Big Picture Principles: Alien Invasives

Big Ideas for Collaborative Conservation across Carolinian Canada

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October 2015

Sent to Carolinian Canada Science Advisory Committee for review,
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Synopsis: **Collaborate. Prevent. Target.**

- ✓ Alien invasive species have been a problem for generations in the Carolinian zone, but in recent years their ecological and economic impact has grown. The Carolinian Zone is among the most susceptible regions of the province, and of Canada, now and for the future.
- ✓ All aspects of dealing with invasive species (prevention, early response, long term control) must be in the context of large scale collaboration, since no single group or organization will be able to address species invading at a regional scale.
- ✓ Carolinian Canada's Big Picture strategies, developed in collaboration with hundreds of groups and individuals, to promote and protect ecosystem health and recovery are the best context for CCC's leadership in dealing with alien invasives.
- ✓ Prevention will always be the most effective, economical and ecologically sound approach to managing invasive species. When prevention fails, early detection and rapid response are crucial if serious infestations are to be prevented.
- ✓ Ecological restoration can build resilience into the ecosystem by reducing the likelihood of infestations and ensuring that desirable but vulnerable native species have enough habitat to maintain viable population levels.
- ✓ Control and management are generally "last-resort" options to address invasions that are impacting species and ecosystems of very high conservation concern. These options may be practical in localized situations where management is feasible and adequate resources are available to ensure successful long-term outcomes. Where feasible, these options may also be taken, often in collaboration with multiple stakeholders, on a regional or landscape scale for high-impact invasives.

Definition: **What are Alien Invasive Species?**

Alien species are plants, animals and micro-organisms introduced by human action outside their natural distribution. **Invasive species** are harmful alien species whose introduction or spread threatens the environment, the economy or society, including human health (*Government of Canada 2004*). Synonyms may include introduced, non-native and exotic.

Some native species have expanded their range due to landscape alterations and climate change (e.g., Canada Goose, Raccoon, White-tailed Deer), and may need special consideration in ecosystem management, but we do not refer to them as invasive species.

Ecological Context: **Accelerated Change**

Change is the most prevalent and inexorable constant in nature. Since life appeared on Earth, organisms have moved and expanded their ranges, occupied new niches, and adapted to new environments**.** It is a normal process in any ecosystem for the occasional "alien" to arrive, carried by the wind, the water or by some other migrating species. Ecosystems adapt and in many cases the newcomers reach a stable equilibrium. However, the rate of arrival of non-indigenous species in the Carolinian Zone has increased exponentially since colonization by Europeans. **In recent decades the rate of invasion by non-native species has increased and the scale of the impact has dramatically increased.**

Human-assisted mass migrations are compounded by the fact that the clearing and development of lands for agriculture, urbanization and other human uses, as well as the pollution and over-harvesting of natural resources, has weakened ecosystems, often creating conditions ideal for the aliens to establish themselves and, in some cases, become dominant at the expense of species native to an area.

Although Carolinian Canada's focus is on biodiversity in the ecological context, invasive species also have a significant socio-economic impact. According to the Global Invasive Species Program, the impacts of invasives around the world add up to more than $1.4 trillion U.S. annually (GISP 2015). Some species (e.g., Garlic Mustard) that impact forest regeneration and growth can reduce forest productivity enough to increase the harvest rotation from 15 years to 25 years, a major financial loss for landowners in the Carolinian Zone. This statistic is also an indicator of the scale of impact on biodiversity, but appropriate biodiversity indicators are generally not being monitored. An introduced species such as Giant Hogweed does not have significant biodiversity impact on a regional scale, but has a socioeconomic impact both because of its potential to injure people and the legal liability it poses to (municipal and corporate) property owners.

Current State: **Significant Threat to Biodiversity**

Global

Recent studies place invasive species alongside climate change as among the top causes of biodiversity loss and change to ecosystems globally (MEA 2005, Burgiel and Muir 2010).

Canada

Up to 22% of species at risk are negatively impacted by alien invasives (Venter et al. 2006)

Ontario

Ontario's Biodiversity Strategy 2011 indicates that alien invasives are **a leading cause of biodiversity loss**. Ontario has more invasive species than other provinces (e.g., 441 invasive plants and at least 26 invasive freshwater fish). This is because the province is highly industrialized, urbanized, and locally and globally mobile, with active international trade. It is also a hub of diverse transportation systems (water, rail, air and ground transportation). The province has lacked adequate legislation to respond to even the most basic challenges like preventing the import and sale of known problem species. Legislation has been proposed but, as of the summer of 2015, was not yet passed.

Carolinian Canada

The Carolinian Zone is one of the most susceptible regions of the province, and of Canada, now and for the future. Alien invasives have spread rapidly in Carolinian Canada over the last century. Some, such as Phragmites (Common Reed) are rapidly expanding their ranges and dominating the sites that they are established on. Many of these species have significant ecological impacts, either directly replacing native species, or by weakening the systems that they move into by reducing the reproduction rates or survival of

native species (i.e. Garlic Mustard, Emerald Ash Borer). There has been direct loss of significant forest species such as American Chestnut, elms and, more recently, ash species in eastern North America. Similarly, a large number of aquatic invasives have been brought to the zone by the shipping industry. Several species of Asian carp imminently threaten the Great Lakes and other inland waters. Introduced mussels continue to cost taxpayers millions of dollars because of their impacts on hydroelectric and potable water intake pipes, not to mention their impacts on commercial fisheries and biodiversity generally.

The list of top invasive species of concern is almost certainly going to change from year to year. Early detection and eradication of potentially serious invasive species that have not yet established (e.g., Kudzu, Asian carp species) will be critical. Local control and site management is already necessary for high-priority established species (e.g., Phragmites, Garlic Mustard, Japanese Knotweed, Dog Strangling Vine, Giant Hogweed, White Sweet Clover, introduced honeysuckles, Autumn Olive and Common Buckthorn).

Trends**: On the Rise**

Global

The impacts of alien species on species at risk are expected to increase with climate change. Many alien invasives thrive in disturbed habitats, which are expected to become more common due to rising temperatures, increased fire outbreaks, and more frequent severe and extreme weather events (McNeely 2000).

Ontario

It is anticipated that the prevalence and impact of invasive alien species will continue to increase over the coming decades. Despite recent positive efforts underway to enact legislation to reduce the introduction and spread of invasives, the expanding movement of goods and people in a global economy combined with increased movement of species as a result of climate change, will likely result in increased invasive species impacts in Ontario. All of this will be occurring on a landscape already stressed by intensive human uses.

Carolinian Canada

The threats posed by invasive species will likely increase with time. Some invasives, such as Zebra Mussel, Sea Lamprey, Eurasian Milfoil and Phragmites, have provided lessons on the conversion of entire ecosystems. Species such as the Asian carp and Kudzu have the potential for changes of a similar scale and are “ready and waiting” in nearby jurisdictions. These should be top priority for early detection and control, with adequate resources and financial support made available to prevent their spread into Ontario.

Greening the Future: **What Carolinian Canada is doing**

Response to Alien Invasives is part of our Policies and Programs

Carolinian Canada is continuing its efforts, along with government, other organizations and citizens, to promote the restoration and protection of ecological functions that enable ecosystems to be resilient. Such resilience is the best “first defense” against invasive species. Carolinian Canada’s Big Picture initiative illustrates the strategic approach we are taking to help ecosystems and society adapt to invasive species – dealing with those that are here and helping with the early detection, control and eradication of new arrivals. Our Ecosystem Recovery Program, the largest of its kind in Canada, supports hundreds of community and landowner leaders to identify, implement and track priority actions for healthy landscapes. Invasive species are addressed in this Big Picture context in combination with other high-priority threats.

Expanding our range of partners

The effectiveness of dealing with invasive species (prevention, early response, long term control) will be greatly enhanced by large scale collaboration. Although smaller-scale local controls are important, no single organization has the capacity to respond on its own to major, regional-scale invasions.

Carolinian Canada is effectively positioned as a science-based network hub to advance a collaborative conservation strategy for the ecoregion across diverse sectors and jurisdictions. We are continuing to expand our partnerships and networking with the industrial and commercial sectors (e.g., horticultural growers, nursery distributors, agriculture) and municipalities, while strengthening collaboration among our traditional partners in the conservation community. Carolinian Canada will strengthen its collaboration with the Ontario Invasive Plant Council in order to capitalize on the expertise and materials the OIPC makes available for partners for delivery to other organizations and the public.

Strategic Conservation: **Big Picture Best Practices for your Property and Community**

One of the most difficult aspects of managing invasive species is that they are usually widespread before they are recognized as harmful. Fortunately, Big Picture strategies to protect ecosystem health overall are also our best defense against alien invasives.

The ecological effects of alien invasives are often permanent and, once these species establish themselves, they are extremely difficult and costly to control and eradicate. Colautti et al. 2006 estimate that the cumulative cost of eradicating 16 alien invasives in Canada (at which time they estimated there were at least 1,500 such species in Canada) was conservatively estimated to be between $13.3 and $34.5 billion annually.

1. Save: Focus on Prevention

The first line of defense is to keep alien invasives from becoming established in the first place. **Prevention will always be the most effective, economical and ecologically sound approach to managing invasive species.**

- ✓ **Avoid disturbing natural communities**. Alien invasives are more likely to colonize disturbed sites. Healthy populations of native species are better able to withstand invasions.
- ✓ **Protect sensitive areas** (e.g., shorelines, slopes, wetlands, forest edge) from disturbance by managing for healthy natural habitats.
- ✓ **Know your local aliens** and how they can be carried or spread into your property or community.
- ✓ **Set up strategies** and policies to prevent their entry (e.g., restrict sales of alien invasives; ensure vehicles, particularly construction and landscaping equipment, are clean; be cautious with buying and disposing of non-native garden species). These methods of moving species are often referred to as pathways. A pathway, such as movement on construction or landscaping equipment, can result in the spread of many different species.

2. Steward: Detect Early, Respond Rapidly & Act Appropriately

When prevention fails, early detection and rapid response are crucial if serious infestations are to be prevented.

- ✓ **Vigilant monitoring** of vulnerable sites can help detect new infestations early.
- ✓ **Be Prepared.** Each alien species requires a different control approach. Consult the latest research and best practices. This is rapidly expanding field of research and recommendations can change from year to year. Social media feeds of habitat partners are a good way to start to get connected with the latest trends. When in doubt, consult an expert.
- ✓ **Watch out** for aliens that are hazardous to your health.

- ✓ **Act immediately** before they become established and spread.
- ✓ **Scale the response appropriately.** Set goals to watch, tolerate, reduce or eradicate depending on the ecological threat and feasibility. Review these goals regularly.
- ✓ **Connect with habitat partners** or volunteers who may assist you to reduce the threat in your area.
- ✓ **Tweak your land stewardship practices** to enhance native species and discourage alien invasives.

3. Seed: **Grow Native Species & Nature-friendly Communities**

Ecological restoration, regardless of whether there is a serious invasive species problem in an area, can build resilience into the ecosystem by reducing the likelihood of future infestation and ensuring that native species have enough habitat to maintain viable populations.

- ✓ **Use native species** when modifying the landscape.
- ✓ **Restore diverse ecosystems** and natural structure to maximize biological control potential.
- ✓ **Rehabilitate disturbed areas quickly** by establishing native plant communities. Restoring native plant communities can reduce the risk of future invasions in areas where control actions have reduced or eliminated invasive species.
- ✓ **Engage allies** such as local nurseries, gardeners, anglers and hunters, neighbours, municipalities, etc. Engage your community networks in volunteer days and habitat projects.

Last Resort: **Targeted Control and Management**

Control and management are generally "last-resort" options to address invasions impacting (or having the potential to impact) species and ecosystems of high conservation concern. These options may be practical where management is feasible and adequate resources are available to ensure successful long-term outcomes.

In general, Carolinian Canada recommends invasive species control methods be targeted where:

a. significant ecological harm to a native species, a number of species, a habitat, or an ecosystem of great concern, is occurring or has the potential to occur;
b. where control is realistically going to have the desired long term effect; and
c. where control methods will on balance produce more good than harm.

Control may also be considered where invasives are having significant community, aesthetic or economic impacts. It is appropriate to undertake control efforts in order to support the efforts of a neighbour implementing a plan that addresses the noted three outcomes. As noted elsewhere in this document, control of some species on a significant scale will require widespread collaborative effort.

Putting it Together: **Managing Diverse Sites**

Different levels of effort may be used for different species at the same site.

Reduce: Where eradication is not possible but limiting the spread could dramatically decrease the associated impacts, control actions might best be focused on reducing the spread of the current infestation and preventing new invasions.

Watch: Some alien invasives (e.g., Giant Hogweed) may be less of an ecological threat, but are of concern to local communities, and we can do our part in the collective effort by sharing information and managing such species on the properties and projects where we have influence.

Tolerate: Many alien invasives (e.g., Common Dandelion) are established but do not pose a significant

threat to biodiversity, and their control may cause harm to local ecosystems.

Collaborate: If there is a significant regional campaign to control a particular invasive, seriously consider partnering in the initiative.

Inform: Ensure that the best and most current information on invasive species is available to landowners, land managers, decision makers, communities and businesses.

Whether invasive species should be controlled or eliminated from an area is a question with important ecological, practical and philosophical aspects. Control methods may be harmful to more than just the target species; potentially harmful chemicals may be introduced to the environment; soils may be damaged, creating conditions suitable for reinvasion by the same or other introduced species; costs may be prohibitive; the invasive species may be so well established that without constant effort, it will almost inevitably return. And from a philosophical point of view, where is one to draw the line in terms of which introduced species to control? Only those that are having negative ecological impacts? Only those that have invaded from another continent? Those that are causing economic harm? Such questions need to be balanced against the benefits of taking specific actions when making management decisions. Carolinian Canada supports and promotes collaborative solutions to the complex issue of invasive species in one of Canada's most biologically diverse and fragile ecoregions.

Resource Links

- The Ontario Invasive Plant Council provides a wide range of advisory material on its website (ontarioinvasiveplants.ca). At this point it is all available free for download, as well as webinars and educational events and services.
- Grow Me Instead (one of the free materials available on the website, is part of the Grow Me Instead campaign that engages the horticulture industry and gardeners)
- Ontario Invasive Plant Council and OMNRF are planning to release a list of invasive species grouped into categories of risk.
- Invadingspecies.com is the webpage of the Ontario Invading Species Awareness program, which is a joint program of the Ontario Ministry of Natural Resources and Forestry and the Ontario Federation of Anglers and Hunters.
- Invasivespeciescentre.ca is a national organization with an Ontario focus

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Thank-you:

About Carolinian Canada: Stretching from Toronto to Windsor, the Carolinian Life Zone of southern Ontario is among North America's most vibrant and fragile ecoregions. Carolinian Canada Coalition brings together diverse sectors, people and governments to collaboratively steward this unique habitat network, green infrastructure to support thriving wild and human communities in harmony for generations. EXPLORE CAROLINIANCANADA.CA (Canadian Registered Charity 83559 4722 RR0001)