



Invasive Species Early Detection and Rapid Response Plan for British Columbia



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IMISWG

Inter-Ministry Invasive Species Working Group



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ACKNOWLEDGEMENTS

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EXECUTIVE SUMMARY

Nearly 1,000 species of plants and animals have been purposely, or unintentionally, introduced into British Columbia (BC) since earliest European settlement. Although many introduced species are benign in native ecosystems, others are invasive and pose serious economic, social and environmental threats to the province. For the purpose of this plan, the Inter-Ministry Invasive Species Working Group (IMISWG) has adopted the following definition of invasive species:

Species that are not native to the province, or are outside of their natural distribution, and can negatively impact BC's environment, people or economy [The BC Government Invasive Species Strategic Plan (IMISWG 2014)].

Early detection and rapid response (EDRR) is widely accepted as the most cost-effective means for controlling invasive species. This process aims to find, identify, and systematically eradicate, contain or control new invasive species before they can reproduce and disperse beyond their point of entry. Implementing a provincial EDRR program increases the likelihood that new incursions will be discovered and eradicated before they become widely established.

The purpose of the BC Invasive Species Early Detection Rapid Response Plan, hereafter referred to as the BC EDRR Plan, is to provide detailed direction on decisions and actions required to identify, assess and respond to new invasive species incursions anywhere in BC. The BC EDRR Plan is designed to complement international and federal initiatives and commitments.

The BC EDRR Plan consists of six steps including early detection, identification, alert screening, risk assessment, rapid response, and monitor and reassess. The BC EDRR Plan describes potential participants and their roles and responsibilities depending upon the specific taxonomic group or species under consideration. It also outlines the requirements for program planning and administration, communication and follow-up reporting and outreach.

The plan has been developed based on the following principles:

- The province is the lead agency for resourcing EDRR in BC for invasive species covered under this plan;
- Preventing introduction of invasive species is the most cost-effective method for their management;
- Immediate eradication is the primary goal for rapid response but containment, or a long-term strategy to achieve eradication, may be necessary for widely established populations of terrestrial invasive species, or aquatic invasive species inhabiting large lakes or river systems;

- Risk assessments provide valuable information concerning the potential threat of new invasive species to the province, which will help determine the resources and management actions required for a successful response;
- Rapid response will employ procedures to achieve specific objectives for managing target species while minimizing adverse effects on economic, human and environmental values;
- Effective EDRR depends upon timely intervention. However some species, such as the freshwater zebra (*Dreissena polymorpha*) and quagga mussels (*Dreissena rostriformis bugensis*), will require an immediate response because of their extreme threat to aquatic ecosystems, rate and mode of spread, and commitments that BC has established through international agreements;
- Regardless of jurisdiction, successful EDRR requires coordination among all levels of government in partnership with impacted industry, land and water managers, and communities;
- Landowner awareness and community involvement are essential for timely and effective EDRR. Public support for EDRR actions and management is important to the success of EDRR in any jurisdiction, and;
- Species specific EDRR plans can be developed under the overarching provincial plan, to provide species specific information aiding an effective response, which is outside the scope of this document.

1.0 INTRODUCTION

Early detection and rapid response (EDRR) is a process to find, identify, and systematically eradicate, contain or control new invasive species before they become established and disperse (Worrall 2002; Waugh 2009).

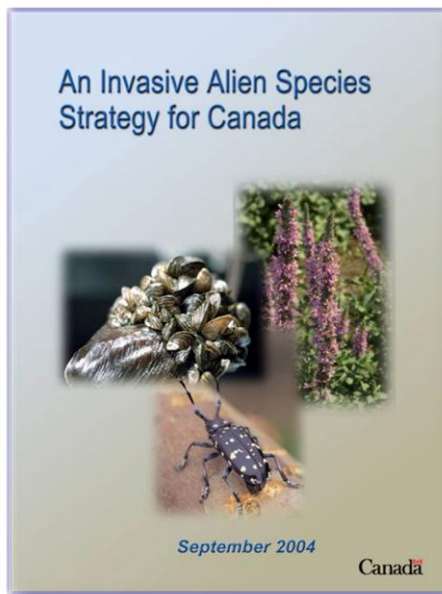
Human settlement, land use and natural and man-made disturbances have rendered our communities and natural landscapes vulnerable to invasive species. Through rapidly expanding global trade, travel and tourism, many new pathways¹ have opened for species to invade new regions. Invasive species threaten our environment, economy, health and safety, and are a global threat to biodiversity. Free from natural processes that control species in their native ranges, invasive species can reproduce and spread rapidly and alter biological communities. Invasive species can also alter fire intensity and frequency, soil chemistry, water quality and reduce ecosystem services when they upset nature's balance. Not all alien species become invasive, which is why risk assessments are a critical part of any invasive species management plan.



Shipping containers, a major vector for new invasive species.

Image: <http://www.universalcargo.com>

The threat of invasive species to Canada was described in the Invasive Alien Species Strategy for Canada (Canada 2004). The strategy identified the primary species of concern in Canada at that time and set mechanisms to address Canada's response to invasive alien species. A companion document, the Early Detection Rapid Response Considerations for Invasive Plants in Canada (Lindgren et al. 2009) provided evidence that many introduced species have significant and lasting impacts on the Canadian economy, ecosystems, human health, and values. In the aquatic environment, invasive species have been identified as the second biggest threat to listed fish in Canada (Dextrase & Mandrak; 2006).



¹ See Appendix 1 for glossary of technical terms

Although numerous definitions of an invasive species exist, the British Columbia (BC) Inter-Ministry Invasive Species Working Group (IMISWG) defines invasive species as: ***Species that are not native to the province, or are outside of their natural distribution, and can negatively impact BC's environment, people or economy.***



American bullfrog (*Lithobates catesbeianus*)
Image: Brian Klinkenberg

While invasive species control programs have existed in various parts of the province since the 1940s, most activity in the past focused on farmland weeds and later on Crown lands used for livestock grazing. Over the last two decades, concern over invasive species has broadened, and now includes the potential threat of invasive species to land and water resources province-wide. Some notorious examples already found in the province include spotted knapweed (*Centaurea stoebe*), purple loosestrife (*Lythrum salicaria*), Eurasian water milfoil (*Myriophyllum spicatum*), eastern grey squirrel (*Sciurus carolinensis*), American bullfrog (*Lithobates catesbeianus*), smallmouth bass (*Micropterus dolomieu*), and European starling (*Sturnus vulgaris*).

Prevention is the best option to avoid the introduction of new invasive species for all taxonomic groups considered in this document. Despite our best efforts, further introductions are unavoidable, especially with the escalation of world trade and travel (Worrall 2002; Natural Resource Management Ministerial Council 2007). Given the multitude of introduction pathways, prevention strategies are challenging and not always successful - new incursions of invasive species continue to be discovered in BC. Once a new species establishes in the province and begins to disperse, the cost of control escalates rapidly and the potential for eradication diminishes.

EDRR is widely accepted as the most cost-effective means of controlling the spread of invasive species. The intent of EDRR is to prevent the establishment and subsequent spread of newly arriving invasive species into BC. Implementing a provincial EDRR program increases the likelihood that new incursions will be discovered, assessed and eradicated before they become widely established.



Zebra mussel (*Dreissena polymorpha*)
Image: Amy Benson, USGS

Development of the Invasive Species Early Detection and Rapid Response Plan for British Columbia (hereafter the BC EDRR Plan) was informed by the Invasive Alien Species Strategy for Canada (Canada 2004), which identified EDRR to new invaders as the second and third priority in invasive species management, following prevention of introduction. In addition, the BC EDRR Plan responds to the Invasive Species Strategy for British Columbia (ISCBC 2012), which recognizes the importance of *“responding quickly and effectively to newly arrived species of concern, both at the regional and provincial levels, using Early Detection and Rapid Response principles and methods.”*

The BC EDRR Plan also addresses one of the priority actions identified in The BC Government Invasive Species Strategic Plan (IMISWG 2014), which calls for the development and implementation of a coordinated province-wide invasive species BC EDRR Plan.

1.1 PURPOSE OF THE BC EDRR PLAN

The purpose of the BC EDRR Plan is to provide detailed direction on the decisions and actions required to identify, assess and respond to new species incursions anywhere in BC. It is designed to complement international and federal initiatives and commitments, and to provide leadership for EDRR to new invasive species in BC.

1.2 SCOPE OF THE BC EDRR PLAN

The IMISWG is the lead on the BC EDRR Plan; however the BC EDRR Plan is relevant to all provincial government ministries with invasive species management responsibilities, federal, First Nations, and local governments, non-government agencies, and private landowners.

THE SCOPE OF THE BC EDRR PLAN INCLUDES:

- Terrestrial and aquatic plants, animals (including fish, mollusks, crustaceans, and other invertebrates), and fungi that are not native to the province, or outside of their natural distributions, and threaten to negatively impact BC’s economy, people and / or environment;
- Any new invasive species infestation on any jurisdiction in BC will be considered for EDRR;
- Invasive species thought to have been eradicated from BC through previous management efforts (i.e., recurrences; re-infestations);
- Legislation and regulations across government related to invasive species management;
- Key stakeholders that may be impacted by, or may directly impact invasive species prevention and management; and
- The goals and objectives contained in the BC Government Invasive Species Strategic Plan (IMISWG 2014).

THE SCOPE OF THE BC EDRR PLAN DOES NOT INCLUDE:

- Diseases and pathogens that affect native fauna and flora, humans, and livestock; these health aspects are addressed under existing native fauna and flora, human, and livestock health programs;
- Provincial agriculture and forest pests managed under the leadership of the British Columbia Plant Protection Advisory Council (BCPPAC);
- Non-native species which do not negatively impact BC's economy, people and / or environment;
- Regional EDRR actions as defined by regional invasive species organizations. This refers to plans or programs to manage invasive species that are high-risk and new to a certain region, ecosystem or waterbody or watershed of BC, but are considered established elsewhere in the province and are beyond the ability to eradicate from BC;
- Invasive species too widespread, as determined by the IMISWG.

1.3 IMPLEMENTATION AND DURATION

The BC EDRR Plan will remain in effect indefinitely and will be reviewed and updated as required.

1.4 AUTHORITY

Legal authority to take immediate action on new invasive species is vested through provincial and federal legislation depending on the target species. Although numerous Acts, Regulations, policies, and guidelines provide authority and direction under specific circumstances, the *Plant Protection Act*, the *Weed Control Act*, and the *Wildlife Act, Controlled Alien Species Regulation* are the principle legislations that define, list and afford provisions to regulate selected prohibited invasive species in BC: <http://www.bclaws.ca>.

The federal *Plant Protection Act* (<http://laws-lois.justice.gc.ca/eng/acts/p-14.8>) provides the legal authority for the Canadian Food Inspection Agency (CFIA) to initiate a regulatory response to plant pests that may be new to Canada (Lindgren et al. 2009). Several amendments to the federal Fisheries Act Regulations were proposed in 2012 (<http://www.dfo-mpo.gc.ca/pnw-ppe/changes-changements/index-eng.html>) to manage invasive species in all Canadian waters (Canada 2012). Although none of the proposed changes have passed into legislation as of 2014, those most pertinent to BC include:

- Establishing a list of aquatic invasive species prohibited from importation, possession, transport; and
- Simplified process to conduct control and eradicate invasive species in the aquatic environment.

Once the federal legislation comes into effect, the BC EDRR Plan will be updated accordingly.

1.5 PRINCIPLES

The BC EDRR Plan has been developed based on the following principles:

- The province is the lead agency for resourcing EDRR in BC for invasive species of provincial concern.
- Preventing introduction of invasive species is the most cost-effective method for their management;
- Immediate eradication is the primary goal for rapid response but containment, or a long-term strategy to achieve eradication, may be necessary for widely established populations of terrestrial invasive species, or aquatic invasive species inhabiting large lakes or river systems;
- Risk assessments provide valuable information concerning the potential threat of new invasive species to the province, which will help determine the resources and management actions required for a successful response;
- Rapid response will employ procedures to achieve specific objectives for managing target species while minimizing adverse effects on environmental, economic and human values;
- Effective EDRR depends upon timely intervention. However some species, such as the freshwater zebra (*Dreissena polymorpha*) and quagga mussels (*Dreissena rostriformis bugensis*), will require an immediate response because of their extreme threat to aquatic ecosystems, rate and mode of spread, and commitments that BC has established through international agreements;
- Regardless of jurisdiction, successful EDRR requires coordination among all levels of government in partnership with industry, land and water managers, and the community; and
- Landowner awareness and community involvement are essential for timely and effective EDRR. Public support for EDRR actions and management is important to the success of EDRR in any jurisdiction.
- Species specific EDRR plans can be developed under the overarching provincial plan, to provide species specific information aiding an effective response, which is outside the scope of this document.

2.0 BC EARLY DETECTION AND RAPID RESPONSE PLAN

The BC EDRR Plan is structured around six steps (Figure 1) and processes (Figure 2) for dealing with the introduction of new invasive species into BC. These steps describe the operational components of a successful program for discovering, identifying, evaluating risk, treating, and monitoring the introduction and treatment of a new invasive species quickly and effectively. From a broader perspective, the BC EDRR Plan also describes program management and administration, and reporting and outreach as important elements of the overall program function. Each step is described in more detail in the body of the plan, Section 2.0.



FIGURE 1: 6 STEPS OF THE BC EDRR PROCESS



OVERVIEW OF THE
**EARLY DETECTION
RAPID RESPONSE
PLAN FOR BC**

PROCESS FLOWCHART

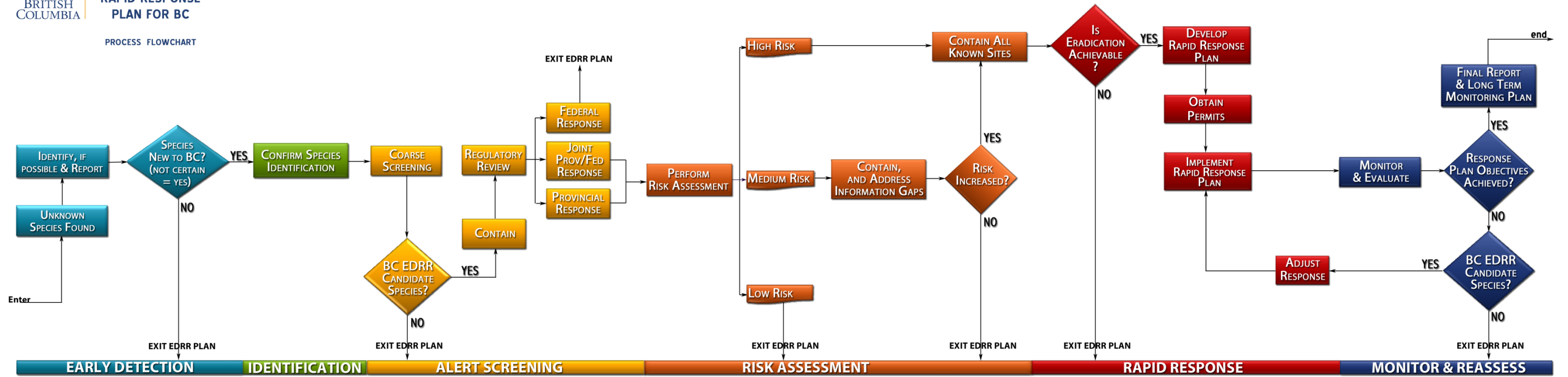


FIGURE 2: OVERVIEW OF THE BC EARLY DETECTION RAPID RESPONSE PLAN FOR INVASIVE SPECIES

2.1 ROLES AND RESPONSIBILITIES

Clearly defined roles and responsibilities are essential for effective program delivery. Table 1 lists the key participants who contribute to the plan and their roles in the process. Specific responsibilities for each participant are found under each section of the process.

TABLE 1: ROLES OF PRINCIPAL AGENCIES AND PARTICIPANTS

Participant	Role
Inter-Ministry Invasive Species Working Group (IMISWG) (Lead Agency - BC Provincial Government)	Reports to the IMISWG Assistant Deputy Minister's Committee (Executive Sponsor). Provides provincial leadership, policy direction and collaborative approaches to preventing invasive species from establishing in BC.
EDRR Advisory Committee (Delegates from IMISWG)	Reports to the IMISWG. Provides directions and decision-making on planning, delivery, monitoring, and reporting on EDRR activities.
Provincial EDRR Coordinator(s) (Provincial Government employees)	Supports the EDRR Advisory Committee. Planning, implementing, and reporting on all aspects of the provincial EDRR program. This function will be assigned to government staff depending upon the invasive species involved.
Invasive Species Specialist(s) (Provincial Government employees)	Supports the Provincial EDRR Coordinator(s). Coordinates and collaborates in delivering the BC EDRR Plan. This function will be assigned to government staff with expertise in the particular taxonomic group in question.
Royal BC Museum (RBCM) (Taxonomic group curators)	Provides taxonomic expertise for identifying and verifying unknown species and serves as the repository for voucher specimens.
Taxonomic Group Network (Taxonomic group experts from government, universities, or private citizens)	Provides expert advice in species identification and verification.
Subject Matter Expert(s) (e.g., Government specialists, universities, international experts)	Contributes special expertise and consultation in the biology and ecology of invasive species, habitat, site factors, treatment, and inventory and monitoring for specific species or taxonomic groups.
Rapid Response Team	Core team members may include the Provincial EDRR Coordinator, Subject Matter Expert, Invasive Species Specialist, operational staff/contractors (to conduct treatments), the Land Manager/Occupier, and the Regional Invasive Species Organization.
Land Manager(s) (e.g., First Nations, federal, provincial, local government staff; non-government organizations; private land owners)	Participates in finding and reporting new invasive species and liaising with the Provincial EDRR Coordinator and Invasive Species Specialists.
Observer(s) (e.g., Trained spotters, government employees, regional invasive species organizations, consultants, public)	Reporting new invasive species in the province.

Invasive Species Council of BC (Non-government organization)	Provides program support, communication and extension services.
Regional Invasive Species Organization(s) (e.g., Regional invasive species committees and councils, local government invasive species programs, stewardship group)	Reporting new invasive species in the province. May support the Provincial EDRR Coordinator through provincial initiatives in their area, as requested.
Federal Government Agencies (e.g., Canadian Food Inspection Agency (CFIA), Fisheries and Oceans, Canada (DFO) and Environment Canada)	Identifies and coordinates rapid response with IMISWG for federally regulated species.

2.2 PLANNING AND ADMINISTRATION

A successful EDRR program requires effective leadership and organization to coordinate and implement programs. At a provincial level, the planning process requires direct oversight and coordination with all jurisdictions that may be affected by the introduction of new species.

The EDRR program requires adequate financial and human resources for immediate and effective program delivery. Stable and consistent funding is essential to ensure that an immediate response is possible when new invasive species are found.

The EDRR Advisory Committee will regularly review the efficacy of the EDRR Program and implement changes to improve the program over time. This review will evaluate the resources used, number of participants, the methods employed, and outcomes. The Provincial EDRR Coordinator(s) will gather this information, including input from the Invasive Species Specialists and other participants.

Responsibility Summary

Inter-Ministry Invasive Species Working Group (IMISWG)

- Provides the framework and capacity for the ongoing EDRR of invasive species.
- Determines the EDRR Coordinator(s) for each taxonomic group
- Establishes and maintains collaborative relationships with international, national, inter-ministry, and non-government agencies, and stakeholders.
- Approves EDRR programs and procedures.
- Coordinates the financial and operational management of invasive species EDRR on all lands in BC.
- Provides oversight for implementing the BC EDRR Plan.
- Evaluates and reports on program efficacy.
- Develops research, education, training, and legislative capabilities.

EDRR Advisory Committee

- Maintains the BC EDRR Plan.
- Develops program procedures, deliverables, templates, and reporting.
- Determines risk-ratings for new invasive species with consideration of recommendations from the Provincial EDRR Coordinator(s).
- Reviews the updates and reports from the Provincial EDRR Coordinator(s).
- Approves annual EDRR program deliverables.
- Evaluates and recommends revisions to the EDRR process.

Provincial EDRR Coordinator(s)

- Coordinates the operational management of specific invasive species EDRR.
- Documents all decisions and actions agreed upon by the EDRR Advisory Committee for each new Provincial Prohibited and Controlled Alien Species introduced into the province.
- Communicates with the Invasive Species Specialist(s).
- Determines, in collaboration with the EDRR Advisory Committee a single contact for media requests in case of high profile invasive species
- Prepares and recommends changes to program budgets and priorities to the EDRR Advisory Committee.
- Liaises with government agency personnel in adjacent provincial, territorial and state jurisdictions.
- Represents BC as a member of federal/provincial EDRR working groups.

2.3 STEP 1 – EARLY DETECTION

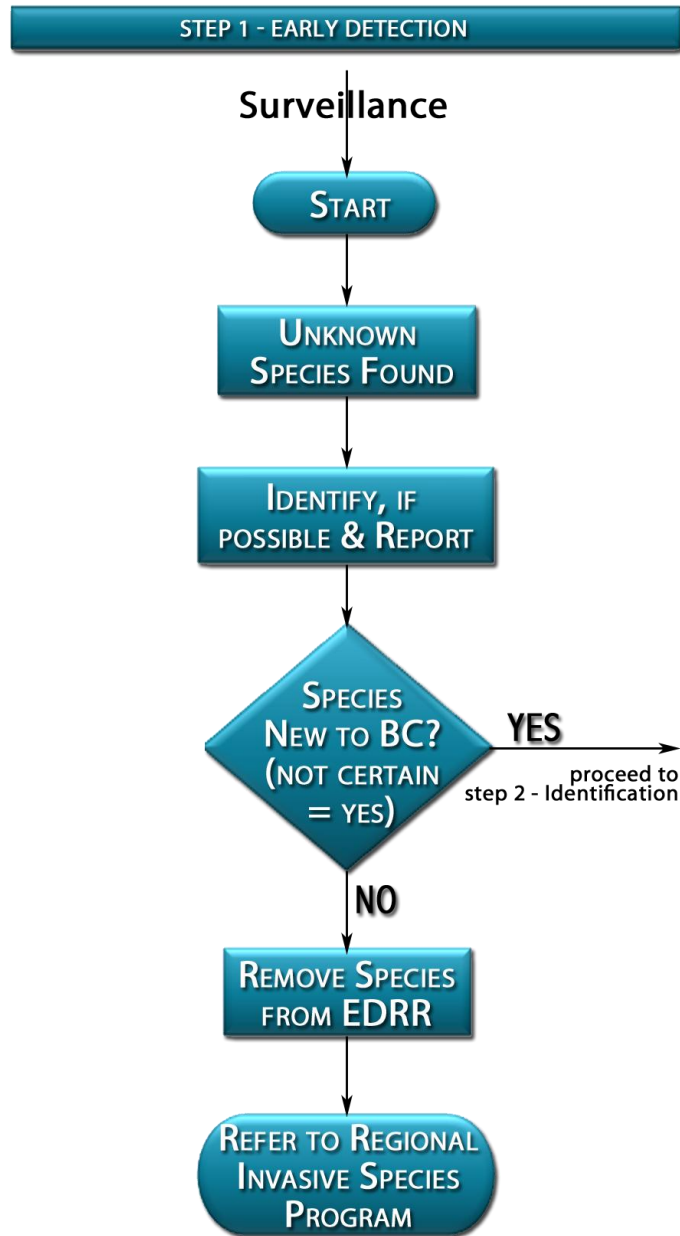


FIGURE 3: STEP 1 – EARLY DETECTION

Early detection is the process of finding new invasive species before they establish high-density, persistent populations and disperse. Consequently, early detection is essential for eradication or effective containment. For a list of provincial Prohibited and Controlled Alien Species see www.for.gov.bc.ca/hra/invasive-species/prohibited.htm.

Process and Outcomes

The first step in early detection is surveillance, which can be conducted passively or actively by any observer (Table 1). Passive surveillance is an incidental discovery of a new invasive species. Active surveillance comprises structured searches or surveys that focus on high-priority target invasive species, specific geographic locations, and important pathways for introduction and dispersal.

Early detection is initiated by the report of a suspected new invasive species to BC. Additional information, such as population size, distribution and density, may also be collected at this time. Photographs are necessary to assist in report verification.

Potential new species to BC should be reported to the appropriate provincial reporting line. Reports of potential new species to BC, for all taxonomic groups, can be submitted through the rapid response portal at: <http://www.for.gov.bc.ca/hra/invasive-species/edrr.htm> All reports are disseminated to the appropriate Invasive Species Specialist.

Once the Invasive Species Specialist has received a report, a preliminary identification will be attempted and can be assisted or accomplished by:

- Looking through provincial plant, animal, bird, and insect field guides, and similar guides for North America, adjacent US states, Alberta, and Yukon;
- Searching online databases such as electronic atlases of the fauna and flora of BC (E-Fauna 2014; E-Flora 2014) and similar tools from Canadian provinces, Yukon and US states;
- Viewing the Conservation Data Centre (CDC 2014) and Nature Serve (Nature Serve 2014) websites; and
- Consulting with local specialists and knowledgeable people, such as provincial, federal, or university scientists, technical staff, and taxonomists.

The Invasive Species Specialist will conduct a preliminary assessment, which will result in one of three outcomes (Table 2). Depending on the outcome, the incursion will either be elevated to the appropriate Provincial EDRR Coordinator, who will proceed with Step 2 to confirm identification for potential new invasive species, or the Invasive Species Specialist will manage species identified as an existing invasive species (i.e., an invasive species already established and therefore beyond the scope of the BC EDRR Plan).

TABLE 2: EARLY DETECTION OUTCOMES AND ACTIONS

Early Detection Outcomes	Actions
<p>1. Specimen identified but not a new invasive species to BC</p>	<ul style="list-style-type: none"> • If an existing invasive plant, site entered into the Invasive Alien Plant Program (IAPP) application: www.for.gov.bc.ca/hra/plants/application.htm. • If an existing invasive animal, sighting entered into BC Species and Ecosystems Explorer and/or Ministry of Environment Aquatic Invasive Species database. • Species removed from EDRR process, considered for regional management, and does not proceed to Step 2.
<p>2. The species is identified as a new invasive species</p>	<ul style="list-style-type: none"> • Provincial EDRR Coordinator notified and forwarded all material and information on the incursion. Provincial EDRR Coordinator moves forward to Step 2: Identification.
<p>3. The species could not be identified</p>	<ul style="list-style-type: none"> • Provincial EDRR Coordinator notified and forwarded all material and information on the incursion. Provincial EDRR Coordinator moves forward to Step 2: Identification.

Timeline

Step one will be completed in approximately one week. Observers are urged to report new invasive species as soon as possible. The Invasive Species Specialist will report back to the observer within one week of completing the preliminary identification.

Responsibility Summary

Provincial EDRR Coordinator(s)

- Liaises with Invasive Species Specialists and other program participants as required.
- Produces Prohibited Invasive Species Alerts.
- Provides EDRR training for regional invasive species organizations and land managers.
- Conducts surveillance, locates new invasive species, records location and physical site information, collects, and photographs for identification.
- Maintains EDRR website with Prohibited and Controlled Alien Species information (<http://www.for.gov.bc.ca/hra/invasive-species/prohibited.htm>).

Invasive Species Specialist(s)

- Liaises with the Provincial EDRR Coordinator, observers, regional invasive species organizations, and affected land managers.
- Assists the Provincial EDRR Coordinator, or provides EDRR training for principle agencies and participants (Table 1)

- Participates in surveillance, locates new invasive species, records location and physical site information, collects, and photographs for identification.
- Conducts preliminary identification of new invasive species.
- Notifies Provincial EDRR Coordinator, observers and other interest groups of verified identification.
- Conducts targeted surveys for invasive species.

Observer

- Learns to recognize provincial Prohibited and Controlled Alien Species (<http://www.for.gov.bc.ca/hra/invasive-species/prohibited.htm>).
- Report new invasive species through the tools listed in the Reporting section.

Land Manager

- Participates in surveillance, locates new invasive species, records location and physical site information, collects, and photographs for identification.
- Reports new invasive species through the tools listed in the Reporting section.

Regional Invasive Species Organization

- Learns to recognize provincial Prohibited and Controlled Alien Species (<http://www.for.gov.bc.ca/hra/invasive-species/prohibited.htm>).
- Participates in surveillance, locates new invasive species, records location and physical site information, collects, and photographs for identification.
- Reports new invasive species through the tools listed in the Reporting section.

Invasive Species Council of BC

- Organizes and delivers an invasive species spotters training program.
- Reports new invasive species through the tools listed in the Reporting section.
- Maintains 1-888-WEEDSBC (1-888-933-3722) hotline.

2.4 STEP 2 – IDENTIFICATION



FIGURE 4: STEP 2 - IDENTIFICATION

If the species found in Step 1 is suspected to be a new invasive species during the preliminary identification, or if the species could not be identified, Step 2 is initiated. Confirmation of a new invasive species by an expert taxonomist is one of the most important steps in the EDRR process.

Process and Outcomes

The taxonomy of a new invasive species will be confirmed by the Provincial EDRR Coordinator in cooperation with subject matter experts and taxonomists. Additional specimens can be sent to provincial, federal or international collections or museums for further confirmation or to provide background information on the biology and ecology of the species. For voucher specimen collection guidelines, see: <http://www.for.gov.bc.ca/hra/invasive-species/edrr.htm> .

TABLE 3: IDENTIFICATION OUTCOMES AND ACTIONS

Identification Outcomes	Actions
<ul style="list-style-type: none"> • Specimen identity verified as not a new invasive species to BC 	<ul style="list-style-type: none"> • If an existing invasive plant, site entered into the Invasive Alien Plant Program (IAPP) application: www.for.gov.bc.ca/hra/plants/application.htm. • If an existing invasive animal, sighting entered into BC Species and Ecosystems Explorer and/or Ministry of Environment Aquatic Invasive Species database. • Species removed from EDRR process, referred to Invasive Species specialist for regional management consideration, and does not proceed to Step 3: Alert Screening.
<ul style="list-style-type: none"> • Specimen identity verified as a new invasive species to BC 	<ul style="list-style-type: none"> • Provincial EDRR Coordinator moves forward to Step 3: Alert Screening.

Timeline

Step two will be completed in approximately one week. Turnaround time for expert identification and verification can be variable depending on the target species and the taxonomic expertise available. Consequently, verification could take from one week to one month or more. Species verifications will be communicated to involved parties thereafter, unless confidentiality is required.

Responsibility Summary

Provincial EDRR Coordinator(s)

- Develops and engages in taxonomic group networks.
- Submits voucher specimens to the RBCM natural history collection. Ensures necessary permitting obtained prior to making collections.
- Confirms species identification in cooperation with the RBCM curator or taxonomic group networks.
- Notifies the EDRR Advisory Committee, the Invasive Species Specialist and the observer of the confirmed identification of new species or defers notification to the Invasive Species Specialist, unless confidential.

Invasive Species Specialist(s)

- Notifies observers or other regional interest groups of the confirmed identification, as requested by the Provincial EDRR Coordinator.

Royal BC Museum (RBCM)

- Confirms species identification in collaboration with the taxonomic group networks and the Provincial EDRR Coordinator.
- Stores and records voucher specimens in the RBCM natural history collection.

Taxonomic Group Network

- Participates in confirming species identification in cooperation with the Provincial EDRR Coordinator and the RBCM curators.
- Forwards voucher specimens for deposit in the RBCM natural history collection.

2.5 STEP 3 – ALERT SCREENING

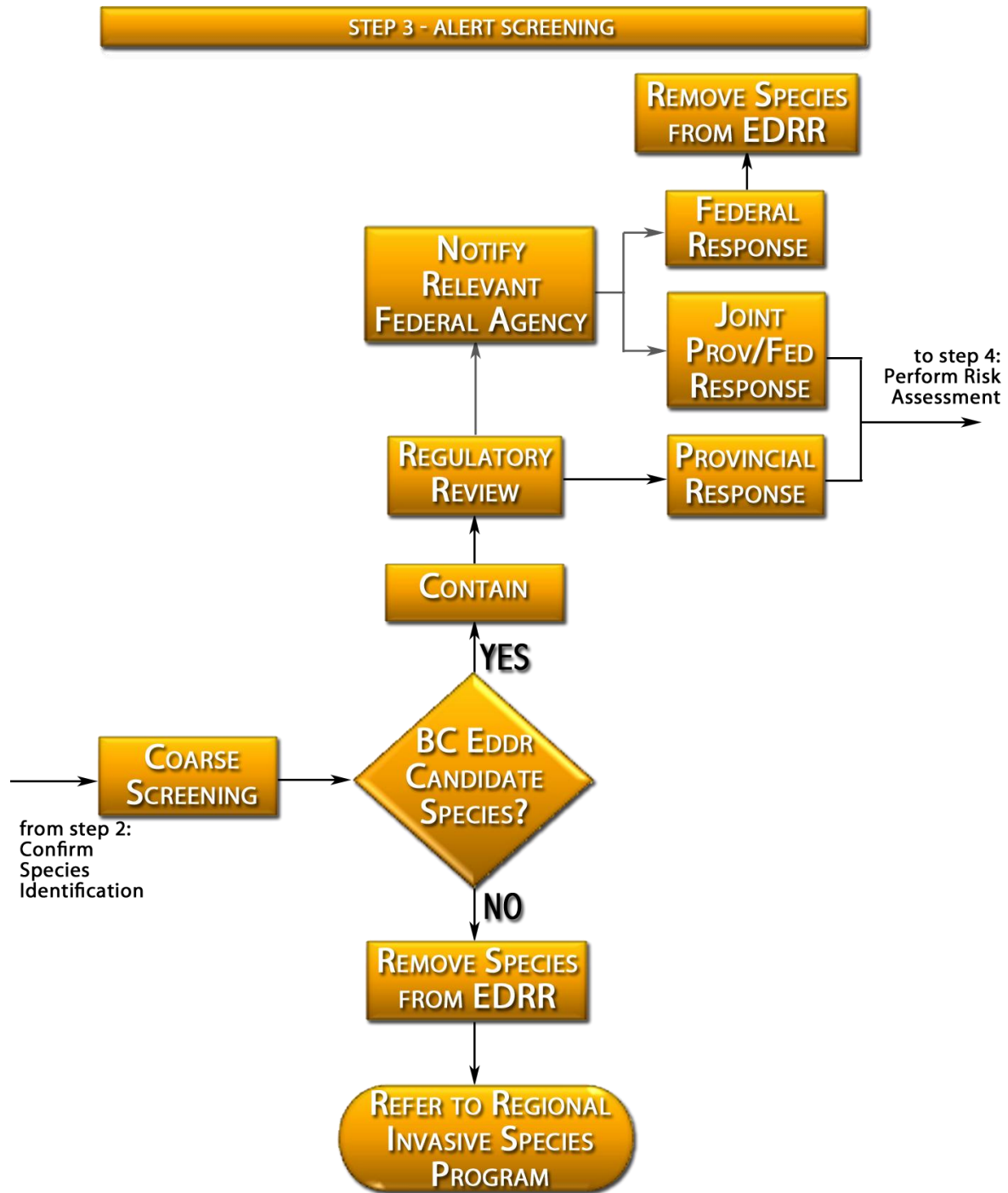


FIGURE 5: STEP 3 – ALERT SCREENING

Alert screening evaluates the status and likely risk of a new invasive species. The species is analyzed using the BC EDRR Coarse Screening Criteria (see: <http://www.for.gov.bc.ca/hra/invasive-species/edrr.htm>), which serves as a preliminary risk assessment and is used to determine whether a species is a candidate for EDRR. This step determines if the species already exists in BC, is federally or provincially regulated, and presents a substantial risk of introduction, establishment, spread and impact, and which level of government will lead in addressing the incursion.

Process and Outcomes

The process uses a broad set of criteria to determine if a species is new to BC or Canada, or has spread beyond its natural range, whether an EDRR response is warranted, and which level of government should lead the response. The first activity in the process is to complete the coarse screening, which includes a set of questions that assess:

- The biology and ecology of the species;
- The distribution of the species locally and globally;
- Whether the species is known to cause impacts in similar habitat elsewhere;
- The potential for the species to cause ecological and economic harm or to adversely affect human health; and
- The likelihood of eradication or containment with immediate action.

While coarse screening is underway, targeted surveys are completed. Surveys will identify population size, spread, habitat, introduction vectors and potential dispersal pathways. The coarse screening will confirm whether a species is suitable to remain an EDRR candidate. If it is found to not be a suitable candidate for eradication, the species will be removed from the EDRR process and referred to the Invasive Species Specialist to consider for regional-scale management. If the species is found to be a suitable EDRR candidate, known sites are physically contained while a regulatory review is completed to determine jurisdictional and regulatory authority. The regulatory review will identify whether the response is to be led by the federal or provincial governments, or jointly.

Alert screening coarsely assesses the risk of the species and determines whether the species should continue in the EDRR process or be removed. Alert screening will result in one of four outcomes (Table 4) for all taxonomic groups.

TABLE 4: ALERT SCREENING OUTCOMES AND ACTIONS

Screening Outcomes	Actions
1. Species is not a BC EDRR candidate.	<ul style="list-style-type: none"> Species removed from EDRR process, referred to the Invasive Species Specialist for management or monitoring.
2. Species is a BC EDRR candidate and the response will be led by the provincial government.	<ul style="list-style-type: none"> Step 4 Risk Assessment is initiated to determine the risk status.
3. Species is a BC EDRR candidate and the response will be jointly coordinated by the provincial and federal governments.	<ul style="list-style-type: none"> Relevant federal agency notified and joint management coordinated. Step 4 Risk Assessment initiated to determine the risk status.
4. Species is a BC EDRR candidate and the response will be led by the federal government.	<ul style="list-style-type: none"> Relevant federal agency notified for management and monitored by the Provincial EDRR Coordinator

Timeline

Step 3 will be completed in less than two weeks, and relevant provincial and federal agencies will be notified, as necessary. The result of the alert screening for all new invasive species will be posted on the EDRR website.

Responsibility Summary

EDRR Advisory Committee

- Adjudicates recommendation from the Provincial EDRR Coordinator regarding inclusion, deferral to a regional program, or removal of all new species considered for EDRR.

Provincial EDRR Coordinator(s)

- Make recommendations to the EDRR Advisory Committee regarding inclusion, deferral to a regional program, or removal of all new species considered for EDRR based on the results of the Alert Screening.
- Conducts surveys to identify population size, spread, habitat, introduction vectors and potential dispersal pathways.
- Conducts analysis using the BC EDRR Coarse Screening Criteria (see: <http://www.for.gov.bc.ca/hra/invasive-species/edrr.htm>) and survey results.
- Where possible, coordinates and conducts containment for all new invasive species populations, including those regulated by federal agencies.
- Conducts regulatory review.
- Notifies relevant Federal/Provincial EDRR working groups and signatories of the Columbia River Basin Team (Heimowitz and Phillips 2011) at the US federal, state and tribal levels for invasive species of mutual interest.

- Notifies the Land Manager and Invasive Species Specialist of the results of the Alert Screening, and where relevant, notifies responsible provincial or federal agencies regarding species outside the scope of this plan.
- Enters information and data from surveys into the relevant database.
- Updates status of new invasive species on the EDRR website.

Invasive Species Specialist(s)

- Conducts surveys to identify population size, spread, habitat, introduction vectors and potential dispersal pathways as requested by the Provincial EDRR Coordinator.
- Assists Provincial EDRR Coordinator with analysis using the BC EDRR Coarse Screening Criteria (see: <http://www.for.gov.bc.ca/hra/invasive-species/edrr.htm>) and survey results.
- Where possible, assists with containment for all known populations of invasive species, as requested by the Provincial EDRR Coordinator.
- Notifies Regional Invasive Species Organizations of Alert Screening outcomes.

2.6 STEP 4 – RISK ASSESSMENT

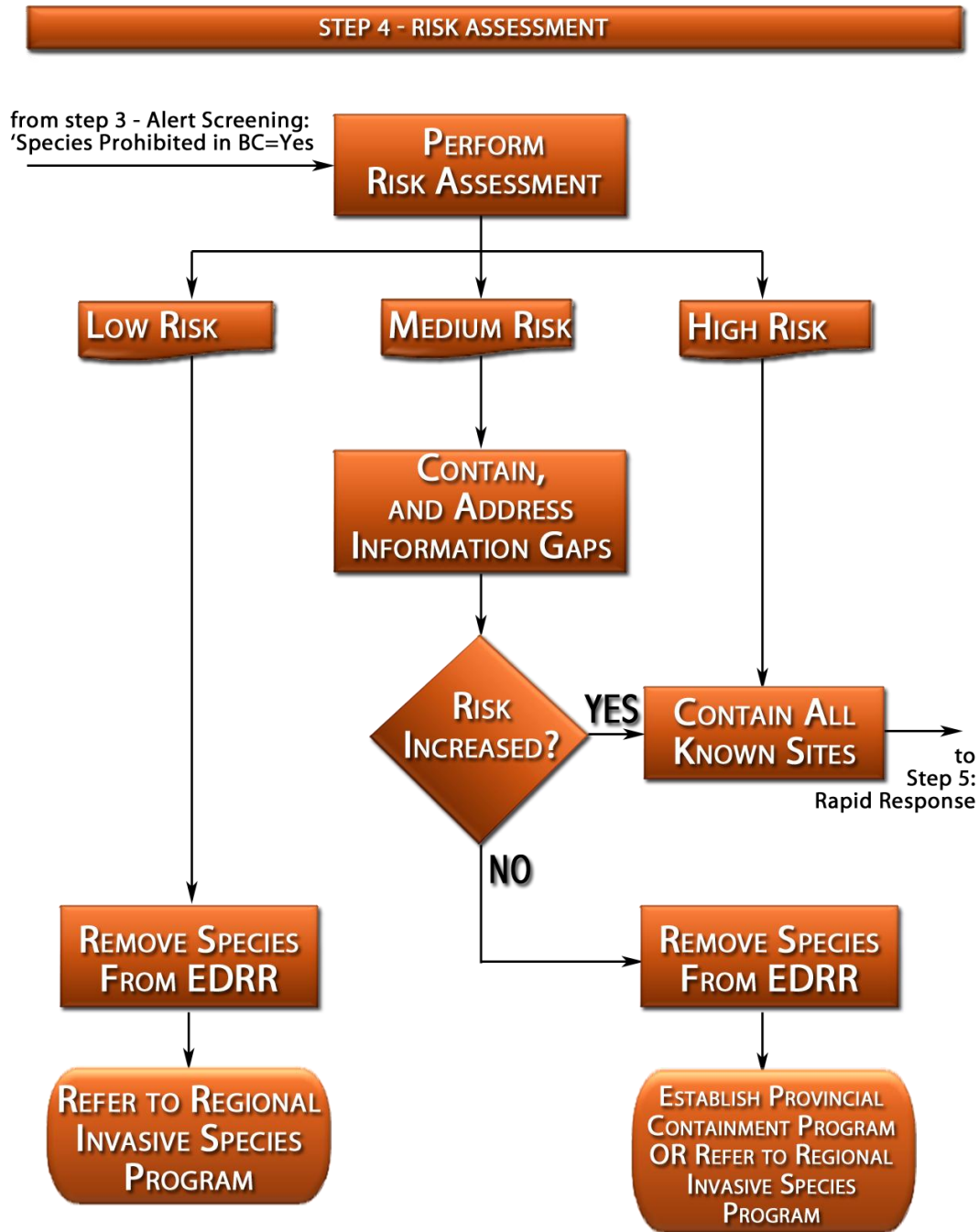


FIGURE 6: STEP 4 – RISK ASSESSMENT

Risk assessment is the detailed evaluation of the likelihood that an introduced invasive species will establish, disperse and become a threat to economic, social and environmental values in its new environment. This procedure is a more rigorous and refined extension of alert screening.

Process and Outcomes

Risk assessments are conducted using the BC Invasive Species Risk Assessment Protocol, which was derived from the CFIA risk assessment protocol (CFIA 2011; IMISWG 2012). Risk assessments completed in other jurisdictions with similar environmental conditions may be adapted for use in BC. Risk assessment will result in one of three outcomes (Table 5).

TABLE 5: RISK ASSESSMENT OUTCOMES AND ACTIONS

Risk Outcomes	Actions
Low	<ul style="list-style-type: none"> Species removed from EDRR process or referred to the Invasive Species Specialist for management consideration.
Medium	<ul style="list-style-type: none"> Contain the invasive species and address any information gaps. Reassess risk.
High	<ul style="list-style-type: none"> Contain the invasive species and proceed to Step 5 to develop the response plan.

Timeline

Step four will be completed in approximately three weeks.

Responsibility Summary

EDRR Advisory Committee

- Assigns risk rating of low, medium or high based on the results of the risk assessment and recommendations from the Provincial EDRR Coordinator.
- Enables invasive species containment until risk status is determined.

Provincial EDRR Coordinator(s)

- Manages and conducts risk assessments.
- Recommends risk-status ratings to EDRR Advisory Committee.
- Notifies the Invasive Species Specialist and Land Manager of risk assessment results.
- Coordinates and conducts invasive species containment.
- Coordinates research to address information gaps.
- Gathers additional information on medium risk invasive species and makes new recommendation to the EDRR Advisory Committee as required.
- Enters inventory data and treatments into relevant database.
- Posts species status updates on BC EDRR website and notifies Invasive Species Specialist.

Invasive Species Specialist(s)

- Conducts additional surveys for target invasive species in newly identified high risk areas, as requested by the Provincial EDRR Coordinator.
- Assists with containment of known sites, as requested by the Provincial EDRR Coordinator.
- Notifies Regional Invasive Species Organization(s) of risk assessment results.

2.7 STEP 5 – RAPID RESPONSE

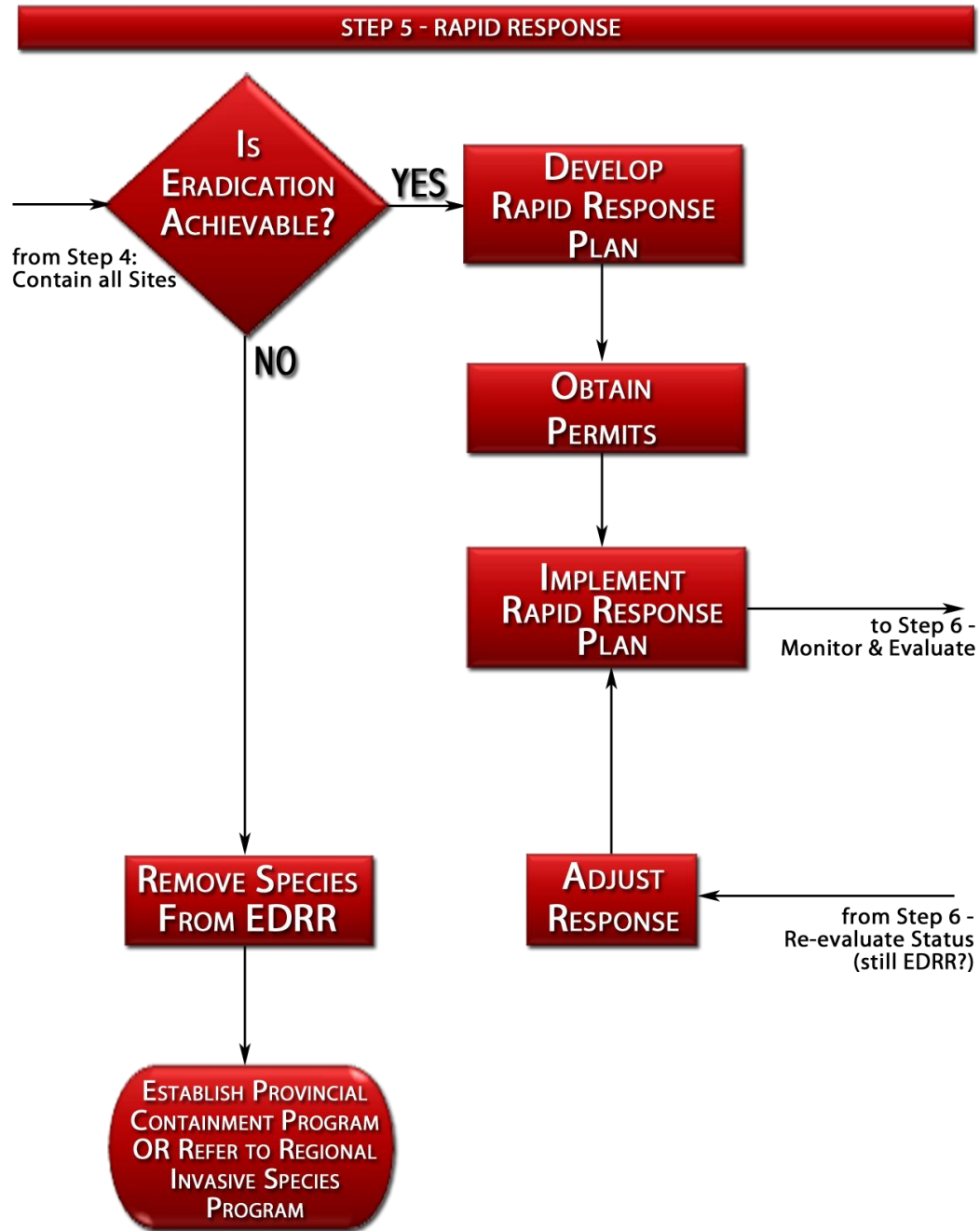


FIGURE 7: STEP 5 – RAPID RESPONSE

Rapid response includes determining if eradication is feasible, developing a response plan, obtaining land access and treatment permits and implementing response activities. Eradication feasibility is determined by the EDRR Advisory Committee through an analysis of treatment availability, consequences and cost.

Process and Outcomes

A Rapid Response Team will be established by the Provincial EDRR Coordinator for each incursion. The composition of the team will depend on the taxonomic group, species, location, and circumstances of the introduction. Federal participation in the team will depend on whether the federal agency is the Land Manager, or has shared jurisdiction over the habitat (e.g. salmon bearing water bodies). Subject matter experts will be called upon as required and team members should be familiar with the BC EDRR Plan.

Permits and/or agreements will be established to implement the response plan in every circumstance, and will need to be acquired before treatments to provide authority to access land, apply treatments, or conform to safety standards.

Response Plans are developed by the Rapid Response Team and give instructions for pre-treatment assessment, the treatment regime, and monitoring timeline. Response plans aim for eradication. Containment is used as an interim measure to prevent spread prior to implementation of the rapid response plan.

Rapid response planning will result in one of two outcomes (Table 6).

TABLE 6: RAPID RESPONSE PLANNING OUTCOMES AND ACTIONS

Response Planning Outcomes	Actions
1. Eradication is achievable; species retained for EDRR.	<ul style="list-style-type: none"> Response plan objectives and treatments established; permits and authorizations obtained; response plan implemented.
2. Eradication is <u>not</u> achievable; species removed from EDRR.	<ul style="list-style-type: none"> Species referred to Invasive Species Specialist for provincial containment and/or regional management.

Timeline

Completion of step five is dependent on the complexity of the response, time requirements for permitting, and the risk of the incursion.

Responsibility Summary

Provincial EDRR Coordinator(s)

- Organizes and coordinates Rapid Response Team.
- Develops the response plan with the Rapid Response Team.
- Obtains or renews registration and permits to access lands and apply treatments.
- Coordinates and applies response treatments according to the response plan.
- Communicates response plan progress to the EDRR Advisory and on the EDRR website.
- Will identify the sole media contact in high profile rapid response scenarios, to allow for unified and controlled information flow (see also Reporting and Outreach Section).
- Adjusts response plan in collaboration with the Rapid Response Team and with guidance of the EDRR Advisory Committee.
- Enters treatments into relevant database.

Invasive Species Specialist(s)

- May participate on the Rapid Response Team.
- Assists with obtaining permits and implementing response plan, as requested by the EDRR Coordinator.

Subject Matter Expert

- May participate on the Rapid Response Team.

Land Manager

- May participate on the Rapid Response Team.
- Provides access to sites requiring treatment.

Regional Invasive Species Organization

- May participate on the Rapid Response Team.

Invasive Species Council of BC

- May support implementation of response plan, as requested by Provincial EDRR Coordinator.

2.8 STEP 6 – MONITOR AND REASSESS

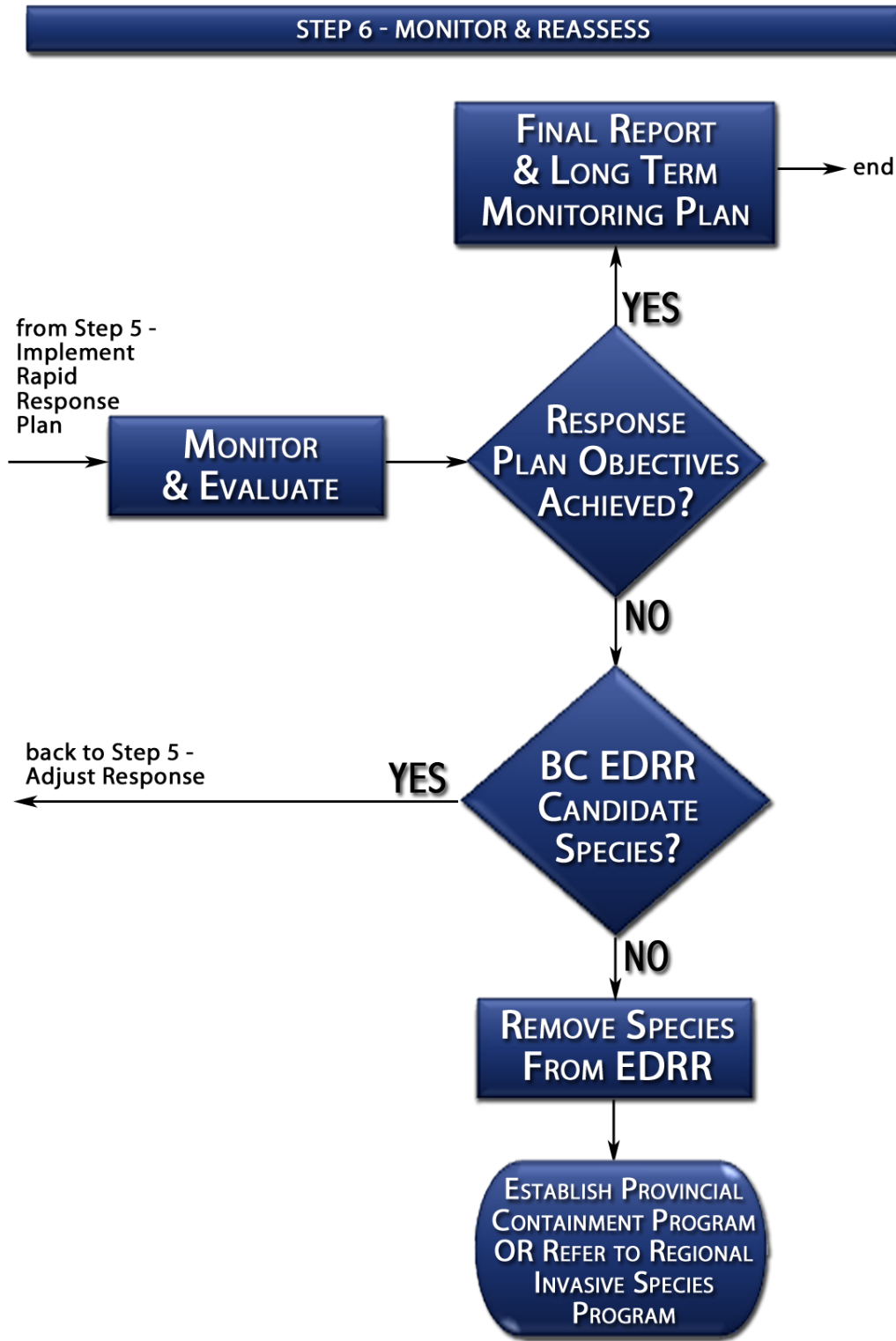


FIGURE 8: STEP 6 – MONITOR & REASSESS

Monitoring and reassessment provides the information required to measure the efficacy of the treatments applied during the Rapid Response step, and to determine if changes in the response are necessary to meet the intended objectives. Reassessment also considers both the strengths and weaknesses of the existing BC EDRR Program and requirements for resources.

Process and Outcomes

Monitoring determines if implementation of the response plan is effective, and if stated response objectives are achieved or if changes are required. The monitoring process will vary depending on the invasive species and will generally address treatment efficacy and changes in invasive species population over time. If response plan objectives are not achieved, a reevaluation of the response and target species will occur to determine if the target species remains an EDRR candidate. The BC Invasive Species Risk Assessment Protocol will be used to reevaluate species status.

Monitoring results enable reassessment of invasive species status and provide information for adaptive management and implementation in future treatments. Results of the evaluation will be included in annual and final reports for each response.

Monitoring and Reassessment will result in one of three outcomes (Table 7).

TABLE 7: MONITORING & REASSESSMENT OUTCOMES AND ACTIONS

Monitoring & Reassessment Outcomes	Actions
1. Eradication in Progress; Species Retained for EDRR	<ul style="list-style-type: none"> Response plan objectives and treatments evaluated and adjusted. Permits and authorizations renewed. Confirm monitoring frequency and implement.
2. Eradication Successful	<ul style="list-style-type: none"> Final Report and long term monitoring plan prepared.
3. Eradication Unsuccessful; Species Removed from EDRR	<ul style="list-style-type: none"> Species referred to Invasive Species Specialist for provincial containment and/or regional management.

Timeline

Step six will be completed as identified in the species-specific response plan. At a minimum, annual monitoring will occur at each known site.

Responsibility Summary

EDRR Advisory Committee

- Adjudicates recommendations from the Provincial EDRR Coordinator to alter the response plan for an EDRR candidate species based on monitoring and reassessment.
- Makes annual decision on whether to remove a species from the EDRR process or to continue with treatments based on the results of ongoing monitoring and reassessments.

Provincial EDRR Coordinator(s)

- Monitors treatment efficacy
- Evaluates treatment results compared to the objectives set out in the response plan.
- Makes recommendations to the EDRR Advisory Committee to remove the species from the EDRR process or continue treatments based on the results of the monitoring and reassessment.
- Adjusts the response plan with the Rapid Response Team, as required.
- Obtains or renews registrations and permits for additional treatments, if required.
- Enters monitoring records into relevant database(s).
- Updates species status on the EDRR website.

Invasive Species Specialist(s)

- Assists with monitoring treatment efficacy.
- Evaluates treatment results compared to the objectives set out in the response plan.
- Makes recommendations to the Provincial EDRR Coordinator regarding changes in species status.
- Participates on the Rapid Response Team, as required.
- Assists in obtaining or renewing registration and permits for additional treatment, as required.

Subject Matter Expert

- Participates on the Rapid Response Team, as required.

Land Manager

- Participates on the Rapid Response Team, as required.
- Provides access to sites requiring monitoring.

Regional Invasive Species Organization

- Participates on the Rapid Response Team, as required.
- May assist with monitoring as requested by the Provincial EDRR Coordinator.

2.9 REPORTING AND OUTREACH

Regular reporting and increased knowledge are important components of the EDRR program. Although considerable communication will be accomplished informally by various means, formal reports are necessary to inform governments, the IMISWG, program partners, and land managers of EDRR program progress.

The following reports will be prepared:

- **Annual EDRR Progress Report** – The Provincial EDRR Coordinator(s) will prepare a report for the EDRR program decision-makers, program participants, and directly-affected parties documenting annual progress of the EDRR program. The Annual EDRR Progress Report will include information regarding all EDRR species being addressed under the BC EDRR Plan, including progress against each of the steps in the plan. Species specific interim reports may be written during the reporting period depending on the invasive species under consideration.
- **Invasive Species Incursion Report** – A final rapid response report will be prepared for each species at the end of the response. This report will document methods, participants, timelines, results of assessment and monitoring, and future plans for managing the species. The final report may also include recommendations for changes to the EDRR process and an analysis of the resources required to achieve the plan’s objectives. This report will be submitted to the EDRR Advisory Committee for consideration and signoff.
- **Invasive species status updates** on the IMISWG website to inform on ongoing eradication and management.

Outreach and extension create awareness among professionals and the general public regarding invasive species. They are also an important tool to encourage professionals and the public to report new species entering the province. Some extension mediums may include:

- * Participation in the Invasive Species Council of BC Annual Forum;
- * Professional presentations;
- * Poster presentations;
- * Field days and displays;
- * The IMISWG website, EDRR section;
- * Brochures, pamphlets and invasive species alerts; and
- * News releases to the media.

Responsibility Summary

IMISWG

- Reviews and makes decisions on recommendations from the EDRR Advisory Committee regarding the Invasive Species Incursion Report(s), Annual EDRR Progress Report.
- Reports to Executive Sponsor on program delivery.

EDRR Advisory Committee

- Makes recommendations to IMISWG regarding Invasive Species Incursion Report(s) and Annual EDRR Progress Report.

Provincial EDRR Coordinator(s)

- Prepares interim progress updates for EDRR Advisory Committee, as required.
- Prepares Annual EDRR Progress Report for the EDRR program decision-makers, program participants, and directly-affected parties.
- Prepares Invasive Species Incursion Report(s).
- Conducts field days, displays, professional and informal presentations.
- Prepares annual update of EDRR activities for stakeholders and the general public documenting annual progress.
- Prepares information fact sheets and interacts with government communication branch regarding press releases and media response.

Invasive Species Specialist

- Contributes to updates and annual reports as requested by the Provincial EDRR Coordinator(s).
- Conducts regional field days, displays and informal presentations.
- Delivers or contributes to professional presentations, program updates and poster presentations.

Invasive Species Council of BC

- Hosts Annual Invasive Species Forum enabling Provincial EDRR Coordinator(s) to present updates on EDRR activities.
- Supports information flow to stakeholders and the public as requested by the Provincial EDRR Coordinator(s).
- Disseminates annual update of EDRR activities and fact sheets to membership and networks.

Regional Invasive Species Organization

- Disseminates annual update of EDRR activities and fact sheets to membership and networks.

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4.0 APPENDIX – ACRONYMS AND GLOSSARY

ACRONYMS:

BC	British Columbia
EDRR	Early Detection and Rapid Response
IMISWG	B.C. Inter-Ministry Invasive Species Working Group
IAPP	Invasive Alien Plant Program database and mapping application
ISCBC	Invasive Species Council of British Columbia (formally Invasive Plant Council of British Columbia or IPCBC)

GLOSSARY:

Alien Species. Species that are introduced, exotic, or non-native to a specific area.

Containment. A management practice that aims to geographically isolate invasive species and prevent them from increasing beyond the edge of their current distribution.

Control. A practice that aims to prevent reproduction and recruitment of new individuals into an existing population, and eventually reduces the distribution and density of the target species over time. Control measures acknowledge that a low level of the invasive species may persist after treatment.

Crown land. Land, or land covered by water (such as rivers or lakes), which is owned by the government of BC or Canada.

Dispersal. The scattering of individuals from an invasive species population to a new location.

Early Detection. A process to find populations of new invasive species near their inception, reporting the discovery to appropriate authorities, and submitting voucher specimens for identification and verification.

Eradication. Elimination of every individual of an invasive species population.

Incursion. An invasion or an introduction of an alien species, especially one of sudden character, with detrimental consequences, to a specific area.

Infestation. The presence of invasive species in sufficiently large numbers to create negative effects on surrounding values.

Invasive Species. Species that are not native to the province, or are outside of their natural distribution, and can negatively impact BC's environment, people or economy.

Land Manager. Individuals or agencies who have a legal or personal responsibility to manage land under their jurisdiction including First Nations, federal, provincial and local government, industry, and private land owners.

Noxious Weed. Any plant species so designated by the BC *Weed Control Act*.

Observers. People who are trained or self-motivated to find new invasive animal and plant species. In BC, they may include: Ministry of Forests, Lands and Natural Resource Operations Regional Invasive Species Program staff, other provincial government agencies and staff, federal agency staff, Regional Invasive Species Organizations, Invasive Species Council of BC spotters, land managers, botanists, ecologists, wildlife managers, industry employees, contractors, and the general public, among others.

Pathway. Dispersal corridors or mediums that allow organisms to move from one location to another by various modes of transportation including wind, water, animals, human, and others.

Prevention. All activities that interrupt the dispersal of new invasive species into a geographic area or specific location where they were not previously found.

Rapid Response. The immediate deployment of resources to eradicate, contain or control an introduction of a new invasive species into a new area.

Risk Assessment. A process to determine the potential risk of an invasive species to the environment, industry, human health, or other social values.

Target Species. Invasive species that are the subject of eradication, containment, or control.

Taxonomic Group. A group of taxonomically similar species, such as terrestrial plants, terrestrial mammals, freshwater fish, birds, etc., which are collectively treated in a similar manner.

Taxonomic Group Network. An electronic distribution list of taxonomic experts who are invited to voluntarily assist in identifying and verifying potentially new invasive species discovered in BC. Experts are asked to participate by the Provincial EDRR Coordinator(s), who moderate and document the online discussions.