

Aquatic Invasive Plants Action Plan (2009-11)

Invasive Plant Council of BC



Version: February 2010

Purpose

The purpose of this action plan is to provide short-term (2-year) guidance to the Invasive Plant Council of BC (IPCBC) on priority actions to increase awareness across BC of the impacts of invasive plants in aquatic ecosystems and to prevent their further establishment.

Note: This action plan is a 'living document' that will be updated as needed.

Background

IPCBC Directors, members, and others have identified aquatic invasive plants awareness as a priority for coordinated action in BC. Based on this direction, the IPCBC struck an Aquatic Plants Advisory Committee in February 2009 to collaboratively develop an Aquatic Invasive Plants Action Plan.

Resources

Existing resources referenced during the development of this action plan include, but are not limited to:

- Department of Fisheries and Oceans. (2006). Draft Report on Priorities for Monitoring Aquatic Invasive Species. *DFO Pacific Region Workshop* (p. 15). Vancouver: DFO.
- Ontario Federation of Anglers and Hunters. (2009, 01 01). *InvadingSpecies.com*. Retrieved 02 13, 2009, from *InvadingSpecies.com*: www.invadingspecies.com/indexen.cfm
- The Aquatic Plant Management Society, Inc. (2009). *Understanding Invasive Aquatic Weeds: Classroom & Homework Activities*. Retrieved 02 13, 2009, from The Aquatic Plant Management Society, Inc: www.apms.org/activity.htm.

Additional references are listed at the back of this document.

Aquatic Plants Advisory Committee

The Aquatic Plants Advisory Committee (Appendix 1) will provide guidance and direction to the Council on the development and delivery of a two-year action plan. In 2008, the committee met both in person and by teleconference to: 1) identify and prioritize issues and key actions associated with preventing the introduction and spread of high-risk (high priority) aquatic invasive plants; and 2) develop this short-term action plan for high-risk aquatic invaders.

Working Definition (Aquatic Invasive Plant)

The term "aquatic invasive plant", as used hereafter, includes both freshwater and marine invasive plants, which are known to occur in either emergent (riparian, wetland) or submergent (aquatic) habitats. As defined by the Invasive Plant Council of BC, invasive plants include all provincially listed invasive plants and noxious weeds, as well as other alien plant species that have the potential to pose undesirable impacts on humans, the economy, or the environment.

Priority Aquatic Invasive Plants¹

The following table illustrates the top most unwanted aquatic invaders as collaboratively identified by the Aquatic Invasive Plants Advisory Committee in 2009. Rationales for their selection, including conditions needed to create an invasion (i.e., disturbance, soil movement, etc), are provided for each priority species.

Ref. No.	Botanical Name	Common Name	Habitat Type	Pathway of Invasion	Similar Non-invasive Species	Rationale for Selection	Current Invasion Status in BC
1	<i>Didymosphenia geminata</i>	Didymo	A	Recreational equipment, including boats, kayaks, lifejackets, and fishing gear (especially waders).		A freshwater alga that can form massive blooms, smothering streambeds and adversely affecting freshwater fish, plant, and invertebrate species by depriving them of habitat. Also impacts recreational opportunities.	Known to occur in several streams throughout BC.
2	<i>Heracleum mantegazzianum</i>	Giant hogweed	R	Horticulture	Cow parsnip (<i>Heracleum lanatum</i>) and Palmate coltsfoot (<i>Petasites frigidus</i> var. <i>palmatus</i>). See Giant hogweed TIPS publication for distinguishing characteristics.	Phototoxic plant that can cause phytophotodermatitis (severe skin inflammations). Forms dense stands that can displace native plants and impact wildlife. Can invade riparian habitats.	Known to occur in the Lower Mainland, Fraser Valley, Gulf Islands, central to southern Vancouver Island, and Okanagan.

¹ Species are not prioritized; they are listed alphabetically by botanical name.

Ref. No.	Botanical Name	Common Name	Habitat Type	Pathway of Invasion	Similar Non-invasive Species	Rationale for Selection	Current Invasion Status in BC
3	<i>Impatiens glandulifera</i>	Policeman's Helmet	R, W	Horticulture		Class B ² Weed in Washington and known to be one of the most invasive weeds in temperate Europe and northern North America.	Known to occur in southern BC.
4	<i>Iris pseudacorus</i>	Yellow flag iris	W	Horticulture, Bio-Remediation, and erosion control.		Colonizes in large numbers, forming dense monotypic stands, thus outcompeting other plants.	Known to occur throughout southern BC (coastal, interior, Kootenays).
5	<i>Lythrum salicaria</i> L.	Purple loosestrife	W	Horticulture		Outcompetes native plants, reduces forage quality and habitat for wildlife	Known to occur throughout southern BC (coastal, interior, Kootenays)
6	<i>Myriophyllum aquaticum</i>	Parrotfeather	A	Horticulture, Pet Trade	Non-invasive and native water milfoils.	Biomass clogs waterways and drainage channels causing flooding and drainage problems. Impedes boating and provides breeding grounds for mosquitoes. Aggressively reproduces, displacing desirable	Known to occur on the south coast including Pitt Meadows and Abbotsford.

² See Appendix 2 for Washington State Noxious Weed List classifications.

Ref. No.	Botanical Name	Common Name	Habitat Type	Pathway of Invasion	Similar Non-invasive Species	Rationale for Selection	Current Invasion Status in BC
						species and altering aquatic ecosystems, impacting fish, plants, and microbes.	
7	<i>Myriophyllum spicatum</i>	Eurasian watermilfoil	A	Recreation	Non-invasive and native water milfoils.	Forms dense mats that restrict light availability, leading to reduced biodiversity and abundance of macrophytes. Displaces native milfoil species and reduces habitats for fish spawning and feeding. Many uninfested water bodies across BC remain susceptible to the introduction of this plant.	Known to occur in Shuswap, Mara, Christina, and Champion Lakes. Also occurs in all the main lakes in the Okanagan Valley and numerous water bodies in the Lower Mainland. Isolated populations were discovered on Vancouver Island in 1985, and in Nicola Lake in 1991.
8	<i>Phalaris arundinacea</i>	Reed canary grass	R, W	Management of linear infrastructure such as highways, waterways, drainage ditches, and dykes		Aggressive invader that threatens meadows, wetlands, marshes, fens, unused fields, floodplains, wet prairies, roadsides, and ditch banks.	
9	<i>Phragmites australis</i>	Common reed	W	Management of linear infrastructure		Forms dense mono-dominant stands in	Known to occur in the Okanagan

Ref. No.	Botanical Name	Common Name	Habitat Type	Pathway of Invasion	Similar Non-invasive Species	Rationale for Selection	Current Invasion Status in BC
				such as highways, waterways, drainage ditches, and dykes; General disturbance		both disturbed and natural areas. Invasion aided by disturbances and stresses including pollution, alteration of the natural hydrologic regime, dredging, and increased sedimentation.	valley.
10	<i>Polygonum cuspidatum</i> , <i>P. sachalinense</i> and their hybrids	Japanese knotweed	R	Horticulture		Extremely difficult to eradicate. Dense stands shade and displace desirable species and degrade habitat.	Knotweeds are currently found in the southwest coastal region, the Shuswap, Kitimat, Stikine, Skeena, Columbia, Okanagan, and Kootenay areas, as well as the Queen Charlotte Islands. Additional plants may exist in many gardens in communities across BC.
11	<i>Ranunculus repens</i> L.	Creeping buttercup	R	Horticulture		Depletes the soil of potassium and other nutrients. Contains an acrid juice that	Present in all of the province's agricultural reporting regions

Ref. No.	Botanical Name	Common Name	Habitat Type	Pathway of Invasion	Similar Non-invasive Species	Rationale for Selection	Current Invasion Status in BC
						causes oral and gastrointestinal inflammations in livestock. It often grows by and can dominate streams, swamps, ponds, and forest openings.	except for the Omineca and Peace River districts.
12	<i>Sargassum muticum</i>	Japanese wireweed	A	Believed to have been introduced unintentionally with a shipment of Japanese oysters	Distinguished from most other Pacific coast seaweeds by its small, spherical float bladders	Competes with and displaces native species of seaweed and eelgrass, in part by shading and reducing light levels, and reduces habitat. Fouls propellers, fishing lines and nets, waterways, and marinas.	Pacific coast of British Columbia.
13	<i>Spartina</i> spp. (<i>S. anglica</i> , <i>S. densiflora</i> , <i>S. patens</i>)	Cordgrass	R, W			Invades unvegetated tidal flats and disturbed areas. Contributes to declines in shorebird foraging habitat, impacts native habitats and fauna, and increases sedimentation, thus contributing to intertidal rise as sediment becomes	Pacific coast estuaries.

Ref. No.	Botanical Name	Common Name	Habitat Type	Pathway of Invasion	Similar Non-invasive Species	Rationale for Selection	Current Invasion Status in BC
						trapped in the rhizome system.	
14	<i>Zostera japonica</i>	Dwarf eelgrass	A	Believed to have been introduced unintentionally with a shipment of oysters	<i>Zostera marina</i> L., a native eelgrass. The leaf sheath of <i>Z. marina</i> is a complete tube that encases the leaf while the leaf sheath of <i>Z. japonica</i> consists of two overlapping flaps. Additionally, <i>Z. japonica</i> has a shorter, narrower leaf than the native <i>Z. marina</i> .	Colonizes sparsely vegetated or bare intertidal flats, drastically modifying habitats. Increased coverage slows water flows, increases sedimentation, and reduces mean sediment grain size. Eventually eelgrass infestations may raise the elevation of mudflats and disrupt ocean currents. Additionally, this plant may decrease shrimp and tubeworm abundance.	Pacific coast of British Columbia.



Aquatic Invasive Plant “Watch List” (Early Detection, Rapid Response)

These additional aquatic plants are not yet known to be invasive in BC, but may have the potential to become “unwanted” in the future as they are known to be a nuisance species in neighboring jurisdictions, provinces, states or elsewhere in the world with similar habitats.

Alert species include:³

1. ***Arundo donax*** or giant reed: Forming compact masses, this escaped ornamental chokes riversides and stream channels, crowds out native plants, interferes with flood control, and reduces habitat for wildlife.
2. ***Butomus umbellatus*** or flowering rush: A rhizomatous perennial that grows on the margins of slow moving waterways and wet areas with muddy soils, such as marshlands, lakes, and streams.
3. ***Cabomba caroliniana*** or Fanwort: An aquarium plant that looks similar to *Myriophyllum* spp. and *Ceratophyllum* spp., both of which have native species. Currently recognized by the Canadian Food Inspection Agency as an invasive alien plant.
4. ***Carex Pendula*** or hanging sedge: Invades roadsides and stream banks. Known to occur in Washington State.
5. ***Caulerpa taxifolia*** or caulerpa or killer algae or Mediterranean agandh: A highly invasive aquarium plant that crowds out native species. This plant was recently eradicated from southern California and is federally regulated by the United States Department of Agriculture (USDA).
6. ***Cyperus esculentus*** or yellow nut sedge: A wetland plant found in both disturbed and undisturbed habitats, which is known to occur in the Fraser Valley. This plant spreads vegetatively from tubers and by seed, which are dispersed with agricultural and nursery activities, soil movement, and in water, especially flooding. Seeds are also dispersed naturally by wind.
7. ***Egeria densa*** or Brazilian elodea: An escaped aquarium plant that is commonly sold in Washington under the name “anacharis.” Elodea is also sold in Washington’s nurseries as an “oxygen” plant. Of concern for southwest BC, elodea known to occur in Washington State forming dense mats that choke out native aquatic plants.
8. ***Epilobium hirsutum*** or hairy willow herb or codins and cream: This plant escaped cultivation and is known to invade a wide range of wetland habitats. Currently prohibited from entering western Australia, this plant is known to occur in gardens throughout western Washington (e.g., the Bellingham area of Whatcom County).
9. ***Hydrilla verticillata*** or Hydrilla: An escaped aquarium plant that looks similar to *Elodea Canadensis* (native) and *Egeria densa* (non-native). Hydrilla is considered to be the most problematic aquatic plant in the United States, forming dense mats of vegetation that interfere with recreation and destroy fish and wildlife habitat. This plant is not currently known to occur in BC; however, it is currently listed as a Class A Weed on Washington’s Noxious Weed List, and is on the Washington State Department of Agriculture’s (WSDA) Quarantine list.

³ Species are not prioritized; they are listed alphabetically by botanical name.

10. ***Ludwigia hexapetala* & *L. peploides*** or water primrose species: An escaped horticultural species found creeping along the shoreline, floating on water, or growing upright. *L. hexapetala* was eradicated near Seattle, Washington, but is still known to occur in southwestern Washington. Both species are on WSDA's Quarantine list, which prohibits their sale, trade, or transport in the State.
11. ***Myriophyllum heterophyllum*** or variable-leaf milfoil: A submersed aquatic plant known to occur in the eastern United States. *Limited information available.*
12. ***Plantago coronopus*** or buck's-horn plantain: A slow spreader that is currently known to occur in Californian and British Columbian (one location on southeastern Vancouver Island) wetlands.
13. ***Spartina alterniflora*** or cordgrass: This weedy wetland invader is listed as a Class A Weed in Washington and is also found on the WSDA's Quarantine list (wetland and aquatic).
14. ***Undaria pinnatifida***: This invasive algae is dispersed both naturally and by humans (ballast water, ship hulls, marine equipment, etc) and is currently being managed in New Zealand and the United States (California).
15. ***Utricularia inflata*** or swollen or greater bladderwort: A freely floating, rootless, carnivorous aquatic plant that is of concern in western Washington State. This plant forms dense beds of floating plants and lake residents consider this plant a nuisance.

Species Needing Additional Information

The committee agreed that the following aquatic plants might have the potential to become invasive; however, additional information is needed:

- o *Abutilon theophrasti* or velvetleaf
- o *Azolla* spp. or water fern: Excluding *Azolla Mexicana*
- o *Cotula coronopifolia* or small marsh flower or brass buttons
- o *Eichornia crassipes* or water hyacinth
- o *Lysimachia procumbens* or golden loosestrife
- o ***Nymphoides peltata* or yellow floating heart **Suggested addition**
- o ***Potamogeton crispus* or curly-leaf pondweed **Suggested addition**
- o *Schoenoplectus mucronatus* or ricefield bulrush

Target Audiences

The committee identified the following target audiences as key for focused outreach initiatives (those in **bold** are highest priority):

- o **Waterscapers, landscapers, gardening including garden clubs, enthusiasts, retailers, nurseries, hobby importers, growers, garden centres, plant importers, wholesale grower, CFIA, and inspectors**
- o **Boaters, anglers, and hunters**
- o **Pet shop owners and customers**
- o **Provincial government, municipalities, and dyking authorities**
- o Contractors and contract managers

- Independent power producers, provincial government (permitting agencies), and alternative energy researchers
- Community lake water management associations
- Land and water managers
- Members of the general public
- Shipping industry and port authorities
- Aquaculture industry leaders

Pathways of Invasion

This action plan will address the following key pathways of invasion (those in **bold** are highest priority):

- **Horticulture**
- **Land- and water-based recreation**
- **Exotic aquarium plant and pet trade**
- **Management of linear infrastructure such as highways, waterways, drainage ditches, marine/estuary dredging, and dykes**
- Biofuel (algae, reed canary grass, *Arunda* sp.)
- Community-based freshwater management
- General disturbance
- Natural dispersal (wind, water, etc)
- Shipping (ballast water, containers) and international trade
- Aquaculture

Action Plan

The Aquatic Invasive Plants Advisory Committee has jointly identified the following activities as priorities in March 2009. These activities will be updated as required under the guidance of the advisory committee, the IPCBC Board of Directors, and others.

Activity	Details	Invasive Plant	Target Audience(s)	Expected Results
Develop best practices to prevent the establishment of aquatic invasive plants	Develop Targeted Invasive Plant Solutions ⁴ or T.I.P.S. for priority aquatic invasive plants: <ul style="list-style-type: none"> • Describe the species of concern, why they are a problem (drainage, habitat loss and alteration, etc), and their pathways of invasion. • Identify prevention (e.g. clean your boats) and Integrated Pest Management (IPM) options for each species, if available. • Identify potential alternatives for horticulture plants. • Provide responsible disposal options for plan overgrowth and propagules, particularly for aquarium and pond plants. • Easy to use, quick reference. • Determine "Top Ten Things You Can Do" for aquatics 	All priority species	All	Improved awareness, increased monitoring, prevention, early detection and reporting, quick response, implementation of integrated best practices
Provide training opportunities for target audiences	Develop and deliver an "aquatic invaders" module for the IPCBC's "Spotters and Specialists" program <ul style="list-style-type: none"> • Standard orientation workshop (~1 hour) for local community groups on invasive plants in their area, how to report them and basic T.I.P.S. for management. • Downloadable from the Council's website and applicable provincially 	All priority species	All	Improved awareness, increased monitoring, prevention, early detection and reporting (1-888-WEEDSBC, Report-A-Weed, regional committees)

⁴ <http://www.invasiveplantcouncilbc.ca/resources/targeted-invasive-plant-solutions-tips>

Activity	Details	Invasive Plant	Target Audience(s)	Expected Results
Support the Aquatic Invasive Plants Advisory Committee	<ul style="list-style-type: none"> • Host events and conference calls to improve communications and share information. • Promote multi-jurisdictional collaboration and coordination to effectively address aquatic invaders • Foster the development of coordinated agreements to encourage joint management plans to reduce the need of many permits • Promote integrated management of invasives and encourage the development of collaborative action plans • Support dialogue opportunities amongst aquatic invasive plant specialists, land managers, resource management, and others 	All priority species	All	Increased coordination and collaboration, implementation of integrated best practices in invasive plant management programs
Develop a detailed Outreach Plan	<ul style="list-style-type: none"> • Specify methods of distribution including provincial government resource areas, regional committees, nurseries, etc • Prioritize specific outreach activities and propose timelines for completion 	All priority species	All	Collaboratively developed and coordinated outreach activities, resulting in improved awareness and education of target audiences
Design and distribute publications and Outreach Materials (<i>current priorities identified in the absence of a detailed Outreach plan – see above</i>)	<ul style="list-style-type: none"> • Public service announcements via radio and/or targeted publications (BC angler guide (MOE), recreation, tourism), news releases, articles, giveaways (magnets, floating key chains for anglers, brochures, booklets, poster, plant tags with key messaging, etc • Look at MOE's aquatic hitchhikers in the fishing guide – possibly expand to include additional information • Graphic presentations – simple, colourful, key messages (look to California, Washington) • Develop and install signage at key areas (i.e., 	All priority species	All	Enhanced awareness of the impacts of aquatic invasive plants as well as increased adoption of best practices or T.I.P.S.

Activity	Details	Invasive Plant	Target Audience(s)	Expected Results
	wildlife sanctuaries) <ul style="list-style-type: none"> • Carabiners to giveaway at Spotters and Specialists events • IPCBC aquatics display (in progress, spring 2009) 			
Maintain the IPCBC Aquatic Plants Action Plan	<ul style="list-style-type: none"> • Regularly update action plan including priority and alert lists • Revise priority activities as needed or every two-years 	All priority species	All	Comprehensive action plan, which provides guidance on key activities to address aquatic invasive plants in BC
Identify suitable non-invasive alternatives	<ul style="list-style-type: none"> • Identify alternatives for horticulture plants identified as “unwanted” in this action plan (priority aquatic invasives) 	All priority species that are used as ornamentals	Horticulture industry including gardeners, landscapers, and others	Increased selection of non-invasive alternatives to aquatic invasive plants used in horticulture
Jointly develop an Operational Plan or Strategy	<ul style="list-style-type: none"> • Clear process to address the eradication or control of a new invader • For example, identify containment lines and recommended actions for priority invaders • Suggest strategies by species or activity as well as potential leads • Support IAPP (MOFR) and existing programs (i.e., regional committee programs) 	All priority species	All	Improved reporting and eradication or control of new invaders
Jointly develop an Early Detection and Rapid Response (EDRR) Action Plan	<ul style="list-style-type: none"> • Plant specific • Clearly identify roles of lead organizations • Develop basic review of who does what with regards to aquatic plants 	All priority species	All	Improved EDRR in BC with regards to aquatic invasive plants, linkage to BC EDRR Plan for Invasive Plants

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<http://www.invasivespeciesinfo.gov/aquatics/main.shtml>

Appendix 1: Committee/Aquatic Contacts⁵

Name	Organization	Email Address
Committee Members		
Mark Adams	EnviroWest	adams@ecl-envirowest.bc.ca
Dave Barrett	Fraser River Salmon Table Society	davlinpacific@telus.net
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Tom Woolf	Idaho State Department of Agriculture	twoolf@agri.idaho.gov
Alison Halpern	Washington State Noxious Weed Control Board	www.nwcb.wa.gov
Kathy Hamel	Washington State Dept. of Ecology	Kham461@ecy.wa.gov
Jenifer Parsons	Washington State Dept. of Ecology	Jenp461@ecy.wa.gov

⁵ This list will be updated as new contacts are identified. Current to January 28, 2010.

Appendix 2: Washington State Noxious Weed Control Board – Noxious Weed List Classifications

Class A Noxious Weeds: Non-native species that are limited in distribution in Washington. State law requires that these weeds be **eradicated**.

Class B Noxious Weeds: Non-native species that are either absent from or limited in distribution in some portions of the state but very abundant in other areas. The goals are to **contain** the plants where they are already widespread and **prevent** their spread into new areas.

Class C Noxious Weeds: Non-native plants that are already widespread in Washington State. Counties can choose to enforce control, or they can educate residents about controlling these noxious weeds.

Monitor List Weeds: Putting plants on the Monitor List allows us to gather more information about them such as their distribution in the State, observable impacts, spread rate, etc.

Appendix 3: Protecting Salmon Habitat from Aliens

The “Protecting Salmon and Habitat from Aliens” project is funded by the Fraser Salmon and Watershed program. Scheduled to wrap up in March 2010, this project is aimed to reduce the impacts of aquatic invasive plants on salmon habitat in key watersheds in BC as has been separated into two phases: Phase 1 – information gathering and resource development (in progress) and Phase 2 – on-the-ground delivery (pending funding).

The overall objectives of this project are to improve the health of watersheds important to salmon through increased awareness and stewardship actions. The IPCBC Aquatic Advisory Committee “Think Tank” (held in March 2009) provided key guidance in the development of this project. The current phase of this initiative is to identify high priority communities and sites that can be targeted for education (workshops and distribution of educational materials) and restoration activities (including inventories or hand pulls).

With guidance from the Aquatic Advisory Committee, IPCBC staff completed the following steps for Phase 1 of “Protecting Salmon Habitat from Aliens”:

1. Identified which aquatic invasive plants impact salmon habitat based on the species included in the draft Aquatic Invasive Plant Action Plan. Additional species were included, as required.
2. Determined a process for selecting priority communities and sites that can be targeted for education activities (questionnaire development).
3. Solicited input from regional invasive plant coordinators via questionnaire (available upon request), and jointly identified areas around the Province for future stewardship and/or education activities.

Results of Phase 1 are presented in “Salmon&Aliens_questionnaire_26Jan201.xls”. These results will guide future outreach, education and stewardship actions with regards to aquatic invasive plants.