	<p>What... Text entry. Distribution code is a derived combination of density and plant cover. See Part IV of this guide for additional information.</p> <p>Why is it important... Provides planners with the distribution code of the species.</p>
Precise Survey	<p>What... Check-box. Check this box if the survey meets the ministry requirements for a precise survey.</p> <p>Why is it important... Identifies whether or not the survey meets ministry standards for a precise survey.</p> <p>Note: A survey is precise if the accuracy of the data collected is within 10m and the resulting polygon's invasive plant infestation has a difference in density no greater than a factor of two.</p>
Density (plants/m²)	<p>What... Text entry.</p> <p>Why is it important... Provides planners with the density of the species as measured in plants per metre².</p>
Biological Agent Code	<p>What... Mandatory text entry.</p> <p>Why is it important... Provides the biological agent released for biological treatment.</p>
Biological Agent Source	<p>What... Text entry.</p> <p>Why is it important... This field captures the location where the biological agents were originally collected from. This data will be useful for determining variations in the effectiveness of an agent.</p>
Collection Date	<p>What... Text entry.</p> <p>Why is it important... It is important for everyone to know when the biological agent was collected. It is useful to know if this date varies from the Treatment Date.</p>

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Bio. Agent Stage	<p>What... Check-box.</p> <p>Why is it important... Check the stage of the biological agent. Note that multiple boxes can be checked. Selections are:</p> <ul style="list-style-type: none"> • Adult • Egg • Pupa • Larvae • Other • All
Release Quantity	<p>What... Mandatory text entry. Enter the number of biological agents released (numeric)</p> <p>Why is it important... This field captures how many biological agents were released on the site during the treatment. This data will be useful for determining variations in the effectiveness of an agent and its future dispersal.</p>
Comments	<p>What... Text entry.</p> <p>Why is it important... Comments may be useful for future reference by yourself or others.</p>
<p>Image Details - Be sure to note the following details: ID, Date, Perspective, Reference No, and Comments.</p>	



Mandatory fields are marked with an "*" (on the form). For additional information on Invasive Alien Plant Species Codes & Bioagent Codes, see Part IV of this guide. The final section of this form, Biological Monitoring, is discussed later in this module.

Establishment Monitoring

Monitoring release sites is important for determining:

- Which habitats the biological control agents are surviving within;
- If the insects are dispersing;
- What biocontrol impact is occurring;
 - If the agent has established at the release site;
 - The density of agents per plant or area;
 - How far the agent has spread from the release point;
 - The agent's preferred habitat and current range;
 - Areas that are unsuitable to the agent;
 - Any effects the agent has had on the invasive alien plant population;
- Potential collection sites;
- If collecting from the site has had any effects on plant or agent populations; and
- Agent life cycle information (i.e. emergence dates, effects of weather).

Agents should be monitored two to three years after their initial release. All release sites should be monitored every five years to determine whether there has been significant change, and when impact is noticeable, photos should be re-taken.

Monitoring Technique

Depending on the reason for monitoring, the techniques may vary. However, once the reason is identified, the monitoring techniques should be consistent for all sites to be able to compare the resulting information.

Reconnaissance techniques can be used to assess parameters such as site suitability, presence or absence of agents, dates of emergence etc.



Monitoring information is also recorded on the Biological Control Release Record. The relevant sections of this record are discussed below.

A more rigorous technique is needed for collecting quantifiable information on insect and plant populations. It is suggested that this type of monitoring be planned at selected sites as dictated by the constraints of program planning, time and budget. This information may be used to determine whether a site contains a collectable quantity of insects. A suggested transect method is as follows:

- 1 **Find the release stake** or from the description on the release form, the closest position to the release stake. Mark a starting point.
- 2 **Determine four directions** from the starting point for running the transects. If cardinal directions cannot be used, determine 4 non-cardinal right angles. Pace out 25 m in each direction. Step #3 can be performed in place of step #2.
- 3 **Pace out three parallel transects** at least 2 metres apart: two 33 m long and one 34 m long if the site does not allow for this transect design. Step #4 can be performed in place of step #3.

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- ④ **Pace out two 50 m parallel lines** lying side by side or staggered (as can be accommodated by the site). The intent is to monitor a uniform number of plants randomly, if the site does not allow for either of the above transect designs
- ⑤ **Visually check for adults on or around the root crown of plants every meter** when monitoring in the spring or late summer. Count and record the number of insects.
- ⑥ **Or, monitor using the same method but dig up a plant every meter** and check the inside of the root for larvae. Count and record the number of larvae.

An additional transect method is as follows:

- ① **Find the release stake** or from the description on the release form, the closest position to the release stake. Mark a starting point.
- ② **With a timing device and a hand counter** (if necessary) move in concentric circles away from the starting point counting the number of weevils found for a pre-determined time. Twenty minutes with one person or ten minutes with two people is recommended.

It is important to keep in mind that whichever monitoring method is used, it should be used for all sites of a particular insect to be consistent and to have comparable results.

Collecting the Data



Biocontrol Agent Intensive Monitoring Record

The “Biocontrol Agent Intensive Monitoring Record” is a useful tool to use to record data while out in the field. Each section of this form is explained below.

Sample Form

A sample form is found on the following pages. Please refer to Part IV of this guide to find a URL to a MoFR web site for a “print friendly” version of this form.

Fields in this Form – Biocontrol Agent Intensive Monitoring Record (Field Use)

There are various fields in this form.


Data entered into IAP Program - Data Entry	<p>What... Check-box. Check if the data has been entered electronically.</p> <p>Why is it important... Identifies if the data has been entered into the IAP Program – Data Entry.</p>
Entered By	<p>What... Text entry.</p> <p>Why is it important... record the name of the individual entering the data on the form.</p>
Temporary Field Site #	<p>What... Text entry.</p> <p>Why is it important... the number assigned to polygons drawn on Trim/forest cover maps while in the field or the number assigned to individual forms while in the field with the intention of identifying this information to data that is later recorded/digitized in the office. It is strictly for field use and is not recorded for long-term use.</p>
Date	<p>What... Mandatory text entry.</p> <p>Why is it important... It is important for everyone to know the date of monitoring.</p>
Mapsheet	<p>What... Text entry. (1:20,000 mapsheet for current location).</p> <p>Why is it important... Provides location of the site.</p>
Site ID	<p>This is assigned at the time of data entry into the IAP Program - Data Entry.</p>
Treatment ID	<p>This is assigned at the time of data entry into the IAP Program - Data Entry.</p>
Monitoring ID	<p>This is assigned at the time of data entry into the IAP Program - Data Entry.</p>
Paper File ID	<p>What... Text entry.</p> <p>Why is it important... This is useful information for cross referencing the paper and electronic files. The format of this field varies widely between agencies.</p>
Location	<p>What... Text entry. Enter any specific information pertaining to the location of the site. If the site is difficult to find, enter as much detail as possible.</p> <p>Why is it important... Identifies the location of the site to others who may need to locate it.</p>
BioAgent Code	<p>What... Mandatory text entry. Enter the code of the biological agent. Code information is available in Part IV of this guide.</p> <p>Why is it important... Identifies the biological control agent used for treatment on this site.</p>

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Release Date	<p>What... Text entry.</p> <p>Why is it important... It is important for everyone to know when biological control agents were released on the site.</p>
Target Plant Species	<p>What... Mandatory text entry.</p> <p>Why is it important... Provides the invasive alien plant which is to be monitored.</p>
Meters	<p>What... Text entry.</p> <p>Why is it important... Identifies the meters the surveyor walked.</p>
North, South, East West	<p>What... Text entry. Surveyor walks in each cardinal direction (or record the direction if not cardinal) and at every meter, monitor the plant closest to the person's toe. The method of monitoring will vary according to the insect and time of year. The number of biological control agents found on that single plant is recorded in the columns.</p> <p>Why is it important... Identifies the number of biological control agents found.</p> <p>Note: You can also calculate "Frequency of Attack" by dividing the total number of insects found by the total number of plants found attacked.</p>
Percent Attack	<p>What... Text entry.</p> <p>Why is it important... Identifies the number of plants attacked (by the biological control agent) divided by the number of plants surveyed.</p>
Comments	<p>What... Text entry.</p> <p>Why is it important... Comments may be useful for future reference by yourself or others.</p>

Monitoring Equipment

This checklist will be useful for gathering equipment needed for monitoring activities:

Checklist:		
Equipment for Monitoring		
<ul style="list-style-type: none"> ✓ Jack-knife ✓ Sweep net ✓ Clipboard with: <ul style="list-style-type: none"> - Monitoring form - Photoplot form - Distribution codes ✓ Pens & Pencils ✓ Watch ✓ Relevant release files 	<ul style="list-style-type: none"> ✓ Camera* ✓ Extra film* or memory cards ✓ Extra camera batteries* ✓ 3 m piece of string* ✓ Stadia rod* ✓ Compass* ✓ GPS unit ✓ Extra GPS batteries 	<p>* If there are photo retakes being done.</p>

Collecting the Data



Biological Control Release Record

Monitoring records are used to record the establishment of the agent, changes in invasive alien plant density, and the presence of other agents that may have moved to the site. Consistent monitoring records allow for the assessment of the effectiveness of biocontrol.

Biological monitoring is recorded on the “**Biological Control Release Record**”. The paper record should be used to record information when in the field. At the office, this data should be transferred from the paper record into the IAP Program - Data Entry. Part II of this guide will demonstrate how to enter information into the IAP Program - Data Entry. Each section of this form is explained below.

Sample Form

This form is the same form as shown previously in this module (Biological Control Release Record). Please refer to Part IV of this guide to find a URL to a MoFR web site for a “print friendly” version of this form.

Fields in this Form – Biological Monitoring

There are various fields in this form. The following definitions will help you to understand how to use each field and its importance in the program. Use this section of the form to capture information when monitoring the effectiveness of biological control agents. Remember, the more information you are able to capture, the easier it will be to understand the effectiveness of biological control agents across various sites.

Agent Destroyed	<p>What... Check-box. Only check this box if you are certain the agent has been destroyed. For example, you find the container of biocontrol agents with the lid still on.</p> <p>Why is it important... Identifies whether or not the agent exists on the site.</p>
Inspection Date	<p>What... Mandatory text entry.</p> <p>Why is it important... It is important for everyone to know when the site was inspected.</p>
Surveyor(s)	<p>What... Mandatory text entry.</p> <p>Why is it important... Identifies the individual performing the survey at the site.</p>
Monitoring ID	<p>What... Text entry.</p> <p>Why is it important... Provides a unique identifier for the Monitoring Record.</p>
Plant Count	<p>What... Text entry.</p> <p>Why is it important... Provides the number of invasive plants counted.</p>
Biological Agent Count	<p>What... Text entry.</p> <p>Why is it important... Provides the number of biological agents counted.</p>
Duration Of Count (in Minutes)	<p>What... Text entry.</p> <p>Why is it important... Provides the length of time, as measured in minutes, that was spent counting plants/and or biological agents on the site.</p>

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Spread: Bearing (Degrees)	<p>What... Text entry.</p> <p>Why is it important... Provides the degrees the surveyor traveled to look for biological agents. (For example, 180°.)</p>
Spread: Distance (Meters)	<p>What... Text entry.</p> <p>Why is it important... Provides the distance, as measured in meters, the surveyor traveled to look for biological agents.</p>
UTM: Same as site?	<p>What... Mandatory check-box (or enter Zone, Easting, Northing OR Latitude, Longitude).</p> <p>Why is it important... This box should automatically be checked if the UTM Zone, Easting, and Northing are identical to the site. As soon as the UTM Zone, Easting, or Northing is modified to something other than that of the site, the check-box should become un-checked. It is important for everyone to know if the monitoring site is identical to the original site.</p>
UTM: Zone	<p>What... Mandatory drop-list.</p> <p>Why is it important... Provides UTM zone of the release site.</p>
UTM: Easting	<p>What... Mandatory text entry.</p> <p>Why is it important... Provides the UTM Easting coordinate of the release site.</p>
UTM: Northing	<p>What... Mandatory text entry.</p> <p>Why is it important... Provides the UTM Northing coordinate of the release site.</p>
Latitude	<p>What... Mandatory (if UTM Zone, Easting Northing has not been entered). Text entry. Enter the geographic latitude (numeric).</p> <p>Why is it important... Identifies the geographic latitude of the monitoring site. It is important for everyone to know if the monitoring site is identical to the original site.</p>
Longitude	<p>What... Mandatory (if UTM Zone, Easting Northing has not been entered). Text entry. Enter the geographic longitude (numeric).</p> <p>Why is it important... Identifies the geographic longitude of the monitoring site. It is important for everyone to know if the monitoring site is identical to the original site.</p>
Target Plant Species	<p>What... Text entry.</p> <p>Why is it important... Provides the invasive alien plant which is to be treated.</p>
Area (Ha)	<p>What... Text entry.</p> <p>Why is it important... Provides planners with the area surveyed as measured in hectares.</p>
Distribution Code	<p>What... Text entry. Distribution code is a derived combination of density and plant cover. See Part IV of this guide for additional information.</p> <p>Why is it important... Provides planners with the distribution code of the species.</p>
Precise Survey	<p>What... Check-box. Check this box if the survey meets the ministry requirements for a precise survey.</p> <p>Why is it important... Identifies whether or not the survey meets ministry standards for a precise survey.</p> <p>Note: A survey is precise if the accuracy of the data collected is within 10m and the resulting polygon's invasive plant infestation has a difference in density no greater than a factor of two.</p>

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Density (plants/m²)	<p>What... Text entry.</p> <p>Why is it important... Provides planners with the density of the species as measured in plants per metre².</p>
Biological Agent Presence	<p>What... Mandatory check-box.</p> <p>Why is it important... Check the box if there is any evidence of a biological agent presence.</p>
Same UTM as site?	<p>What... Mandatory check-box.</p> <p>Why is it important... This box should be checked if the UTM of the location of the evidence of biological agent presence matches that of the site.</p>
Biological Agent Presence	<p>What... Mandatory check-box.</p> <p>Why is it important... Check the indicators that represent the biological agent is present. Check all that apply. Selections are:</p> <ul style="list-style-type: none"> • Foliar Feeding Damage • Root Feeding Damage • Seed Feeding Damage • Adults Present • Larva(e) Present • Pupa(e) Present • Oviposition Marks • Exit Holes/Tunnels • Eggs Present
Comments	<p>What... Text entry.</p> <p>Why is it important... Comments may be useful for future reference by yourself or others.</p>

Dispersal of Biological Control Agents

The intention of biological control is to ensure the long term sustainability of a site with a population of invasive plants in equilibrium with native plant species. Once the biological control agents are released on a site, it is anticipated that the insects will increase in number as they populate the treatment site. They will then disperse to find and attack host plants outside of the original treatment site. Dispersal monitoring is the tracking of the agents away from their original treatment sites. This monitoring provides insights into: the agents' habitat requirements; ability to/and rate of spread; and, geographic distribution.

Over time, this information provides everyone with the ability to:

- make improved decisions around the collection and release of agents for further treatments; and,
- obtain the knowledge of when collection and release of agents should be stopped in a given geographic location due to sufficient spread of agents in that area.

A Success Story

Formalizing the process of tracking and monitoring the dispersal of biological control agents is relatively new in BC. However, informal dispersal activities have occurred for years. The invasive plant St. John's Wort is a prime example of an invasive alien plant which is now considered "under biological control". This plant now fluctuates with its biological control agents in a "predator-prey" relationship.

Collecting the Data



Biological Agent Dispersal Record

When evidence of a biological control agent is present, this information must be recorded on a **Biological Agent Dispersal Record**. If the site is:

- a new site, then a process similar to the inventory process (as discussed in Module 1.5 of this guide) is applied.
- an existing site, then a process similar to the biological treatment monitoring process discussed earlier in this module is applied.

Biological Agent Dispersal is recorded on the “**Biological Agent Dispersal Record**”. The paper record should be used to record information when in the field. At the office, this data should be transferred from the paper record into the IAP Program - Data Entry. Part II of this guide will demonstrate how to enter information into the IAP Program - Data Entry. Each section of this form is explained below.

Sample Form

A sample form is found on the following pages. Please refer to Part IV of this guide to find a URL to a MoFR web site for a “print friendly” version of this form.

Freedom of Information Note:

When private information (i.e. Landowner name & phone number) is collected, it must be collected directly from the individual with their knowledge of your intentions, no exceptions. This information is being collected under section 26 (c) of the Freedom of Information and Protection of Privacy Act and is being used for the purpose of contacting private land owners in support of management of invasive alien plants. If you have any questions regarding the collection of this personal information, please contact the Privacy Section at 250-387-2227. If you have any questions regarding the use of this personal information, please contact forhisp.apphelp@gov.bc.ca.

SAMPLE



**BIOLOGICAL CONTROL AGENT
DISPERSAL RECORD**



DATA ENTERED INTO INVASIVE ALIEN PLANT PROGRAM ENTERED BY _____ TEMPORARY FIELD SITE # _____

SITE SITE ALREADY EXISTS

INSPECTION DATE * (YYYY-MM-DD) TIME (24hr) MAPSHEET (ASSIGNED AT DATA ENTRY) PAPER FILE ID
SITE ID

DISTRICT ID RANGE UNIT ID PASTURE SAME DATE AS SITE?

SURVEY AGENCY * EMPLOYER

SURVEYOR(S) * JURISDICTION

GPS/UTM GRID
ZONE * EASTING * NORTHING * OR LATITUDE * LONGITUDE *

LOCATION/SITE
LOCATION COMMENTS

BIOGEOCLIMATIC CLASS
ZONE SUBZONE VARIANT PHASE SITE SERIES

SITE CHARACTERISTICS SITE SOIL TEXTURE
SLOPE % ASPECT ELEVATION COARSE FINE ORGANIC

INVASIVE PLANTS

FOR DATA ENTRY ENTER EACH SPECIES SEPARATELY	AREA (Ha)	DISTRIBUTION CODE	SURVEY TYPE			DENSITY (PLANTS/m ²)	PROPOSED ACTIVITY			
			CURSORY	OPERATIONAL	PRECISE		M	C	B	NONE
PLANT SPECIES *			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLANT SPECIES			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
PLANT SPECIES			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

COMMENTS

BIOAGENT DISPERSAL

DISPERSAL ID BIOAGENT CODE * TARGET PLANT SPECIES * DURATION OF COUNT (MIN) BIOAGENT COUNT PLANT COUNT

BIOAGENT PRESENCE

FOLIAR FEEDING DAMAGE	ROOT FEEDING DAMAGE	SEED FEEDING DAMAGE	ADULTS PRESENT	LARVA(E) PRESENT	PUPA(E) PRESENT	EGGS PRESENT	OVIPOSITION MARKS	EXIT HOLES

COMMENTS

FS 1251 HSP 2006/05

NOTE: MANDATORY DATA FIELDS ARE INDICATED WITH *





BIOLOGICAL CONTROL AGENT DISPERSAL RECORD



BIOAGENT DISPERSAL (cont.)

DISPERSAL ID	BIO AGENT CODE *	TARGET PLANT SPECIES *	DURATION OF COUNT (MIN)	BIOAGENT COUNT	PLANT COUNT

BIOAGENT PRESENCE

FOLIAR FEEDING DAMAGE	ROOT FEEDING DAMAGE	SEED FEEDING DAMAGE	ADULTS PRESENT	LARVAE PRESENT	PUPA(E) PRESENT	EGGS PRESENT	OVIPOSITION MARKS	EXIT HOLES

COMMENTS

DISPERSAL ID	BIO AGENT CODE *	TARGET PLANT SPECIES *	DURATION OF COUNT (MIN)	BIOAGENT COUNT	PLANT COUNT

BIOAGENT PRESENCE

FOLIAR FEEDING DAMAGE	ROOT FEEDING DAMAGE	SEED FEEDING DAMAGE	ADULTS PRESENT	LARVAE PRESENT	PUPA(E) PRESENT	EGGS PRESENT	OVIPOSITION MARKS	EXIT HOLES

COMMENTS

MAP

SKETCH A WEED SITE MAP HERE, OR GLUE A SITE MAP HERE, OR ATTACH A SITE MAP TO THIS FORM.

IMAGE DETAILS

ID	DATE (YYYY-MM-DD)	PERSPECTIVE	REFERENCE NO.

COMMENTS

Fields in this Form – Biological Agent Dispersal

There are various fields in this form. The following definitions will help you to understand how to use each field and its importance in the program.

Data entered into IAP Program – Data Entry	<p>What... Check-box. Check if the data has been entered electronically.</p> <p>Why is it important... Identifies if the data has been entered into the IAP Program – Data Entry.</p>
Entered By	<p>What... Text entry.</p> <p>Why is it important... record the name of the individual entering the data on the form.</p>
Temporary Field Site #	<p>What... Text entry.</p> <p>Why is it important... the number assigned to polygons drawn on Trim/forest cover maps while in the field or the number assigned to individual forms while in the field with the intention of identifying this information to data that is later recorded/digitized in the office. It is strictly for field use and is not recorded for long-term use.</p>
Site Already Exists	<p>What... Check-box. Check if the site details have already been recorded.</p> <p>Why is it important... Eliminates the duplicate entry of sites.</p>
Date	<p>What... Mandatory text entry.</p> <p>Why is it important... It is important for everyone to know when the site was inspected. Use the calendar icon to assist you.</p>
Mapsheet	<p>What... Text entry. (1:20,000 mapsheet for current location).</p> <p>Why is it important... Provides location of the site.</p>
Site ID (assigned at data entry)	<p>This is assigned at the time of data entry into the IAP Program - Data Entry.</p>
Paper File ID	<p>What... Text entry.</p> <p>Why is it important... This is useful information for cross referencing the paper and electronic files. The format of this field varies widely between agencies.</p>
District Code	<p>What... Text entry. Use the District Code.</p> <p>Why is it important... It is important for everyone to know what district the site falls within.</p>
Range Unit	<p>What... Text entry.</p> <p>Why is it important... Used as a MoFR administrative unit within stock ranges in some locations.</p>
Pasture	<p>What... Text entry.</p> <p>Why is it important... Identifies if the site is part of a Pasture.</p>
Same Date as Site?	<p>What... Check-box. Data that tracks whether the recording of the dispersal occurred on a site on the same day/year the site was created or on a different day/year.</p> <p>Why is it important... Provides an indication that there may be history that shows how long invasive plants have existed on the site and to what extent.</p>

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Survey Agency	<p>What... Mandatory text entry. Enter the appropriate agency.</p> <p>Why is it important... It is critical that the agency performing the dispersal activities is identified for future reference.</p>
Employer	<p>What... text entry.</p> <p>Why is it important... Identifies the employer that conducted the survey. This is important in case planners require additional information about the survey.</p>
Surveyor(s)	<p>What... Mandatory text entry.</p> <p>Why is it important... Identifies the agency/ individuals that conducted the survey. This is important in case other program users require additional information about the survey.</p>
Jurisdiction	<p>What... Text entry. Obtain the information from the codes in Part IV of this guide.</p> <p>Why is it important... Identifies the sites jurisdiction. This is the owner of the site.</p>
UTM: Zone, Easting, Northing	<p>What... Mandatory text entry if the site was previously unknown or unrecorded and the "New Site" check-box has been marked and the New Site has been drawn on the map.</p> <p>Why is it important... Identifies the location of a new site.</p>
Latitude	<p>What... Mandatory (if no zone, easting or northing entered) text entry. Enter the geographic latitude (numeric).</p> <p>Why is it important... Identifies the geographic latitude of the site. It is important for everyone to know if the dispersal site is identical to the original site.</p>
Longitude	<p>What... Mandatory (if no zone, easting or northing entered) Text entry. Enter the geographic longitude (numeric).</p> <p>Why is it important... Identifies the geographic longitude of the site. It is important for everyone to know if the dispersal site is identical to the original site.</p>
Location	<p>What... Text entry.</p> <p>Why is it important... Used to describe the location of the site.</p>
Comments	<p>What... Text entry.</p> <p>Why is it important... Comments may be useful for future reference by yourself or others.</p>
BEC Zone	<p>What... Text entry. Represent large geographic areas with a broad homogeneous macroclimate in a biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
Subzone	<p>What... Text entry. Next level down in the biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
Variant	<p>What... Text entry. Subdivisions of sub zones and one further reduction in climatic and geographic variability in the biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>

Module 1.9 - Biological Treatment & Monitoring Data

Phase	<p>What... Text entry. This is not a formal category in BEC. It shows extensive areas that do not contain zonal ecosystems. It is not frequently used but can be used to distinguish unique locations.</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
Site Series	<p>What... Text entry. This includes landscape positions producing a single plant association in the biological geographic climatic classification system (BEC).</p> <p>Why is it important... The classification system allows habitat descriptions of occurrence and prediction of spread.</p>
<p>Note: The Biogeoclimatic Class must be a valid combination (according to the ministry) otherwise the data will not be accepted when entered into the IAP Program - Data Entry.</p>	
Land Owner	<p>What... Text entry.</p> <p>Why is it important... Provides the name of the individual who owns the land. This is useful for future reference.</p>
Telephone #	<p>What... Text entry.</p> <p>Why is it important... Provides the telephone number of the individual who owns the land. This is useful for future reference.</p>
Contact	<p>What... Text entry.</p> <p>Why is it important... Provides the name of the individual who should be contacted regarding any activities on the land. This is useful for future reference.</p>
Telephone #	<p>What... Text entry.</p> <p>Why is it important... Provides the telephone number of the individual who should be contacted regarding any activities on the land. This is useful for future reference.</p>
Slope %	<p>What... Text entry. The angle of the land from horizontal.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Aspect	<p>What... Text entry. A slope's orientation to the sun.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Elevation (M)	<p>What... Text entry. The height of land above sea level.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Site Soil Texture	<p>What... Text entry. Relates to the relative amount of sand, silt, and clay in a soil.</p> <p>Why is it important... A site characteristic that allows habitat descriptions of occurrence and prediction of spread.</p>
Plant Species	<p>What... Mandatory text entry. Plant species code. See Part IV for code list.</p> <p>Why is it important... It is imperative that the correct species for the dispersal is identified.</p>
Area (Ha)	<p>What... Text entry.</p> <p>Why is it important... Provides planners with the area surveyed as measured in hectares.</p>

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Distribution Code	<p>What... Text entry. Distribution code is a derived combination of density and plant cover. See Part IV of this guide for additional information.</p> <p>Why is it important... Provides planners with the distribution code of the species.</p>
Density (Plants/M²)	<p>What... Text entry.</p> <p>Why is it important... Provides planners with the density of the species as measured in plants per metre².</p>
Proposed Activity	<p>What... Text entry.</p> <p>Why is it important... Provides the recommended treatment as a result of the survey. This is available to planners.</p>
Comments	<p>What... Text entry.</p> <p>Why is it important... Comments may be useful for future reference by yourself or others. These are especially helpful if the site is hidden or if there is special information that should be highlighted.</p>
Dispersal ID	<p>What... Text entry.</p> <p>Why is it important... Provides a unique identifier for the dispersal record.</p>
Bioagent Code	<p>What... Mandatory text entry.</p> <p>Why is it important... Provides the list of biological agents that could be present on the site.</p>
Target Plant Species	<p>What... Mandatory text entry.</p> <p>Why is it important... Provides the list of invasive plants which have been treated.</p>
Duration Of Count (Min)	<p>What... Text entry.</p> <p>Why is it important... Provides the length of time, as measured in minutes, that was spent counting plants/and or biological agents on the site.</p>
Bioagent Count	<p>What... Text entry. Enter the number of biological agents (numeric).</p> <p>Why is it important... Provides the number of biological agents counted.</p>
Plant Count	<p>What... Text entry. Enter the number of invasive plants (numeric).</p> <p>Why is it important... Provides the number of invasive plants counted.</p>
Biological Agent Presence	<p>What... Check-box.</p> <p>Why is it important... Check the indicators that represent the biological agent is present. Check all that apply. Selections are:</p> <ul style="list-style-type: none"> • Foliar Feeding Damage • Root Feeding Damage • Seed Feeding Damage • Adults Present • Larva(e) Present • Pupa(e) Present • Oviposition Marks • Exit Holes/Tunnels
Comments	<p>What... Text entry.</p> <p>Why is it important... Comments may be useful for future reference by yourself or others.</p>

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Image Details - Be sure to note the following details: ID, Date, Perspective, Reference No, and Comments.



- A sketch map can be included on the form.
- Mandatory fields on this form are indicated with an "**".

IAP Reference Guide - Part I

Module 1.10: Wrap Up Part I

In this module, you will learn:

- Next Steps

Summary

You have now completed Part I of the Invasive Alien Plants Reference Guide. You should be able to:

- explain why the Invasive Alien Plants Program exists and provide an overview of the program;
- identify applicable legislation related to invasive plants in BC; and,
- understand the various tasks involved in the treatment and monitoring of invasive plants including manual, chemical, and biological treatments.

You should also understand how to complete the following paper forms during your field activities:

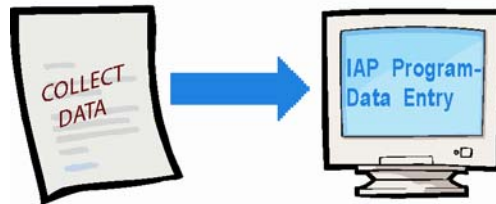
- Site Invasive Plant Inventory Record
- Mechanical Treatment Record
- Chemical Treatment Record
- Biological Control Release Record
- Biological Control Monitoring Record
- Biological Agent Dispersal Record



Next Steps

Part II

You should now explore Part II of this guide to learn about the IAP Program - Data Entry. This is an electronic program application that allows you to enter, edit, search, plan and extract invasive alien plant data in BC. The data collected on the paper forms (referenced above) must be recorded in this program. Part II of this guide will walk you through how to transfer the data from the paper into the program.



Part III

When you are ready to learn about the IAP Program - Map Display, refer to Part III of this guide. It is highly recommended that you complete Part II of this guide first!



Part IV

Remember, Part IV of this guide is your appendix. This includes useful codes & tables, field collection forms, and other useful reference material. Don't forget to spend some time exploring these useful resources.

