

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.

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					
LOCATION			COMMENTS		
BIOGEOCLIMATIC CLASS					
ZONE	SUBZONE	VARIANT		PHASE	SITE SERIES
TARGET PLANT SPECIES					
TARGET PLANT SPECIES *		AREA (Ha)	DISTRIBUTION CODE	SURVEY TYPE	
				CURSORY	OPERATIONAL
				<input type="checkbox"/>	<input type="checkbox"/>
				PRECISE	DENSITY (PLANTS/M ²)
				<input type="checkbox"/>	
BIOLOGICAL CONTROL					
BIO AGENT CODE *		BIO AGENT SOURCE		COLLECTION DATE (YYYY-MM-DD)	
BIOAGENT STAGE					
ADULT	EGG	PUPA	LARVAE	OTHER	ALL
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
					RELEASE QUANTITY *
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.
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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 <input type="checkbox"/>		ENTERED BY			TEMPORARY FIELD SITE #		
SITE <input type="checkbox"/> 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? <input type="checkbox"/>		
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							
SLOPE %		ASPECT	ELEVATION	SITE SOIL TEXTURE			
				COARSE <input type="checkbox"/>	FINE <input type="checkbox"/>	ORGANIC <input type="checkbox"/>	
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"/>		M C B NONE
PLANT SPECIES			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		M C B NONE
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
COMMENTS							

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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.

Large empty area for sketching a weed site map.

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>

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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 “*”.