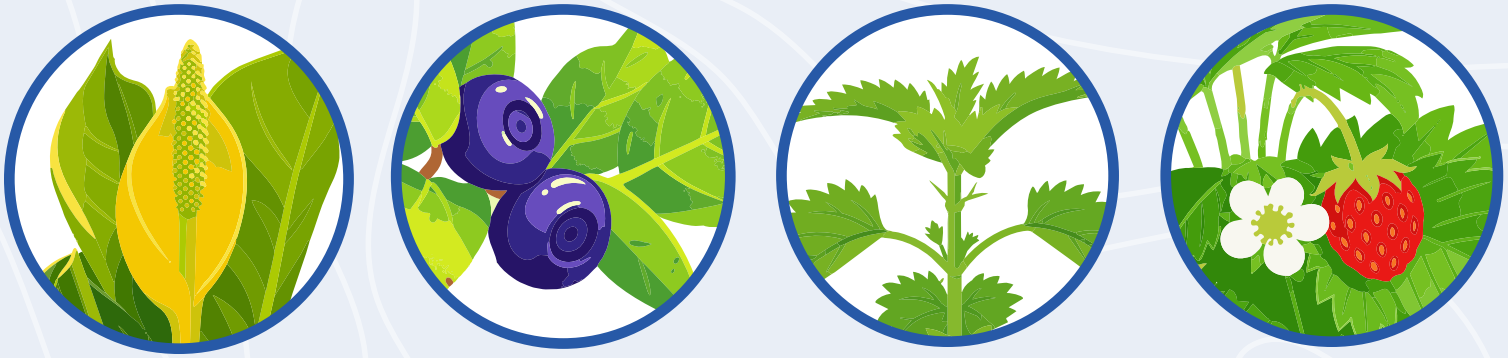
Invasive Species Council of BC



Invading Waters, Invading Lands:

First Nations Stories of Resilience in British Columbia, Canada

About Us

The Invasive Species Council of BC (ISCBC) is a registered charity and non-profit society making a difference in the lives of people across British Columbia by helping diverse parties work together to stop the spread of invasive species. We engage people, businesses, government and industry in adopting simple, but important practices that have a huge impact. Our goal is to protect the places we love from the detrimental environmental, social, and economic effects of invasive species. Indigenous partners have a significant role in our work. They guide training and resource development and identify opportunities for collaboration. ISCBC coordinates the Indigenous Invasive Species Network which supports communication and knowledge exchange on invasive species prevention, management practices, and other initiatives

We recognize and value the critical importance of Indigenous leadership in ecological stewardship and we are committed to reflecting this in all aspects of our work.

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Japanese knotweed *(Reynoutria japonica).* Photo: W.carter, CC0, via Wikimedia Commons

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Introduction

Invasive species present a significant challenge throughout British Columbia. Their ability to outcompete native species for food and habitat, the absence of natural predators, combined many other features of invasiveness allows them to spread quickly and disrupt local environments. This chapter focuses on knotweeds (*Reynoutria* spp. and *Persicaria wallichii*) and European green crab (*Carcinus maenas*), species whose presence affects both ecosystem and community well-being.

Drawing on the experiences of First Nations in B.C., the chapter describes how these invasive species impact native species populations, many of which are already at risk, and disrupt cultural practices connected to the land and waters. It also shows how Nations are responding by protecting culturally significant species, restoring affected areas, and strengthening stewardship grounded in Indigenous knowledge. Through these examples, the chapter demonstrates how ecological change influences cultural traditions, safety and access to important foods and resources.

By examining knotweeds and European green crab through both ecological and cultural lenses, the chapter highlights the value of collaborative, culturally informed approaches to invasive species management.

Knotweeds

Knotweed has been causing ecological and cultural disruption across B.C. Originally valued for its rapid growth and striking appearance, it was introduced through horticulture in Canada for use in gardens and landscaping[1]. Today, four species of knotweed are established in B.C.: Bohemian *(Reynoutria x bohemica)*, giant *(R. sachalinensis)*, Himalayan *(Persicaria wallichii)*, and Japanese knotweed *(R. japonica)*.

Knotweeds are highly invasive and difficult to eradicate. They grow rapidly, up to 4-15 centimetres per day, and can push through concrete and asphalt. Stands can reach heights of up to 20 metres and reduce property values, damage infrastructure, and compromise public safety by cracking foundations, affecting septic systems, and creating blind spots along roadways[2,3,4].

Common throughout the province, knotweed thrives along waterways, roadsides, railway corridors, abandoned lots, and gardens. It prefers moist soil and full or partial sun. It spreads primarily through fragments of roots and stems, and only the hybrid Bohemian knotweed produces viable seeds in North America. These traits make its management challenging and increase the risk of reinfestation if management is not performed carefully[5,6].

Dense knotweed along a roadside, showing how this plant can overwhelm an area and crowd out native vegetation. Photo: R. Westbrooks

Knotweeds can have very significant impacts as ecosystems engineers that "can transform ecosystems visually, structurally, and chemically" [1]

Knotweed is a major concern for many First Nations in B.C. Communities are working to control and, when possible, remove it because of its extensive growth and destructive impacts. The following sections share examples and firsthand accounts of how knotweed affects First Nations communities and the lands they rely on.

> **"People from the community are raising concerns over the plant. The infestations can become huge and really get in the way of accessing homes and locations on their property." — Semá:th Territory Voices**

Sumas First Nation

Sumas (Semá:th) First Nation (SFN), part of the larger Stó:lō Nation, is in the Upper Fraser Valley near Abbotsford, British Columbia, and home to the Semá:th people[9]. The Semá:th have inhabited this region since time immemorial, with their traditional territories encompassing waterways such as the Sumas River, Marshall Lonzo Creek, Saar Creek, and Kilgard Creek. Their lands encompass culturally and ecologically significant sites, including Sumas Mountain, Semá:th Lake, and the drainage of the Stat'lo' (streams) that flow into it[9].

Sumas Knowledge and Stewardship

The Semá:th People's beliefs, values, language, and way of life are guided by teachings from Chichelh Siya:m (Creator), which emphasize Xaxastexw te mekw' stam, respect for all things[10]. Because all beings possess Shxwelí, a life force, everything must be treated with care. The Semá:th honor

Young knotweed stems growing along a building foundation, showing how the plant can exploit cracks and cause structural damage. Photo: Sumas First Nation

obligations to the Creator by showing respect to their ancestors and carrying forward the knowledge that has been imparted on them, ensuring the land remains healthy for future generations.

This relationship with the land, often described as Traditional Knowledge, is central to Semá:th stewardship. It is integrated into land use and environmental decision-making to protect cultural resources and support practices that benefit current and future generations.

The Semá:th rely on many resources from their territory, including traditional foods like salmon

In 2021, the costs to control and restore sites infested with Japanese knotweed in the UK was estimated at $461 million CAD (£246.5)[7].

(sthéqi) and crayfish from Marshall Lonzo Creek and the Sumas River[10]. Harvesting traditional plants also remains an essential activity. Species such as stinging nettle (th'éx̱th'ex̱) *(Urtica dioica)*, wild strawberries (schí:ya) *(Fragaria vesca)*, wild blueberries (kwxwó'méls) (*Vaccinium* sp.), huckleberries (Sqá:lá:lhp) *(Vaccinium parvifolium)*, devil's club (Qwó:pelhp) *(Oplopanax horridus)*, and skunk cabbage (ts'ó:kw'e) *(Lysichiton americanus)* continue to support Semá:th cultural practices and well-being[10].

Knotweed and Its Impacts on the Sumas First Nation

The earliest documented knotweed infestation within Semá:th territory occurred in 2015, when Japanese and Bohemian knotweed were identified[11]. Since then, the plant has been found at multiple locations across SFN territory. Sasha Tuttle, Environmental Compliance Officer for the Nation, notes the challenges the species presents and the growing concern about knotweeds' rapid spread and the difficulty community members face in managing it. Since 2018, infestations have appeared on properties along Sumas Mountain Road, Kelly

Sumas Prairie. Photo: Purpy Pupple

Road and other areas, limiting access and creating challenges for those living nearby[11]. Community members are unable to individually manage and remove knotweed themselves, the potential for larger infestations becomes much more severe (S. Tuttle, personal communication, 2025).

Knotweed also poses significant risks to infrastructure. Its deep, resilient root systems can exploit cracks in pipes and penetrate concrete, asphalt, and building foundations, making infestations costly to manage once established[4]. The roots can extend several metres underground and spread laterally, placing homes, community buildings, and roads at risk of structural damage[12]. As a result, lands intended for development or housing may require extensive improvement before they can be used. Although knotweed-infested properties are not permanently unsuitable, they often require costly long-term treatment and monitoring to ensure the plant is effectively controlled before development can proceed. Existing structures may also face increased maintenance needs and safety concerns, including potential impacts to the local daycare centre.

SFN members are increasingly concerned about knotweed's effects on the territory's ecosystems. Dense growth displaces native plants, and infestations are now appearing in riparian areas near community streams and creeks, including along Kilgard Creek. This site was recently repaired following the 2021 atmospheric river event,

Knotweed infestation on a SFN member's property. Photo: C. Milsop

which caused flooding and sediment buildup[13]. Flooding created an opportunity for the knotweed infestations to spread, given how easily the plant can propagate through stem and root fragments[14]. Once established, knotweed can disturb soil, reduce stability, contribute to erosion and increased sediments, which may lead to culvert blockages, further flooding, and habitat damage[15].

Community members are also concerned about impacts on native vegetation. Studies have shown that knotweeds reduce the growth of native plants by lowering plant cover, biomass, and species richness[16]. Some research suggests that chemicals released by knotweed (i.e. allelopathy) may contribute to these declines[17,18].

Knotweeds are one of the 100 worst invasive species as identified by the International Union for Conservation of Nature (IUCN) and a top ten invasive species for control in BC. Its ability to tolerate a range of soil types and climates means that it has the potential to spread much further than it has to date[8].

Japanese knotweed *(Reynoutria japonica).*

How the Sumas First Nation Is Addressing Knotweed

The SFN recognizes the need for proactive knotweed management and has developed an action plan informed by years of monitoring, treatment, and adaptation. In 2019, the Nation began herbicide treatments (glyphosate applied externally to the leaves during the fall) across multiple sites, including residential properties, roadsides, daycare facilities, and riparian zones such as Kilgard Creek[11]. Because knotweed spreads through root and stem fragments, treatments focus primarily on herbicide applications targeting the root system and often require several treatments over multiple years[19]. Between 2019 and 2023, some locations received four to five treatments, demonstrating SFN's commitment to long-term management. While new and persistent infestations continue to appear, systematic treatment, monitoring efforts, and documentation help ensure they are quickly addressed[11]. The action plan also highlights the need for provincial coordination, particularly for pesticide permits near waterways, and emphasizes public education to reduce further spread.

> **SFN members are often the first to notice knotweed on their properties, along roads, and near community facilities.**

Community involvement is central to this work. SFN members are often the first to notice knotweed on their properties, along roads, and near community facilities. Their observations allow staff to respond quickly with documentation, treatment and prevention of further spread. This on-the-ground knowledge provides insight that cannot be duplicated by external contractors or technical surveys alone.

Education efforts further support knotweed management. Awareness campaigns and engagement activities empowers their members to understand how knotweed impacts native plants, traditional medicines, and culturally important foods such as huckleberries, salmonberries (elíle) *(Rubus spectabilis)*, and devil's club[10]. Community members have raised concerns about invasive plants limiting access to cultural resources and hindering intergenerational knowledge-sharing. Increased understanding empowers members to identify knotweed, avoid actions that spread it, and participate in control efforts.

SFN knotweed community education flyer.
Photo: Sumas First Nation

Through surveys, workshops, and conversations with community members, the SFN continues to refine its invasive species management priorities[10]. This collaborative approach ensures cultural values guide decision-making and support ongoing capacity-building for environmental stewardship (S. Tuttle, personal communication, 2025).

The Haida are the original inhabitants of Haida Gwaii, an island group in the northeast Pacific Ocean. Guided by the teaching Yah'guudang, meaning respect for this place, the Haida understand their connection to the land and waters as one rooted in responsibility. Photo: Council of the Haida Nation.

Haida Nation

The Haida are the original inhabitants of Haida Gwaii, an island group in the northeast Pacific Ocean. This temperate archipelago, located off the coast of B.C., is home to rich wildlife, expansive rainforest and extensive muskeg[20]. The Haida have lived on these lands since time immemorial. Today, most members reside in the villages of Old Massett (Gaw Tlagée) at the northern end of Graham Island and Skidegate (HlGaagilda) to the south[21]. Beyond these communities, Haida members steward and protect culturally and ecologically significant areas throughout the territory, including Naikoon Park, Gwaii Haanas, and the V.J. Krajina (Port Chanal) Ecological Reserve[22].

Haida Knowledge and Stewardship

Guided by the teaching Yah'guudang, meaning respect for this place, the Haida understand their connection to the land and waters as one rooted in responsibility[23]. Stewardship reflects this belief and is expressed through reciprocity, accountability, and care for future generations.

This approach shapes major land-use frameworks, including the Strategic Land Use Agreement (2007) and the Haida Gwaii Land Use Objectives Order, which set strict wholistic ecosystem-based management standards grounded in Haida values and ecological conservation[24,25]. The Haida Watchmen Program is another expression of Yah'guudang. It supports youth and elders in safeguarding cultural knowledge, protecting biodiversity, and passing intergenerational teachings forward (M. Liddle, personal communication, 2025).

In 2024, the Gaayhllxid • Gíihlagalgang "Rising Tide" Haida Title Lands Agreement recognized Haida title over more than 200 islands, strengthening Haida-led governance and oversight of nearly half a million hectares[26].

Access to culturally significant species remains central to Haida food security, sovereignty, and tradition. Salmon, herring, halibut and seaweed continue to play essential roles as traditional

Knotweed infestation on Haida lands. Photo: Elijah Morigeau–Council of the Haida Nation, Heritage and Natural Resource Department

foods (D. McNeill, personal communication, 2025). Plants such as devil's club (Ts'iihlnjaaw) *(Oplopanax horridus)* and skunk cabbage (Hlgun) *(Lysichiton americanus)* also hold medicinal and cultural importance. Devil's club is used as a traditional medicine for various ailments, while the broad leaves of skunk cabbage serve practical purposes, including lining cooking pits and wrapping fish for steaming[27,28].

Knotweed and its Impacts on the Haida Nation

Knotweed has been reported on Haida Gwaii since 1957. Species currently found on the Islands include Himalayan knotweed *(Persicaria wallichii)*, Japanese knotweed *(Reynoutria japonica)* and Bohemian knotweed *(Reynoutria x bohemica)*[29]. Like the Semá:th, the Haida Nation is experiencing the increasing effects of this invasive plant. Knotweed has become established across community properties, resource roads, and even culturally significant spaces, including cemeteries (E. Morigeau, personal communication, 2025).

> **"In Skidegate, knotweed grows aggressively around the cemetery, pushing up beneath the headstones and cement pads. It makes it difficult to walk through the area and pay respect to loved ones."**
> **— Haida Territory Voices**

Its rapid growth, extensive root systems and large infestations make management difficult.

As knotweed expands, it increasingly affects daily life. Marlene Liddle, Stewardship Director for the Council of the Haida Nation (CHN), notes that its dense stands are beginning to limit access to homes and other properties, posing particular challenges for Elders. She also highlights concerns about structural damage, as knotweed can damage building foundations and create costly repairs if left unchecked.

> **Community members enjoy harvesting from the salmonberry bushes, but members are starting to raise concerns that knotweed is beginning to show up in its place. It seems to be pushing out the native plant." — Haida Territory Voices**

Beyond infrastructure concerns, knotweed is affecting native plants and traditional food sources. Liddle and Elijah Morigeau, Stewardship Technician for the CHN, have observed knotweed overtaking salmonberry (sk̲'aawg̲an) *(Rubus spectabilis)*, an important Haida food plant. Knotweed is now found along roadsides and Indian reserve lands, where its dense growth is crowding out salmonberry patches. Community members worry that continued spread may affect other traditional foods and food security.

Impacts on salmon and their habitat are another key concern. Knotweed has been identified along fish-bearing streams on Haida territory, where its extensive water intake can contribute to drought stress and affect salmon fry survival (M. Liddle, personal communication, 2025). As knotweed replaces native vegetation along stream banks, its shallow root systems fail to stabilize soil, increasing erosion and sediment buildup. This sediment can cover spawning beds and reduce habitat quality[30]. Knotweed also alters riparian processes by outcompeting native tree seedlings, reducing the supply of large woody debris, and diminishing invertebrate diversity and richness. These invertebrates are important food sources for salmon[31,32].

How the Haida Nation is Addressing Knotweed

The CHN has made knotweed management a clear priority on Haida Gwaii. In 2023, a herbicide treatment trial conducted in Old Massett showed promising results, helping to inform future control strategies[33]. During the 2024 field season,

Knotweed infestation on Haida lands–post treatment. Photo: Elijah Morigeau–Council of the Haida Nation, Heritage and Natural Resource Department

crews focused on inventorying and monitoring knotweed infestations across Old Massett, Skidegate, Port Clements, and Daajing Giids. These surveys improved understanding of the current distribution of Himalayan, Japanese, and Bohemian knotweed across communities and helped guide future management planning. Although chemical treatments were not conducted in 2024 due to a lack of equipment and certified applicators, CHN used the season to build capacity by acquiring new equipment, completing herbicide training with provincial experts, and securing the necessary pesticide-use licensing[33]. This preparation positioned CHN to begin large-scale chemical treatments in 2025, with Old Massett and Skidegate identified as priority areas. In 2025, CHN completed 14 treatments in these lands and aims to

> **When it comes to invasives, we want to provide the training, certification and opportunities to our people. It's the best thing to do, they're the ones out on the land and they have that local knowledge. Adding to that, it keeps money and opportunities in our territory, it's the best route to go."**
> **— Haida Territory Voices**

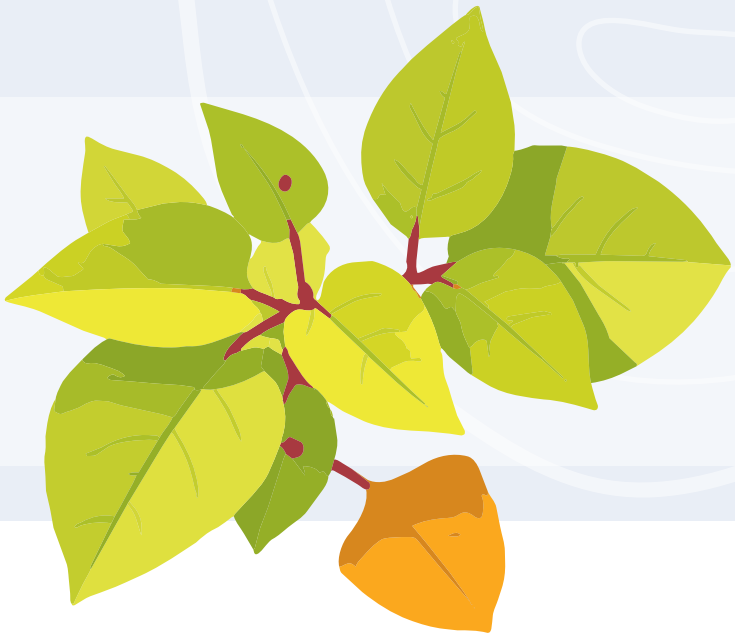
continue building on this progress to further reduce knotweed presence across Haida Gwaii into 2026[33].

Building on this work, next steps include revisiting known knotweed sites, expanding chemical treatments, and strengthening partnerships with municipalities and band councils. Public outreach will also remain an important component of the program, supporting landowners in making informed decisions about knotweed management and helping to reduce the risk of unintentional spread[33].

To advance this work, the CHN has invested in growing its local capacity. In 2024, the CHN partnered with provincial experts from B.C.'s Ministry of Forests to deliver herbicide training that covered safe storage, equipment calibration, and practice applications. Three Haida crew members successfully obtained Assistant Applicator Certificates, and the CHN acquired a Pesticide Use Licence, allowing herbicide treatments to be carried out under Haida leadership. New equipment, including professional-grade backpack sprayers, increases the CHN's ability to manage complex infestations. Building this capacity reduces reliance on external contractors while strengthening local expertise rooted in Haida stewardship[33].

Community input is also central to knotweed management. The CHN has mapped infestations across Haida communities, and continues to draw on local knowledge to guide priorities. Many members have encountered knotweed near their homes, prompting questions about how best to manage it. Past attempts to remove knotweed without proper techniques have sometimes led to further spread, underscoring the need for clear and accessible guidance (M. Liddle, personal communication, 2025). CHN outreach helps community members understand knotweed's invasive nature, the risks associated with improper removal, and the steps needed to protect culturally important sites[33]. Information sessions, resource sharing, and tailored promotional materials support this work (M. Liddle, personal communication, 2025).

Community education has further increased participation in stewardship. Some members have now earned herbicide applicator certificates, and others use social media and community networks



Including Haida voices in awareness, identification, and management strengthens ecological outcomes and supports cultural sovereignty, ensuring knotweed control contributes to the well-being of both people, the community and ecosystems on Haida Gwaii.

to seek assistance or report sightings (E. Morigeau, personal communication, 2025). These efforts strengthen local capacity and reflect Haida values of responsibility to the land and waters. Including Haida voices in awareness, identification, and management strengthens ecological outcomes and supports cultural sovereignty, ensuring knotweed control contributes to the well-being of both people, the community and ecosystems on Haida Gwaii.

Reflections Summary–Knotweed Management: Navigating Spraying, Treatment Decisions, and Lessons Learned

The management of knotweed in First Nations is shaped by practical and relational challenges, with sensitivity around the use of chemical treatments. Although many Nations choose to ban or avoid pesticides in their territories, effective management of difficult species like knotweed often requires a challenging shift toward targeted chemical treatment. For the Nations in this chapter, knotweed had been established for years posing risks to homes, infrastructure, and community spaces, making non-chemical options largely ineffective.

A key foundation before beginning any pesticide application is building strong relationships with community members. For both Sumas and Haida, this meant connecting in multiple ways—through community meetings, social media updates, and one-on-one conversations. In Sumas, for example, the Nation's Registered Professional Biologist went door-to-door to speak directly with households

Bohemian Knotweed *(Reynoutria x bohemica)*.
Photo: Cbaile19, CC0, via Wikimedia Commons.

affected by knotweed. These conversations explained why herbicide treatment was necessary, the risks knotweed poses, and clear information about safety. It also provided an opportunity to hear thoughts and concerns from community members (S. Tuttle, personal communication, 2025).

Maintaining trust and transparency is central to in-community spray programs. Nations emphasize the importance of being recognized and trusted

> **"Raising awareness and sharing information about knotweed is key to combating this invasive species in our territory. Some people may be hesitant to conduct treatment, but if we don't act, knotweed will overtake a lot of our lands and threaten the native species that belong here. That's why it's so important to get the word out."**
> **— Haida Territory Voices**

within the community to uphold transparency and confidence in their work. This includes making sure community members know who is conducting treatments on their lands. A strong example comes from the Haida Nation, where they prioritize certifying and training their own members in responsible herbicide use. This approach not only creates employment opportunities but also ensures that the people carrying out the work are familiar faces, promoting both trust and a sense of ownership among Haida community members (M. Liddle, personal communication, 2025).

Combining this personal approach with broader public education helps ensure that community members are fully informed. Public awareness efforts, such as posting visible signage before work begins and sharing relevant resources through mailouts and social media, play an important role in preparing the community for upcoming treatments.

From a technical perspective, First Nations recognize that knotweed management is a long-term commitment. Sasha Tuttle from Sumas First Nation reinforces this, noting that effective treatment requires multiple rounds of treatments over several years. She also notes that knotweed can remain dormant for five to ten years, even after long periods without visible regrowth. This creates challenges when determining how to use areas formerly infested with knotweed. Restoration, not leaving bare soil and replanting native vegetation is encouraged, but there is always a risk that resurging knotweed could compromise new plantings. Using these sites for infrastructure poses even greater concerns due to knotweed's capacity to damage buildings and utilities. An alternative approach is mechanical removal, such as stripping topsoil, However, this method is very costly, less effective than chemical treatments and raises additional concerns about the risk of spread and where to relocate the potentially contaminated soil.

In some cases, allowing treated areas to recover naturally can be highly beneficial, giving pollinators and ecological processes the chance to re-establish without further disturbance. Sasha Tuttle echoes this perspective, noting that "the land has an inherent ability to recover, we just need to provide it the opportunity to do so."

> **"On the Skidegate Band Council's reserve lands, a knotweed infestation has spread along the banks of a fish-bearing stream. During drought conditions, the invasive plant absorbs so much water that fish fry cannot survive in the ponds. Community members then intervene, rescuing the fry and transporting them by bucket to the lake to ensure their survival."**
> **— Haida Territory Voices**

A Haida fisherman's EGC haul. Photo: Council of the Haida Nation.

European Green Crab

The European green crab *(Carcinus maenas)*, hereafter referred to as EGC, is listed by the Internation Union for Conservation of Nature (IUCN) as one of the world's worst invasive species[8]. Highly adaptable and fast-reproducing, EGC was first detected on B.C.'s Pacific coast in 1998. Since then, populations have expanded along the north, west, and south coasts of Vancouver Island and Haida Gwaii, and, more recently, along the central coast, Salt Spring Island, the Sunshine Coast, and Boundary Bay[34].

EGC feed on clams, mussels, oysters, juvenile crabs, and small fish, and uproot eelgrass beds while foraging. Eelgrass is a critical nursery habitat for salmon, herring, and other species central to coastal ecosystems and food systems[35].

The disturbance of eelgrass is of particular concern. Research from Barkley Sound found eelgrass declines of 73–81% within four weeks in areas with high EGC density[36]. Such losses have ecological, cultural, and economic consequences that extend far beyond the immediate shoreline.

For many First Nations in B.C., intertidal ecosystems support shellfish harvesting, salmon habitat, and a range of traditional foods integral to food security, food sovereignty, cultural traditions, and community well-being[37]. EGC affects these relationships by damaging eelgrass meadows and reducing access to key marine species.

Once EGC populations become self-sustaining, eradication is unlikely. Factors such as broad environmental tolerance, rapid reproduction, and a lengthy free-swimming larval stage, which can drift in ocean currents for up to 90 days, enable the species to move easily along the coast[38]. As a result, management efforts in B.C. emphasize monitoring, early detection, and community-based action. First Nations stewardship groups are central to this work, as Fist Nations leadership provides essential knowledge and governance for protecting culturally and ecologically significant marine habitats[34,39]. This chapter highlights how First Nations in B.C. are responding to EGC and the approaches they are using to manage its impacts within their territories.

Marine Planning Program Team Members Conducting an Eelgrass Survey. Photo: Council of the Haida Nation (CHN)

Haida Nation

This section builds on the cultural and traditional context introduced earlier and provides additional detail on Haida places and placenames. Where possible, both Northern (Xaad kíl) and Southern (Xaayda kil) Haida names are included.

Haida Knowledge and Stewardship

The Haida Nation has long upheld a relationship with the waters of Haida Gwaii rooted in cultural tradition and stewardship. For the Haida, the ocean is not only a source of food but also a foundation of identity, governance, and intergenerational knowledge. Marine ecosystems provide salmon, halibut, herring, shellfish, and other species that continue to support Haida sustenance, ceremony, and trade[40]. Stewardship of these resources is guided by Yahguudang, the principle of respect for all living beings, which reflects the Haida worldview of the connection between people, the land, and the waters.

> **"The eelgrass is a diverse ecosystem for many of our culturally relevant species. That's why it's so important to keep those areas pristine and protected so those species have a chance to thrive. When they thrive, Haida people can thrive. It's all connected."**
> **— Haida Territory Voices**

Haida stewardship practices, such as seasonal harvesting, selective fishing techniques, and place-based marine management, have supported the long-term sustainability of their territories for generations. Today, these teachings are integrated

into modern governance through initiatives such as the co-management of Gwaii Haanas National Park Reserve, National Marine Conservation Area Reserve, and Haida Heritage Site, where decision-making authority is shared between the Haida Nation and the Government of Canada[40,41]. This approach affirms Haida responsibility for their marine homelands and provides a collaborative framework that balances cultural values with biodiversity conservation.

Current stewardship also addresses external pressures such as overfishing, climate change, and increased shipping traffic. The Haida Marine Plan, developed through the Marine Planning Partnership for the North Pacific Coast (MaPP), sets direction for marine use, conservation, and economic development grounded in Haida values[40]. Through these efforts, the Haida Nation demonstrates how Indigenous governance can sustain marine ecosystems while reinforcing cultural continuity.

Among the aquatic species vital to the Haida people are sea otters (K̲u • K̲uu) *(Enhydra lutris)*, salmon (tsiin) *(Oncorhynchus* sp.*)*, herring (iinang • ‘íináang) *(Clupea pallasii)*, northern abalone (gálgahlyaang • galg̲ahlyan) *(Haliotis kamtschatkana)*, lingcod (skaynaan • Shaynang) *(Ophiodon elongatus)*, and clams (k’yúu • k̲aaga), such as razor clams *(Siliqua patula)* and butter clams *(Saxidomus gigantea)*. Protecting the habitats that sustain these species is central to ensuring they remain available for future generations.

European Green Crab and its Impacts on the Haida Nation

European green crab (Ts’a’ám Sg̲énuwaas • Tllga jii. nga sda k̲uust’an k’inhlg̲ahl) was first detected in Haida Gwaii in 2020. In a short time, it has become a significant threat to Haida culture, marine biodiversity and ecosystem health (D. McNeill, personal communication, 2025). Because the species is relatively new to the territory, the Haida Nation is still working to understand its impacts. However, its impact on eelgrass (t’aanuu • t’aanuu) is already clear.

Eelgrass meadows are foundational habitats in Haida Gwaii’s nearshore ecosystems. They act as nursery grounds for juvenile fish and invertebrates, buffer sediments and currents, support carbon storage (“blue carbon”), and sustain culturally important species such as Dungeness crab (k̲’uust’an • k̲’ust’aan), salmon, and herring[43,44,45].

European green crab feed on clams, mussels, oysters, juvenile crabs, and small fish, and uproot eelgrass beds while foraging.

Gravid (i.e., carrying egg masses) female European green crabs. Photo: Coastal Restoration Society

Dan McNeill, Marine Stewardship Director for the CHN, has observed firsthand the role these meadows play in supporting healthy ecosystems. In productive eelgrass estuaries, native fish move through dense meadows, while crabs and clams shelter and develop within them. When eelgrass is removed or damaged, the area's biological productivity declines. For example, juvenile salmon emerging from spawning creeks in Skidegate Inlet rely on eelgrass estuaries to acclimate to marine conditions and access abundant food[46].

> **"As the EGC are feeding, they're ripping up the eelgrass, tearing up the roots and turning a lush estuary into a mud bog. The native species just can't thrive in an ecosystem like that."**
> **— Haida Territory Voices**

EGC disrupt this balance by burrowing into sediments in search of prey, uprooting eelgrass rhizomes, and feeding on shoots[47,48]. In areas with high EGC densities, this can lead to substantial losses of eelgrass biomass. Even low to moderate densities accelerate decline: studies in B.C. have found that eelgrass loss occurs 2.4 to 4 times faster where EGC are present than in areas with minimal EGC activity[36].

For the Haida, these ecological effects have cultural implications. McNeill notes that eelgrass supports species central to Haida sustenance and traditions. Everything is interconnected and depends on one another. As eelgrass meadows decline, there is potential for reduced numbers of salmon, native crabs, and clams – culturally important species used for food, trade, and traditional practices.

Deploying European green crab traps. Photos (left to right): Council of the Haida Nation (CHN), National Marine Sanctuaries, Public domain, via Wikimedia Commons

Training local contractors on EGC trap deployment. Photo: Council of the Haida Nation.

Green crabs live from 4-7 years, can grow up to 10 cm in width, and females can release upwards of 185,000 larvae once or twice a year[50].

EGC also directly consume and compete with culturally important species. They behave aggressively towards similarly sized Dungeness crabs *(Metacarcinus magister)* and can outcompete them for food and habitat[49]. EGC prey on oysters, clams, mussels, other crabs, and small fish[50], and can consume up to 28% of their body weight per day[51], a feeding rate higher than that of native species[52]. These pressures pose concerns for local harvesting and fisheries, undermining food security and sovereignty, intergenerational knowledge, and ceremonies tied to native marine species, while also increasing stewardship burdens on communities already committed to protecting their waters[53].

Reproductive capacity compounds the issue. Monitoring by the CHN illustrates the scale of expansion and the increase in efforts[53]:

- 2021 – 1,737 traps set and 116 crabs removed by a 34-person field crew
- 2022 – 12,956 traps set and 31,326 crabs removed by 51-person field crew
- 2023 – 26,667 traps set and 444,793 crabs removed by a 72-person field crew

These numbers reflect both rapid population growth and increasing distribution across Haida Gwaii. Community reports indicate that EGC are now widespread along the eastern coast and are beginning to appear on the west side as well (D. McNeill, personal communication, 2025).

How the Haida Nation is Addressing European Green Crab

Since EGC was detected in the Haida Nation, the CHN has mobilized a comprehensive approach to managing its spread. The Nation's plan includes trapping, monitoring, research, and public education, enabling coordinated action across the territory.

Trapping and depletion are currently the primary management tools. Haida members deploy and check traps, remove EGC and report findings. These efforts not only reduce EGC numbers in the environment but also provide training and employment opportunities while keeping capacity and knowledge within the Nation (D. McNeill, personal communication, 2025). In 2023 alone, nearly half a million EGC were removed[53]. The goal of depletion trapping is not eradication, given the species' reproductive capability and mobility, but rather to supress the population, lower densities and protect habitat and food sources relied upon by native species[45].

Monitoring and partnerships further support this work. The CHN uses systematic trap surveys and environmental DNA (eDNA) screening for early detection, distribution mapping, and assessing whether eradication or long-term suppression is feasible in estuaries and rivers important for salmon rearing. Community members also provide critical information by reporting sightings and unusual changes on the land and waters. This local knowledge plays a key role in identifying new EGC locations (D. McNeill, personal communication, 2025).

Collaboration with other governments and First Nations strengthens these efforts. The CHN works with partners, including MaPP, the Province of BC, and Fisheries and Oceans Canada, to share information, access research and data resources, and fund removal initiatives[46,53]. Working alongside other First Nations experiencing similar challenges has also been important. Dan McNeill notes that this cooperation enhances monitoring and depletion techniques, while reinforcing Nation-to-Nation relationships grounded in shared responsibility.

Measuring a European green crab. Photo: Kwiaahwah Jones

Public education and increasing awareness is another priority. Clear guidance on identifying EGC and understanding what to do when they are encountered helps prevent confusion with native species. In Haida territory, native purple and yellow shore crabs *(Hemigrapsus nudus* and *H. oregonensis)* and juvenile Dungeness crab *(Metacarcinus magister)* can be misidentified as EGC, so proper identification supports stewardship rather than accidental harm[55,56]. Community training, demonstration events, and outreach materials explain how timely reporting and informed removal contribute to successful management[53].

Community participation remains a cornerstone of Haida stewardship. A recent example is the CHN's first-ever K̲'aasda Copper Bay European Green Crab Derby, held during the three K̲'aasda sockeye fishery weekends. Participants of all ages hand-captured over 1,550 EGC, without the use of traps[45], demonstrating the commitment of Haida members to protecting local waters. This work is underscored by the teaching Gina 'waadlux̲an gud ad kwaagid (Interconnectedness), which reminds us that everything depends on everything else.

The traditional territory of the T'Sou-ke First Nation is situated on the southwest coast of Vancouver Island, B.C.
Photo: C. Thomas

T'Sou-ke First Nation

The traditional territory of the T'Sou-ke First Nation is situated on the southwest coast of Vancouver Island, B.C. It includes diverse marine, shoreline, and inland environments that have long supported the T'Sou-ke people through abundant natural resources. The T'Sou-ke are part of the Coast Salish peoples, whose presence in the region dates back roughly 5,000 years[57]. Their language is a unique dialect of Northern Straits Salish and is closely related to the languages spoken by the Saanich, Songhees, Samish, Lummi, and Semiahmoo peoples[57].

According to oral histories handed down through generations, the T'Sou-ke trace their origins to a copper box that descended from the sky and came to rest just east of Billings Spit. From this box emerged four men, who became the ancestors of the T'Sou-ke, Elwah, Malahat, and Duncan peoples. The Nation's name, "T'Sou-ke," comes from a Straits Salish word referring to a small stickleback fish commonly found in local waters[57].

Its free-swimming larvae live up to 90 days in oceans currents, which enables them to spread to new locations[50].

T'Sou-ke Knowledge and Stewardship

Central to T'Sou-ke stewardship is the understanding that people and the environment are interconnected. This value guides the Nation's approach to caring for the lands, waters, and species within its territory[58]. Stewardship brings the Nation, its members, and external partners together to meet present needs while ensuring the territory remains healthy for future generations.

This commitment is expressed through initiatives such as shoreline restoration, marine protection, and invasive species management. Through participation in the Clean Coast, Clean Waters Initiative, T'Sou-ke has led cleanup efforts from

Stewardship brings the Nation, its members, and external partners together to meet present needs while ensuring the territory remains healthy for future generations.

Long Spit to Jordan River and removed ghost gear (fishing equipment like nets, lines, traps, and pots that are lost, abandoned, or discarded in the ocean) from Sooke Harbour and Basin[59].

T'Sou-ke environmental leadership is grounded in Nation-driven laws and governance. In 2006, the Nation replaced land-related provisions within the Indian Act with its own land code, developed by and for T'Sou-ke. This transition and commitment to self-governance strengthened local decision-making and reinforced the Nation's responsibility to care for its territory today and for future generations[60].

One example of this governance in action is the T'Sou-ke First Nation Guardians, who take a hands-on role in environmental stewardship. As the eyes and ears of the territory, they monitor environmental changes, respond to emerging issues, and help protect local ecosystems[61]. Their work includes supporting salmon populations and coordinating invasive species management[62].

Salmon hold both cultural and practical importance for the T'Sou-ke. Migratory Pacific salmon, including sockeye *(Oncorhynchus nerka)*, coho *(O. kisutch)*, chinook *(O. tshawytscha)*, pink *(O. gorbuscha)*, and chum *(O. keta)*, have long been vital to sustenance and ceremony[57]. Members harvest salmon from the Strait of Juan de Fuca, the Sooke River, and inland spawning waterways. Other fish species, including halibut *(Hippoglossus stenolepis)*, lingcod, herring, and rockfishes *(Sebastes* spp.), also provide reliable food throughout the year[57].

European green crab being measured. Photo: Eva Shaffer/ T'Sou-ke First Nation

T'Sou-ke stewardship reflects an understanding that environmental balance supports cultural continuity and food security. Marine invertebrates harvested at low tide, such as crabs, mussels, sea urchins, cockles, and several species of clams, remain essential foods[57]. Plants, including salmonberries *(Rubus spectabilis)* and camas bulbs *(Camassia* sp.), are equally significant. Camas bulbs, traditionally pit-cooked to convert complex starches into sweet, digestible sugars, are a longstanding carbohydrate-rich food[63]. Together, all of these species sustain the T'Sou-ke people and reinforce the Nation's responsibility to steward the lands, waters, and the species that inhabit them.

T'Sou-ke marine team member collecting a EGC trap
Photo: Eva Shaffer/T'Sou-ke First Nation

European Green Crab and its Impacts on the T'Sou-ke First Nation

EGC was first detected in T'Sou-ke territory in 2012. Since then, it has been found in culturally significant areas such as Sooke Harbour and Basin, where it poses risks to native species and marine habitats. In response, the T'Sou-ke's Marine Team began monitoring for EGC in 2022, gaining insight into how the species affects eelgrass and clam beds, both central to T'Sou-ke culture, food systems and stewardship (E. Shaffer, personal communication, 2025).

Eva Shaffer, a member of the T'Sou-ke Marine Team, emphasizes the Nation's responsibility to protect eelgrass and the many species that rely on it. Eelgrass provides essential habitat for young salmon as they transition from rivers to the ocean. Within these meadows, juvenile salmon find food, shelter and protection—conditions that support their growth and survival. EGC occupy the same habitats and cause physical disturbance through burrowing and feeding, uprooting eelgrass rhizomes, capable of destroying entire eelgrass beds in the process. The negative ecological and cultural impacts of EGC on eelgrass habitats cannot be overstated[36,65,66]. These ecosystems support salmon, herring, invertebrates, and clams. As eelgrass declines, the ability of these species to thrive is reduced, affecting ecological processes and cultural practices tied to harvesting, knowledge sharing, and community well-being. Shaffer notes that eelgrass loss has intergenerational impacts for T'Sou-ke people because it affects species central to identity, food security, and cultural continuity.

T'Sou-ke environmental leadership is grounded in Nation-driven laws and governance. In 2006, the Nation replaced land-related provisions within the Indian Act with its own land code, developed by and for T'Sou-ke.

Clam beds are also experiencing growing pressure. Clams are a longstanding food source for the T'Sou-ke people, who have traditionally harvested along Sooke Harbour and Basin, and throughout the foreshore areas of the Juan de Fuca Strait and surrounding bays[57]. Species such as butter, Manila *(Venerupis philippinarum)*, and little neck *(Protothaca staminea)* clams have supported T'Sou-ke diet and trade for generations. EGC prey on clams and can significantly reduce populations, as observed in other regions[54,67,68].

This concern is shared by T'Sou-ke Marine Team member Ryan Chamberland, who highlights the importance of local observation in identifying habitat changes. He and others have documented signs of EGC predation, including clusters of broken clam shells and direct sightings of EGC feeding on clams. These observations illustrate how EGC presence disrupts local ecosystems and challenges traditional harvesting practices.

The crabs spread up the North American West coast was episodic, first finding its way up to BC coasts during the 1997/98 El Niño episode[72].

How the T'Sou-ke First Nation is Addressing European Green Crab

Since the arrival of EGC in T'Sou-ke territory, the Nation has implemented a coordinated response that includes trapping and monitoring, research, and public education. These actions are designed to reduce ecological harm, protect food sources, and support long-term stewardship of the territory.

A significant component of T'Sou-ke's approach is large-scale trapping to suppress crab populations. To support this work, the T'Sou-ke Marine Team collaborates with a range of partners, sharing local knowledge and strengthening relationships. One key collaboration is with the Coastal Restoration Society (CRS), which works with Nations across the coast on large-scale environmental restoration initiatives. Together with the Ahousaht and Tla-o-qui-aht First Nations, they launched the South Coast EGC Control Project, a three-year pilot designed to test large-scale trapping in areas at risk[69].

For T'Sou-ke, the project built capacity on several fronts. T'Sou-ke Marine Team received hands-on training in EGC removal, and the work reinforced Nation-to-Nation collaboration. Ecologically, targeted trapping in Sooke Basin and other culturally significant sites helped reduce local EGC numbers and limit further spread. At its peak, the T'Sou-ke Marine Team removed more than 187,000 EGC from the Sooke Basin region[70]. By September 2023, combined removals across from T'Sou-ke, Ahousaht, and Tla-o-qui-aht territories exceeded 600,000 crabs[70].

Monitoring and research are equally important. In partnership with the CRS and the Hakai Institute,

T'Sou-ke marine team members collecting data
Photo: Eva Shaffer/T'Sou-ke First Nation

the Nation uses early detection tools, including a light trap designed for Dungeness crab larvae, supplied in partnership with Hakai, to support monitoring efforts. Water samples collected from this trap are used for eDNA analysis to identify and predict new invasion sites, as well as better understand larval dispersal throughout the Salish Sea; however, these samples are tested by a Fisheries and Oceans Canada (DFO) lab[71]. This approach allows the T'Sou-ke Marine Team to detect European green crab DNA in water samples, supporting more targeted trapping efforts and efficient use of resources. According to Chamberland, this technology is strengthening the Nation's ability to establish baselines, track changes over time, and improve understanding of larval dispersal patterns throughout the Salish Sea[71].

The Nation also conducts extensive eelgrass health assessments. T'Sou-ke Marine Team members use aerial surveys, drop cameras, mapping, and ground surveys to monitor eelgrass. This data is

then used to assess eelgrass health, coverage, density, and regeneration in response to EGC[59]. These data are used to identify the areas most vulnerable to EGC disturbance and to inform protection strategies that support species dependent on eelgrass habitat.

Public education is another essential part of the Nation's work. Through outreach and hands-on programming, T'Sou-ke builds local understanding of EGC impacts and encourages community participation in monitoring. The Nation's foot-trapping program, located in high-visibility areas, allows community members to observe removal efforts directly and learn to distinguish EGC from native crabs. Informative signage reinforces identification tips and provides instructions on reporting sightings. T'Sou-ke's Marine Team member Louis Sudlow notes that these interactions help increase awareness and improve reporting accuracy.

Community reporting is a core part of T'Sou-ke's strategy. Local knowledge contributes to early observations, identifies new areas of concern, and supports timely responses in culturally significant locations. T'Sou-ke Marine Team members rely on this information to prioritize trapping and monitoring activities. Eva Shaffer highlights that reports from community members enable the Nation to take action more quickly than monitoring alone would.

> **"Eelgrass is essential to the overall ecosystem and health of the species that inhabit T'Sou-ke waters. A lot of species rely on the beds – juvenile salmon, herring, invertebrates, and shellfish. That's why it's important that we do what we can to protect it."**
> **—T'Sou-ke Territory Voices**

While these efforts have resulted in measurable gains, the scale of trapping and monitoring required to suppress EGC populations depends on reliable funding. Existing progress reflects a period of secure financial support. Without continued investment, trapping capacity and monitoring programs will be reduced, increasing the likelihood that EGC populations will rebound and undermine the gains made to date.

For the T'Sou-ke First Nation, this work reflects an inherent responsibility to care for the territory. Continued stewardship ensures that the benefits extend not only to T'Sou-ke people but also to all species and communities that depend on the region's lands and waters.

The Nation's foot-trapping program, located in high-visibility areas, allows community members to observe removal efforts directly and learn to distinguish EGC from native crabs.

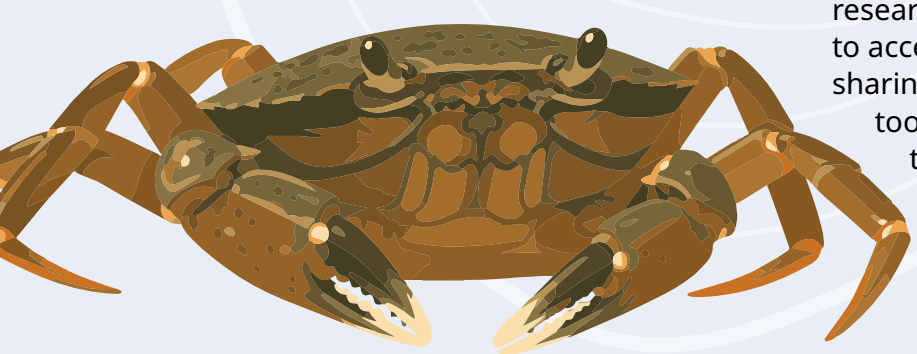
Reflections Summary–European Green Crab: Five Key Takeaways from First Nations Led Examples

1. Early detection, monitoring, and rapid response

Across Nations managing EGC, early detection has been key to management. The Haida and T'Sou-ke First Nations both emphasize integrated systematic monitoring using a combination of trap surveys, eDNA sampling, and land and on-the-water observations by community members. These approaches allow Nations to identify new infestations quickly, prioritize high-risk estuaries and areas with eelgrass beds, and deploy resources before populations become unmanageable. Early detection is particularly critical given EGC's rapid reproduction and larval dispersal, which make eradication impossible once populations are established.

2. Clear planning paired with sustained action

Successful EGC responses are guided by clear plans that combine short-term action with long-term commitment. Rather than aiming for eradication, Nations focus on sustained suppression, habitat protection, and adaptive management. The Haida Nation's large-scale trapping programs and T'Sou-ke's large-scale trapping pilot demonstrate how consistent effort over multiple years can meaningfully reduce pressure on eelgrasses, clam beds, and other critical habitat. These plans are supported by data collection and ongoing evaluation, ensuring management strategies evolve as conditions change.



3. Community and leadership buy-in as a foundation

Strong leadership and community buy-in are central to success. Leadership support enables sustained funding applications, partnerships, and long-term staffing, while community involvement strengthens detection, monitoring, and response. In all cases, community members are not passive observers but active participants, reporting sightings, assisting with trapping, and sharing local ecological knowledge. This buy-in reinforces the Nation's stewardship responsibilities and ensures invasive species work aligns with cultural values, food sovereignty, and intergenerational knowledge transmission.

4. Building local capacity and Nation-led delivery

A key lesson across Nations is the importance of investing in local capacity. Hiring, training, and certifying Nation members to conduct monitoring and trapping keeps expertise and funding within the community while reducing reliance on external contractors. This approach strengthens sovereignty over invasive species management and ensures responses are grounded in local knowledge of lands and waters.

5. Partnerships that respect First Nations leadership

Effective EGC management is strengthened through partnerships, but these partnerships work best when First Nations leadership is clearly centred and leading the work. Nations collaborate with provincial and federal agencies, non-profits, research institutions, and neighbouring Nations to access funding, technical expertise, and data-sharing opportunities. These partnerships support tools such as eDNA monitoring, large-scale trapping, and habitat assessments while reinforcing Nation-to-Nation relationships and shared responsibility for lands and waters facing the same invasive threat.

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