

Yellow Iris

(Iris pseudacorus)

Best Management Practices in Ontario



Environment and
Climate Change Canada

Environnement et
Changement climatique Canada



Foreword

This Best Management Practices (BMP) document provides guidance for managing invasive yellow iris (*Iris pseudacorus*) in Ontario. Funding and leadership to produce this document was provided by Environment and Climate Change Canada, Canadian Wildlife Service – Ontario. BMPs are developed by the Ontario Invasive Plant Council (OIPC) and its partners to facilitate invasive plant control initiatives by individuals and organizations concerned with the protection of biodiversity, agricultural lands, infrastructure, crops, and species at risk in Ontario.

The intent of this document is to relay specific information relating to invasive plant control practices that have been recommended by leading professionals across Ontario. This document contains the most up-to-date, effective, and environmentally safe control practices known from research, experience, and literature available at this time. It complies with current provincial and federal legislation regarding pesticide usage, habitat disturbance, and species at risk protection. It is subject to change as legislation is updated or new research findings emerge. The information provided in this BMP is not to be considered legal advice. The timing windows suggested will differ throughout Ontario and should be tailored to your region. Interested parties are advised to refer to the applicable legislation to address specific circumstances.

Check the website of the OIPC (www.ontarioinvasiveplants.ca) for updates.

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For more information on invasive plants in Ontario, please visit the following websites:

ontarioinvasiveplants.ca, www.ontario.ca/page/invasive-species-ontario, www.invadingspecies.com, or www.invasivespeciescentre.ca.



Yellow Iris.

Photo courtesy of the Severn Sound Environmental Association.

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Yellow Iris.

Photo courtesy of the Severn Sound Environmental Association.

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Introduction

Yellow iris (*Iris pseudacorus*) is a perennial, aquatic, herbaceous plant in the iris family (*Iridaceae*). It is also known as pale yellow iris, yellow water iris or yellow flag (Brouillet et al. 2010). Native to Eurasia and North Africa, yellow iris was introduced to North America as an ornamental plant in the early 1900s. This invasive plant was first recorded in North America in Newfoundland in 1911 (Denslow et al. 2010) and in Ontario in 1940 (Government of Ontario 2012). In North America, yellow iris is now found in almost every US state and across Canada, occurring in British Columbia, Alberta, Manitoba, Ontario, Quebec, Nova Scotia and Prince Edward Island. While it is listed as noxious weed in many states and a few Canadian provinces, it remains a popular ornamental plant due to its showy yellow flowers, low maintenance requirements and its ability to thrive in a variety of environmental conditions.

Since its introduction to North America, yellow iris has escaped cultivation and has become a problematic invasive plant in a variety of aquatic, semi-aquatic and wet terrestrial environments. Yellow iris has several traits that contribute to its success as an invader. It forms very thick mats of vegetation that can float on the surface of water or establish dense stands of emergent vegetation. Yellow iris is also capable of reproducing vegetatively via rhizome fragments and through the production of hundreds of seeds that can float and form new colonies downstream. Seeds have a hard coat and internal gas space that allows them to float for up to two months. Rhizomes are very hardy with the ability to survive extended periods of drought and float for up to seven months. Fragments as small as 2 cm can generate new plants. Yellow iris can tolerate anoxic conditions (low oxygen), drought, salinity, and low-fertility, acidic soils. While yellow iris can spread via its seeds and rhizomes that float, humans are the primary dispersal pathway for this invasive plant as many infestations originate from intentional planting in gardens.

As a result of the traits listed above, yellow iris has several negative impacts on the environment, economy and society. Dense mats of floating vegetation decrease biodiversity and displace desirable native plant species by cutting off light availability. Many of these plants are important food and shelter sources for wildlife including species at risk. Yellow iris alters hydrology through its dense mats of vegetation and traps sediment which can convert aquatic habitats such as wetlands to wet meadows and forests. This plant can also clog irrigation, and drainage ditches and stormwater management ponds, impacting agricultural operations and increasing the risk of flooding. Yellow iris can negatively impact human health and safety as all parts of the plant are toxic if ingested and contact with the plant's sap can cause skin irritation. Because of this, yellow iris is listed as a noxious weed in many US states and in some Canadian provinces. Once established, this invasive plant becomes extremely difficult and costly to control. Despite these negative impacts, yellow iris is not listed as a provincial noxious weed and there is currently no ban on the sale of this invasive plant in Ontario.

This document was developed to help guide the effective and consistent management of invasive yellow iris populations across Ontario.



Yellow Iris overtaking a wetland.

Photo courtesy of Dr. Catherine Tarasoff, Agrowest Consulting Scientists Ltd.

Description

Identification

Size and Stem:

Yellow iris is an herbaceous, aquatic, perennial plant. The stems are solid, erect and unbranched. It can grow 0.4 m – 1.5 m tall.



Yellow iris is an herbaceous, aquatic perennial plant that can grow up to 1.5 m tall

Photo courtesy of: Scott Gillingwater.

Leaves:

The leaves are broad, flattened, stiff and sword-shaped. They have a raised mid-rib (main vein) and a pointed tip. The leaves lack a petiole (leaf stalk), overlap and form clusters that fan out at the base. The fan of leaves are flattened at the base. They can be dark green to blue-green in color. Leaves can range between 50 cm – 100 cm long and 10 mm – 30 mm wide.



The leaves of yellow iris are broad, stiff and sword-shaped and form clusters that fan out at the base.

Photo courtesy of: Credit Valley Conservation.

Flowers:

The flower stalk can measure between 50 cm – 100 cm tall and contains two to three flowers. The flowers are pale yellow to orange, rarely white, and have six segments. These segments are fused at the base to form a tube that occurs above the ovary. The three drooping sepals are tongue-shaped and yellow with purple veins and spots at the base. The sepals measure 5 cm – 7.5 cm wide and 3 cm – 4 cm long. The three erect, smaller petals are yellow and measure 2 cm – 3 cm long. There are three petal-like branches that emerge from the style and a small lip-like stigma that occurs at the tip. The flowers measure 8 cm – 10 cm wide.



The flowers are pale yellow or orange. They have three drooping sepals that are tongue-shaped, three erect petals and three petal-like branches that emerge from the style (top of the ovary).

Photo courtesy of: Credit Valley Conservation.

Fruit and Seeds:

Each flower produces a glossy-green, leathery, 6-sided, oblong capsule. This fruit measures between 4 cm – 8 cm long and 5 mm – 8 mm wide. Each capsule has three chambers that each have 2 rows of seeds. It can contain between 100 – 120 seeds. Seeds are brown, flattened, smooth and disc-shaped. The seeds measure 2 mm – 5 mm in diameter and 0.5 mm – 3 mm long. They have a very hard seed coat and an internal gas space which allows them to float.



The fruit of yellow iris is a glossy-green, leathery, 6-sided capsule that contains 100 - 120 seeds.

Photo courtesy of: Murray Dawson, iNaturalist.
Available: <https://www.inaturalist.org/observations/24105236>, licensed under CC-BY-NC



The seeds of yellow iris are brown, flattened and disc-shaped. They can float.

Photo courtesy of: Alexander Barasnyk iNaturalist. Available: <https://www.inaturalist.org/observations/80616130>, licensed under CC-BY-NC

Roots:

Yellow iris has an extensive underground root system of branching, thick, pink-coloured rhizomes. These rhizomes measure 1 cm – 4 cm in diameter and can grow to a depth of 10 cm – 30 cm. Rhizomes exude a black sap which can cause skin irritation and is toxic if ingested.








Yellow iris has branching, thick, pink-coloured rhizomes. They exude a black sap that can cause skin irritation and is toxic if ingested.

Photo courtesy of: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

Lookalikes

Yellow iris resembles other native and non-native emergent aquatic plants that have broad, sword-shaped leaves. This includes native species such as Harlequin blue flag (*Iris versicolor*), cattails (*Typha* spp.), burreed (*Sparganium* spp.), and American sweetflag (*Acorus americanus*) (Table 1). This also includes non-native species such as German Iris (*Iris x germanica*), water soldier (*Stratiotes aloides*) and European sweetflag (*Acorus calamus*) (Table 2). Yellow iris can be distinguished from these other plant species by the presence of yellow flowers (that lack a “beard”), leaf length and shape, shape of the fruit and colour of the rhizomes.

Table 1: The main identification features of yellow iris in comparison to four native species that may appear similar (lookalikes). Key I.D. features that separate the lookalikes from yellow iris are in bold.

	Yellow Iris <i>(Iris pseudacorus)</i>  INVASIVE Photo courtesy of: Credit Valley Conservation	Harlequin Blue Flag <i>(Iris versicolor)</i>  NATIVE Photo courtesy of: Todd Boland, iNaturalist.	Cattails <i>(Typha spp.)</i>  NATIVE Photo courtesy of: iNaturalist.	Burreed <i>(Sparganium spp.)</i>  NATIVE Photo courtesy of: Sergey Mayorov, iNaturalist.	American Sweetflag <i>(Acorus americanus)</i>  NATIVE Photo courtesy of: Pat Deacon, iNaturalist.
Alternative Common Names	<ul style="list-style-type: none"> • Pale yellow iris • Yellow flag • Yellow water iris 	<ul style="list-style-type: none"> • Blue flag, larger blue flag • Multi-colored blue flag • Northern blue flag 	<ul style="list-style-type: none"> • NA 	<ul style="list-style-type: none"> • NA 	<ul style="list-style-type: none"> • Several-veined sweetflag • Sweetflag
Accepted French Name	<ul style="list-style-type: none"> • Iris faux-acore 	<ul style="list-style-type: none"> • Iris versicolore 	<ul style="list-style-type: none"> • Typha 	<ul style="list-style-type: none"> • Rubanier 	<ul style="list-style-type: none"> • Acore d’Amérique
Native Range	<ul style="list-style-type: none"> • Eurasia 	<ul style="list-style-type: none"> • Eastern North America 	<ul style="list-style-type: none"> • Eastern North America 	<ul style="list-style-type: none"> • Eastern North America 	<ul style="list-style-type: none"> • Eastern North America
Habitat	<ul style="list-style-type: none"> • Wet meadows • Wetlands • Wet roadside ditches 	<ul style="list-style-type: none"> • Wet meadows • Marshes • Along shorelines 	<ul style="list-style-type: none"> • Marshes • Wetlands • Ponds 	<ul style="list-style-type: none"> • Marshes • Fens • Swamps 	<ul style="list-style-type: none"> • Lakes • Slow-moving rivers • Wetlands
Size & Stem	<ul style="list-style-type: none"> • 0.4 m – 1.5 m tall • Solid 	<ul style="list-style-type: none"> • 0.6 m – 1 m tall • Solid 	<ul style="list-style-type: none"> • 0.9 m – 2.5 m tall • Solid 	<ul style="list-style-type: none"> • 0.3 m – 2.1 m • Solid 	<ul style="list-style-type: none"> • 0.6 m – 1.5 m • Solid







	Yellow Iris <i>(Iris pseudacorus)</i>  <p>INVASIVE</p> <p>Photo courtesy of: Credit Valley Conservation</p>	Harlequin Blue Flag <i>(Iris versicolor)</i>  <p>NATIVE</p> <p>Photo courtesy of: Todd Boland, iNaturalist.</p>	Cattails <i>(Typha spp.)</i>  <p>NATIVE</p> <p>Photo courtesy of: iNaturalist.</p>	Burreed <i>(Sparganium spp.)</i>  <p>NATIVE</p> <p>Photo courtesy of: Sergey Mayorov, iNaturalist.</p>	American Sweetflag <i>(Acorus americanus)</i>  <p>NATIVE</p> <p>Photo courtesy of: Pat Deacon, iNaturalist.</p>
Leaves	<ul style="list-style-type: none"> • Green to blue-green • Sword-shaped, erect, flattened, raised mid-rib • Basal • 50 cm – 100 cm long • 2 cm – 3 cm wide • In a flattened “V” as they emerge (as do the other irises) 	<ul style="list-style-type: none"> • Green to blue-green • Sword-shaped, erect, flattened, arching from base • 30 cm – 80 cm long • 1 cm – 3 cm wide • Often reddish to purplish at base 	<ul style="list-style-type: none"> • Light green to green • Linear • Up to 185 cm – 215 cm • 0.6 cm – 2.5 cm wide 	<ul style="list-style-type: none"> • Bright green • Sword-shaped with sharp spines • 40 cm – 60 cm long • 1 cm – 4 cm wide 	<ul style="list-style-type: none"> • Bright green • Sword-shaped, erect, with one mid-vein that is almost flush with the surface of the leaf • White or red at base • Sweetly fragrant when broken • 60 cm – 180 cm long • Up to 2.5 cm wide
Flowers	<ul style="list-style-type: none"> • Pale yellow to orange • Three larger drooping sepals, yellow, purple veins and brown spots at base • Three smaller petals, erect, yellow • 2 – 3 flowers per stalk • 8 cm – 10 cm wide 	<ul style="list-style-type: none"> • Blue to blue-violet • Three larger drooping sepals, yellow at base with radiating blue-purple veins • Three smaller petals, erect, blue-purple • 1 – 3 flowers per stalk • 7 cm – 10 cm wide 	<ul style="list-style-type: none"> • Separate female and male flowers that occur on the same plant • Cylindrical spike 	<ul style="list-style-type: none"> • Separate female and male flowers that occur on the same plant • Female flowers form large, spiny clusters • Male flowers form small, spiny clusters above female clusters 	<ul style="list-style-type: none"> • Long, cylindrical, finger-like flower head lacking a showy spathe (modified leaf) • Individual flowers are yellowish to brownish • 5 cm – 10 cm long
Fruits	<ul style="list-style-type: none"> • Glossy green, oblong capsule • 6 angled • 4 – 8 cm long and 5 – 8 mm wide 	<ul style="list-style-type: none"> • Green, oblong capsule • 3 angled • 3 cm – 7 cm long, 1 mm – 3 mm wide 	<ul style="list-style-type: none"> • Brown, spikes • Sausage shaped 	<ul style="list-style-type: none"> • Spiny, ball-shaped 	<ul style="list-style-type: none"> • Tiny, pyramid-shaped capsule. • Brownish to reddish
Roots	<ul style="list-style-type: none"> • Pink rhizomes 	<ul style="list-style-type: none"> • White rhizomes 	<ul style="list-style-type: none"> • Rhizomes 	<ul style="list-style-type: none"> • Rhizomes 	<ul style="list-style-type: none"> • Stout, knobby, brown rhizomes

Table 2: The main identification features of yellow iris in comparison to three invasive and non-native species that may appear similar (lookalikes). Key I.D. features that separate the lookalikes from yellow iris are in bold.

	<p>Yellow Iris (<i>Iris pseudacorus</i>)</p> <p>INVASIVE</p>  <p>Photo courtesy of: Credit Valley Conservation</p>	<p>German Iris (<i>Iris x germanica</i>)</p> <p>NON-NATIVE</p>  <p>Photo courtesy of: iNaturalist.</p>	<p>Water Soldier (<i>Stratiotes aloides</i>)</p> <p>INVASIVE</p>  <p>Photo courtesy of: Sergey Mayorov, iNaturalist.</p>	<p>European Sweetflag (<i>Acorus calamus</i>)</p> <p>NON-NATIVE</p>  <p>Photo courtesy of: Irina Mitjushina, iNaturalist.</p>
Alternative Common Names	<ul style="list-style-type: none"> • Pale yellow iris • Yellow flag • Yellow water iris 	<ul style="list-style-type: none"> • Flags • Bearded irises 	<ul style="list-style-type: none"> • NA 	<ul style="list-style-type: none"> • Calamus • Flag-root • Myrtle-flag • Sweet calamus
Accepted French Name	<ul style="list-style-type: none"> • Iris faux-acore 	<ul style="list-style-type: none"> • Iris d'Allemagne 	<ul style="list-style-type: none"> • Stratiote faux-aloès 	<ul style="list-style-type: none"> • Acore roseau
Native Range	<ul style="list-style-type: none"> • Eurasia 	<ul style="list-style-type: none"> • Eurasia 	<ul style="list-style-type: none"> • Eurasia 	<ul style="list-style-type: none"> • Eurasia
Habitat	<ul style="list-style-type: none"> • Wet meadows • Wetlands • Wet roadside ditches 	<ul style="list-style-type: none"> • Wet meadows • Marshes 	<ul style="list-style-type: none"> • Wetlands • Ponds • Wet ditches 	<ul style="list-style-type: none"> • Marshes • Swamps • Slow-moving rivers
Size & Stem	<ul style="list-style-type: none"> • 0.4 m – 1.5 m tall • Solid 	<ul style="list-style-type: none"> • 0.4 m – 0.9 m tall • Solid 	<ul style="list-style-type: none"> • 0.4 m – 0.6 m 	<ul style="list-style-type: none"> • 0.3 m – 1 m • Solid

Yellow Iris
(*Iris pseudacorus*)



Photo courtesy of: Credit Valley Conservation

German Iris
(*Iris x germanica*)



Photo courtesy of: iNaturalist.

Water Soldier
(*Stratiotes aloides*)



Photo courtesy of: Sergey Mayorov, iNaturalist.

European Sweetflag
(*Acorus calamus*)



Photo courtesy of: Irina Mitjushina, iNaturalist.

<p>Leaves</p>	<ul style="list-style-type: none"> • Green to blue-green • Sword-shaped, erect, flattened, raised mid-rib • Basal • 50 cm – 100 cm long • 2 cm – 3 cm wide • In a flattened “V” as they emerge (as do the other irises) 	<ul style="list-style-type: none"> • Greyish-green • Sword-shaped, erect, flattened • 30 cm – 70 cm long • 2 cm – 3 cm wide 	<ul style="list-style-type: none"> • Bright green • Sword-shaped with sharp spines • 40 cm – 60 cm long • 1 cm – 4 cm wide 	<ul style="list-style-type: none"> • Bright green • Sword-shaped, erect with one, prominent mid-vein that is off-centered • White or red at base • Sweetly fragrant when broken • 90 cm – 101 cm long • 1 cm – 2.5 cm wide
<p>Flowers</p>	<ul style="list-style-type: none"> • Pale yellow to orange • Three larger drooping sepals, yellow, purple veins and brown spots at base • Three smaller petals, erect, yellow • 2 – 3 flowers per stalk • 8 cm – 10 cm wide 	<ul style="list-style-type: none"> • Dark purple to pale deep blue • Three larger drooping sepals, white to yellow at base with radiating veins • Three smaller petals, erect, blue-purple • The lip of each sepal has a “beard” • 2 – 3 flowers per stalk 	<ul style="list-style-type: none"> • White • Three petals • Yellow center 	<ul style="list-style-type: none"> • Long, cylindrical, finger-like flower head lacking a showy spathe (modified leaf) • Individual flowers are yellowish to brownish • 5 cm – 10 cm long
<p>Fruits</p>	<ul style="list-style-type: none"> • Glossy green, oblong capsule • 6 angled • 4 – 8 cm long and 5 – 8 mm wide 	<ul style="list-style-type: none"> • Green, oblong capsule • 3 angled • 4 cm – 5 cm long 	<ul style="list-style-type: none"> • Fleshy berry 	<ul style="list-style-type: none"> • Fruits often not produced, sterile
<p>Roots</p>	<ul style="list-style-type: none"> • Pink rhizomes 	<ul style="list-style-type: none"> • Rhizomes 	<ul style="list-style-type: none"> • Thin roots covered in long, silky fibers 	<ul style="list-style-type: none"> • Stout, knobby, brown rhizomes

Biology and Life Cycle

Yellow iris is an aquatic, herbaceous, perennial plant that can spread via seeds or vegetatively through rhizomes. Both seeds and rhizomes are dispersed predominantly via water but can also be unintentionally transported via contaminated equipment (i.e., spades/shovels used for invasive plant management, mud on boots or on machinery for digging ditches). This plant has several adaptations that allow it to persist in many environments. Yellow iris can survive anoxic conditions (with low dissolved oxygen) as it stores a compound in its rhizomes that allows it to metabolize energy in these environments (Sutherland 1990; Morgan *et al.* 2022). This plant can also tolerate conditions of drought, with rhizomes able to survive up to 3 months of drought and remain viable (DiTomaso and Kyser 2016). Yellow iris can tolerate salinity (Sutherland 1990; Mopper *et al.* 2016) and recent reports have found this plant persisting in coastal habitats lacking consistent sources of freshwater (Thomson *et al.* 2022). Yellow iris can also tolerate drastic changes in water levels, allowing it to persist in a variety of water depths. Yellow iris can also survive in wet soil in winter down to temperatures of -25 °C (Sutherland 1990).

Yellow iris can occur as emergent vegetation in water deeper than 25 cm but can also form dense mats of floating vegetation. Several hundred plants can be connected via rhizomes (Morgan *et al.* 2022). As mentioned, rhizomes are drought tolerant but are also long-lived with reports of them surviving for over 20 years (DiTomaso and Kyser 2016) and floating for up to seven months (Tu 2003). They store up to 80% carbohydrates which allows the plant to grow and spread rapidly (Tarasoff *et al.* 2016). Finally, small pieces of rhizomes allow yellow iris to reproduce via fragmentation with pieces as small as 2 cm generating new plants (Jaca 2013).

Yellow iris can also spread sexually through the production of seeds. This plant reaches sexual maturity at three years old (Morgan *et al.* 2022). The yellow flowers of this plant open between May

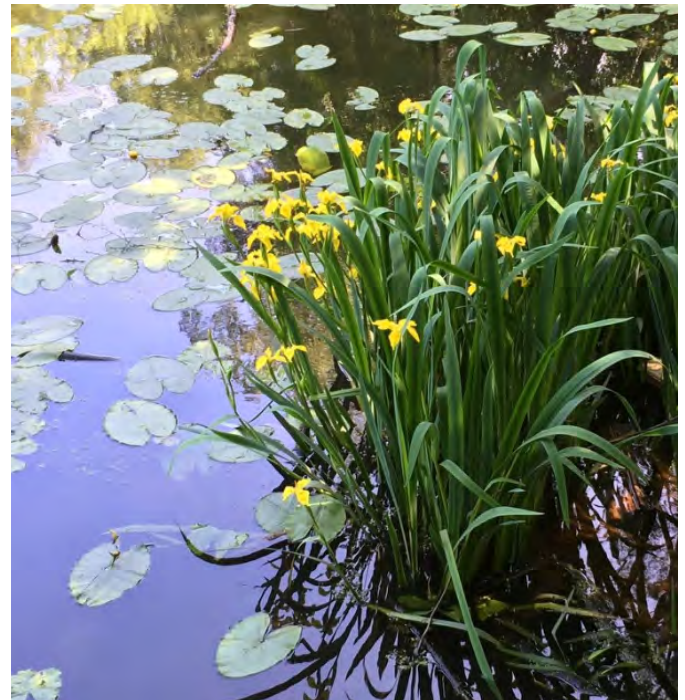
through July and are pollinated predominantly by bumble bees and long-tongued flies (Tu 2003; Morgan *et al.* 2022). Yellow iris produces large, green capsules in July to November that contain between 32 – 120 seeds (DiTomaso and Kyser 2016), however, only a small portion are viable (up to 20%) (Sutherland 1990; Tu 2003; Gaskin *et al.* 2016). The seeds have a hard seed coat and internal gas space which allows them to float for up to two months and they tend to germinate better on shorelines (Sutherland 1990; Morgan *et al.* 2022). There is some evidence that seeds can remain viable for only two years, giving this plant a short-term seedbank (DiTomaso and Kyser 2016). Seeds do not require warm or cold stratification and can germinate in dark or low light environments (Gillard *et al.* 2022).

Seasonality:

Leaves: Emerge and actively grow from April to June

Flowering: May to July

Seed Ripening/Dispersal: July to November



Yellow iris can occur as emergent vegetation but also forms dense mats of floating vegetation.

Photo courtesy of: iNaturalist. Available: <https://www.inaturalist.org/observations/49562906>, licensed under CC-BY-NC

Habitat

Yellow iris is often found growing in or near water, being able to survive in a wide range of environmental conditions (Fraser Valley Invasive Species Society n.d.; Tu 2003). In its native range, it is found in a variety of fertile, low-lying and wetland habitats (Tu 2003). It can be found in and around streams, rivers, ponds, wet meadows, fens, swamps and wetlands. It is also typically found in disturbed environments such as wet roadside ditches, irrigation ditches and storm management ponds (Gupta et al. 2019). Yellow iris usually occurs in sites that have high soil water content, in both brackish (saltwater) or freshwater, and can occur in water up to 25 cm deep (Tu 2003; Jacobs et al. 2010).

Once established, yellow iris prefers full sun, soils with acidic to neutral pH (3.6 – 7.7) (Jacobs 2010) and soils that have high soil moisture. It grows readily on a variety of soil types including organic matter, gravel, sand and muck (Jacobs et al. 2010). It can grow on peats as well as permanently submerged organic and inorganic soils with poor oxygen availability (Sutherland 1990). Yellow iris can tolerate salinity, low-fertility soils and shaded conditions (Sutherland 1990; DiTomaso and Kyser 2016). While it can thrive on a variety of soils, yellow iris has high nitrogen requirements (Tu 2003; Jacobs 2010).



Yellow iris growing in swamp.

Photo courtesy of: Lexi Armstrong, Nature Conservancy of Canada.

Pathways of Spread and Distribution in Ontario

Yellow iris is native to Eurasia and North Africa where it occurs in a variety of fertile, low-lying areas, including stream, rivers and ponds (Tu 2003). It was brought to North America as an ornamental plant and continues to be grown in gardens for this purpose. Yellow iris still remains widely available and is valued for its showy yellow flowers and ability to persist in many environments (Tu 2003; Jacobs 2010).

In North America, yellow iris is found in all states with the exception of North Dakota and Arizona (EDDMaps 2022; iNaturalist 2022). It is listed as a noxious weed in several states including Colorado, Connecticut, Idaho, Massachusetts, Montana, New Jersey, Hampshire, Oregon, Washington, Vermont and Washington.

Yellow iris has spread throughout most of Canada and has been reported in every province except Saskatchewan, Northwest Territories, Yukon and Nunavut. It is listed as a noxious weed in British Columbia and Alberta. In Ontario, it is found across the Greater Toronto Area including Toronto, Mississauga, Brampton and Markham. It occurs throughout southern Ontario including Chatham, London, Hamilton and Niagara Falls; to the east it is found in Peterborough, Ottawa, Kingston, Brockville and Cornwall and as far north as Sudbury and Thunder Bay. There is currently no ban on the sale of yellow iris in Ontario.

Yellow iris can spread via rhizomes and seeds which commonly disperse via water as they can float for extended periods of time. However, humans are the primary dispersal pathway for yellow iris. Many infestations originate from intentional planting of yellow iris in gardens which can then spread to nearby natural areas such as shorelines of rivers, streams and wetlands. Yellow iris has also been planted for erosion control as it causes sedimentation which can help stabilize streambanks (Tu 2003; DiTomaso and Kyser 2016). It has also

intentionally been planted for the remediation of wastewater as it able to accumulate heavy metals in the plant's tissues (Yousefi and Mohseni-Bandpei 2010; Caldelas et al. 2012).

For up-to-date distribution information, visit: EDDMapS www.eddmaps.org/ontario or iNaturalist <http://inaturalist.ca>.



Yellow iris growing at the edge of a lake.

Photo courtesy of Jim Varick, iNaturalist. Available: <https://www.inaturalist.org/observations/25419063>, licensed under CC-BY-NC

Impacts

Ecological:

Yellow iris forms thick mats that can float on top of water or create dense clumps of emergent vegetation (Government of Ontario 2012; DiTomaso and Kyser 2016). This growth form poses a myriad of negative ecological impacts. These dense mats cut off sunlight which lowers total plant diversity, alters patterns of plant succession and displaces native plants needed by wildlife including species at risk (Jacobs *et al.* 2010; DiTomaso and Kyser 2016; Gallego-Tevar *et al.* 2022). For instance, yellow iris reduces native sedges and rushes that support many waterfowl species (Jacobs *et al.* 2010). The formation of monocultures also alters wildlife habitat. For example, floating mats of vegetation can reduce areas of deeper water needed by fish and waterfowl (Jacobs *et al.* 2010; Metro Vancouver and Invasive Species Council of Metro Vancouver 2021). These dense floating mats can also narrow waterways (DiTomaso and Kyser 2016; Government of Alberta 2018).

Yellow iris is also capable of altering hydrology and causes sedimentation (Government of Ontario 2012; DiTomaso and Kyser 2016). The mats of floating vegetation reduce water flow, alter water quality and increase sedimentation (Sutherland 1990; Jacobs *et al.* 2010). This can compact soil and increase elevation converting wetlands to drier habitats such as wet meadows and forests (Government of Ontario 2012; Metro Vancouver and Invasive Species Council of Metro Vancouver 2021). By doing so, yellow iris creates suitable habitat for itself but also for other invasive plant species.

Economic:

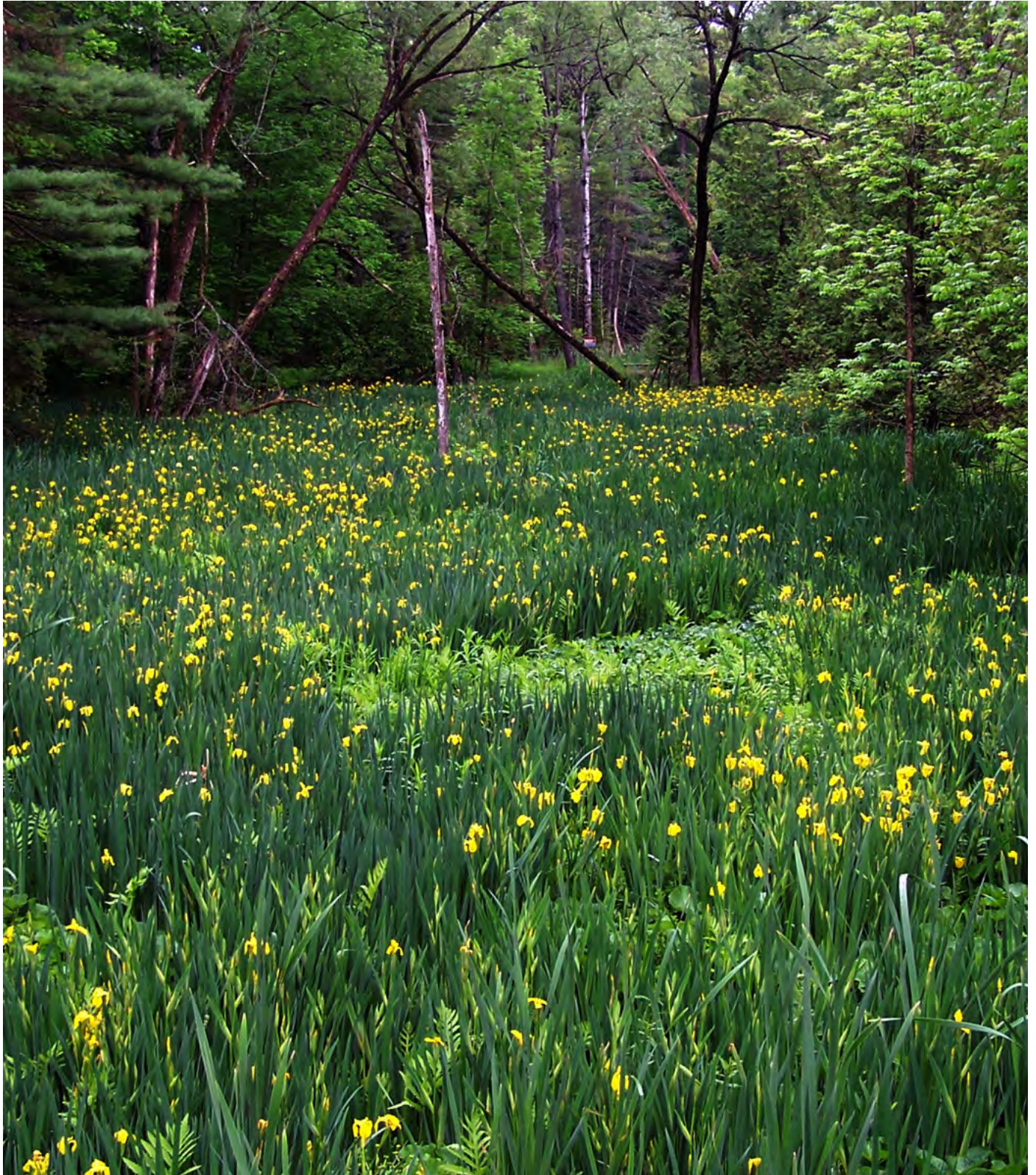
While yellow iris is listed as a noxious weed in many areas in North America, it is commercially available in Ontario likely due to its popularity as an ornamental in gardens. It is popular due to its showy flowers and low-maintenance requirements (Tu 2003; University of Florida Institute of Food and Agricultural Sciences 2022). Mats of yellow iris can clog irrigation, storm management ponds and decrease recreational value. Once established it becomes difficult and costly to remove (Jacobs *et al.* 2010; DiTomaso and Kyser 2016). In a risk assessment conducted in New York, yellow iris management was considered a major investment requiring 100 person hours/year of manual effort or 10 person hours/year for mechanical use or requiring the use of herbicides (Jordan *et al.* 2008).

Societal:

All parts of yellow iris, especially the rhizomes, are toxic to animals and humans if ingested. The plant contains a glycoside called iridin and when ingested can cause severe gastrointestinal symptoms (Jacobs *et al.* 2010; DiTomaso and Kyser 2016). Contact with the plant sap can also cause skin irritation.

Despite this, the plant has been shown to have some medicinal value as it has been used to treat toothaches, rheumatism, sciatica and jaundice (Crisan and Cantor 2016). This plant also has some edible uses as seeds can be roasted to make a coffee substitute. However, due to the potential toxic effects of this plant, it is strongly recommended to avoid consuming any parts of yellow iris.

Yellow iris has also been planted for erosion control and is used in remediation and heavy metal removal in wastewater (Jacobs *et al.* 2010).



Yellow iris can form very dense clumps of emergent vegetation.

Photo courtesy of: David Hawke

Invasive Plant Management Planning

Applicable Legislation and Permitting Requirements

Permits, approvals or authorizations are often required from municipal, provincial or government agencies before initiating control for yellow iris. These permits depend on the location, timing of work and type of management activities (e.g. mechanical/manual or chemical). Individuals undertaking control activities are responsible for complying with any applicable legislation. Please note that this is only for general guidance and is not intended as legal advice.

Please note that at the time of publication of this document, there are no herbicides approved for the control of yellow iris in Canada.

The presence of species at risk or protected habitat often requires an assessment of the potential impacts of the control project and authorization. Activities that may affect species listed in the *Endangered Species Act* (2007), species listed on Schedule 1 of the *Species at Risk Act* (2003) and SARA’s general or critical habitat prohibitions may require permits. Depending on the species and its location, it may be protected provincially or federally, and direct applications to the appropriate authorities will be required.

The following examples of legislation are not an exhaustive list but are provided for consideration.

Table 3: Legislation pertaining to yellow iris management

Legislation & Regulating Body	Summary of Purpose	Application to Yellow iris Management
Federal		
<p>Species at Risk Act (SARA)</p> <p>Environment and Climate Change Canada</p> <p>Applicable to Terrestrial and Aquatic Environments</p>	<p>Protection and Recovery of Species at Risk and their Habitats</p>	<p>Permits are required by individuals conducting activities such as yellow iris management that may affect species at risk or damage required habitat.</p> <p>For activities that may affect species listed on Schedule 1 of SARA and for activities which contravene SARA’s general or critical habitat prohibitions, permits may be required. The SARA applies to terrestrial lands including federal lands/parks/national and marine areas for aquatic critical habitat.</p> <p>For more information on species at risk, critical habitat, or obtaining a permit consult:</p> <p>https://www.canada.ca/en/environment-climate-change/services/species-risk-public-registry/permits-agreements-exceptions/permits-agreements-information.html</p>

<p>Migratory Birds Convention Act (MBCA) & Regulations</p> <p>Environment and Climate Change Canada</p> <p>Applicable to Terrestrial and Aquatic Environments</p>	<p>Protection of Migratory Birds, and their Nests and Eggs</p>	<p>Projects that have potential to disturb, harm or kill migratory birds, eggs or disturb their nests will require permits to identify and mitigate impacts.</p> <p>No person or vessel shall deposit a substance that is harmful to migratory birds, or permit a substance in waters or an area frequented by migratory birds or in a place from which the substance may enter such water or such an area.</p> <p>Projects that involve cutting vegetation where migratory birds are likely to be nesting, also requires a permit.</p> <p>For more information and to find out if you require a permit please visit: https://www.canada.ca/en/environment-climate-change/services/migratory-birds-legal-protection/convention-act-regulations.html</p>
<p>Transport Act Historic Canals Regulations</p> <p>Parks Canada</p> <p>Applicable to Aquatic Environments</p>	<p>Management, Proper Use and Protection of Historic Canals</p>	<p>Any aquatic invasive plant removal project located with the Rideau Canal or Trent Severn Waterway will require a permit from Parks Canada</p>
<p>Fisheries Act</p> <p>Fisheries and Oceans Canada</p> <p>Applicable to Aquatic Environments</p>	<p>Protection of Fish and Fish Habitat</p>	<p>Prohibits undertaking work or activities that would lead to:</p> <ul style="list-style-type: none"> • The death of fish (by means other than fishing) or the harmful alteration, disruption or destruction of fish habitat. • Introduction of deleterious substances in water frequented by fish (e.g. herbicides). • Impact species listed as aquatic species at risk and any part of their critical habitat. • If there is risk of harm to fish or their habitat, authorization from DFO is required prior to undertaking any projects to avoid and mitigate impacts. The use of herbicides may be authorized to prevent the introduction or spread of, or to control aquatic invasive plants that may cause harm to fish, fish habitat or use of fish. <p>Consult guidance at the following websites to comply with the Fisheries Act: https://www.dfo-mpo.gc.ca/pnw-ppe/index-eng.html</p>
<p>Pest Control Products Act</p> <p>Pest Management Regulatory Agency (PMRA), Health Canada</p> <p>Applicable to Terrestrial and Aquatic Environments</p>	<p>Regulation of Pest Control Products in Canada</p>	<p>The pesticide label is a legal document.</p> <p>Pesticides must be applied in accordance with all label directions. Using a pesticide to treat a species not listed on the label violates the Pest Control Products Act and may incur penalties. Ensure you have the most current label and are aware of any re-evaluation decisions.</p> <p>Visit the Pest Management Regulatory Agency's product label search site at https://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php</p>

<p>Plant Protection Act and Plant Protection Regulations</p> <p>Canadian Food Inspection Agency</p>	<p>Protection of Plant Resources</p>	<p>Prevents importation of new plant pests and attempts to limit the movement and spread of pests in Canada.</p> <p>No person shall move, grow, raise, culture or produce anything that could be or is a pest species. No person shall import or admit anything to Canada that could be a pest.</p> <p>At the time of publication yellow iris is not listed under the Pests Regulated by Canada. The full list can be accessed at: https://inspection.canada.ca/plant-health/invasive-species/regulated-pests/eng/1363317115207/1363317187811</p>
<p>Weed Seeds Order</p> <p>Canadian Food Inspection Agency</p>	<p>Regulation of Weed Species</p>	<p>Prevents the introduction and spread of new weed species by restricting the presence of weeds in commercially sold seeds. Standards must be met in order to sell or import seeds into Canada.</p> <p>At the time of publication, yellow iris is not listed under the WSO. The full list can be accessed at: https://laws-lois.justice.gc.ca/eng/regulations/SOR-2016-93/page-2.html#h-838559</p>
<p>Provincial</p>		
<p>Endangered Species Act</p> <p>Ministry of Environment Conservation and Parks</p> <p>Applicable to Terrestrial and Aquatic Environments</p>	<p>Protection of Endangered and Threatened Species and their Habitat</p>	<p>Permits are required by those persons conducting activities, such yellow iris management, that may harm species at risk including damaging or destroying habitats.</p> <p>For the full list of species at risk in Ontario and for information on permit requirements consult: http://ontario.ca/page/how-get-endangered-species-act-permit-or-authorization</p>
<p>Environmental Assessment Act</p> <p>Ministry of Environment Conservation and Parks</p> <p>Applicable to Terrestrial and Aquatic Environments</p>	<p>Assess Potential Environmental Effects of a Project</p>	<p>This act applies to provincial ministries and agencies; municipalities; public bodies. This act considers potential environmental effects prior to a project commencing by providing a planning and decision-making process. An environmental assessment may be required if the Ministry of Northern Development, Mines, Natural Resources and Forestry is not the proponent. Contact the Ministry of Environment Conservation and Parks for more information</p> <p>To find out more, consult: https://www.ontario.ca/page/preparing-environmental-assessments</p>
<p>Invasive Species Act</p> <p>Ministry of Northern Development, Mines, Natural Resources and Forestry</p> <p>Applicable to Terrestrial and Aquatic Environments</p>	<p>Prevent and Control the Spread of Invasive Species</p>	<p>The species that are regulated pose a threat to Ontario's natural environment. There are two classes under this act: Prohibited and Restricted.</p> <p>At the time of publication, yellow iris is not listed under the Invasive Species Act. For a full list of the species listed under this act, consult: https://www.ontario.ca/page/managing-invasive-species-ontario</p>

<p>Pesticides Act & Regulation 63/09</p> <p>Ministry of Environment Conservation and Parks</p> <p>Applicable to Terrestrial and Aquatic Environments</p>	<p>Regulation of Pesticide Use in Ontario</p>	<p>Ontario regulates pesticides by assigning appropriate education, licensing and/or permit requirements on their use under the Pesticides Act and Ontario Regulation 63/09. Federally registered pesticide products are assigned one of four federal product class designations (i.e., Manufacturing, Restricted, Commercial and Domestic) and are immediately allowed for sale and use in Ontario. The class designations determine who can sell or use the pesticides products in addition to the restrictions are placed on its use.</p> <p>Under the Pesticides Act, the Ontario Cosmetic Pesticide ban prohibits the use of commercial and restricted herbicides in, on or over land or water. However, some exceptions exist to allow the use of herbicides to control invasive plants including:</p> <ul style="list-style-type: none"> • Agriculture: Farmers can use commercial and restricted pesticides to control invasive plants if they impact agriculture or horticulture operations. • Forestry: Commercial and restricted herbicides can be used in a forest for the purposes of harvesting, renewing or maintaining a forest or protecting forest resources. A Forestry Class Land Exterminator license is required. • Natural Resources: Prohibited pesticides used to manage, protect and renew a natural resource. Must meet specific criteria. • Public Works: Use of pesticides to remove invasive plants along roads, building and infrastructure. • Health or Safety: Use of commercial or restricted herbicides to protect public health and safety. <p>For more information on these exceptions and the rules with respect to pesticide use visit: https://www.ontario.ca/laws/regulation/090063. Consult the Ministry website for updates</p>
<p>Public Lands Act</p> <p>Ministry of Northern Development, Mines, Natural Resources and Forestry</p>	<p>Regulation of Crown and Shore Lands in Ontario</p>	<p>Removal of yellow iris by hand or using mechanical equipment (e.g., a rake or cutter bar) from provincial Crown land and shore lands does not require permits so long as all the rules outlined under the Public Lands Act are followed. If all the rules cannot be met, a permit is required to remove invasive aquatic plants. This does not apply to federal lands and waterbodies (e.g., the Trent-Severn and Rideau Canal waterways).</p> <p>Before commencing your project, consult the rules under the Public Lands Act: https://www.ontario.ca/page/remove-invasive-aquatic-plants</p>
<p>Conservation Authorities Act</p> <p>Ministry of Environment Conservation and Parks</p>	<p>Regulation of Conservation Authorities' Activities Related to Natural Hazard Management</p>	<p>Conservation authorities regulate development of activities occurring in or near rivers or streams, Great Lakes and inland lake shorelines, watercourses and wetlands to prevent water-related natural hazards such as flooding and erosion. This also regulates altering hydrology such as diverting an existing channel of a river.</p> <p>A permit may be required if the property is located in a regulated area. Consult your local conservation authority: https://conservationontario.ca/</p>

Background on Species at Risk Impacted by Yellow iris

Yellow iris can significantly alter wildlife habitat, impacting a variety of birds, reptiles, amphibians, fish, insects and plants, many of which are already considered to be at risk in Ontario and Canada. At the time of this document’s publication, yellow iris is only listed as threat to one species at risk in Ontario: American water-willow (*Justicia americana*) (Ontario Ministry of Natural Resources 2017). Therefore, in this analysis, the level of impact posed by yellow iris to other species at risk is based on potential impacts to required habitat. This is based on the criteria used by Bickerton (2015) to classify impacts of invasive *Phragmites* on species at risk in Ontario as well as input from species at risk experts across Ontario (Bickerton 2015; see Ontario Invasive Plant Council’s Invasive *Phragmites* Best Management Practices document for more details).

High Impact:	Yellow iris is considered a high concern or threat because it can significantly reduce required habitat that could lead to the reduction or disappearance of the species at risk.
Moderate to Low Impact:	Yellow iris is considered to be a moderate to low threat because it is present in similar habitat of the species at risk and is likely to have negative impacts.
Potential Impact:	Yellow iris is considered to be an anticipated threat but likely does not co-occur in the same habitat as the species at risk.
Unknown Impact:	Yellow iris is considered to have unknown impacts to the species at risk or its habitat.

Tables 4 - 9 provide examples of species at risk (birds, amphibians, reptiles, plants, insects and fish) that are listed on Ontario’s Species at Risk List (SARO, see: <https://www.ontario.ca/page/species-risk-ontario>) and/or are listed under the Committee on the Status of Species at Risk in Ontario (COSSARO, see: <http://cossaroagency.ca/species/>). The following list is not exhaustive and impacts are inferred based on potential impacts yellow iris may have to required habitat. This analysis was conducted for provincially listed species at risk. Federally listed species at risk and their habitat may also be impacted. A full list of federally listed species at risk can be found here: <https://species-registry.canada.ca/index-en.html#/species?sortBy=commonNameSort&sortDirection=asc&pageSize=10>. The status of a species at both the federal and provincial level is also indicated for each species included in Tables 3 to 8.



Queensnake
(*Regina septemvittata*)

Photo courtesy of: Scott Gillingwater



Prothonotary warbler
(*Protonotaria citrea*)

Photo courtesy of: Owen Strickland, iNaturalist. Available: <https://www.inaturalist.org/photos/164622322>, no rights reserved



Spiny softshell
(*Apalone spinifera*)

Photo courtesy of: Scott Gillingwater

Birds

Yellow iris has indirect impacts on species at risk birds because it can alter hydrology, changing wetlands to drier environments which can reduce suitable habitat for foraging and nesting. This plant can also outcompete native species of sedges and rushes that are utilized by bird species. At time of publication, no birds are reported to be impacted by yellow iris. However, six species at risk birds may be impacted by yellow iris based on potential impacts to habitat.



Black tern (*Chlidonias niger*)

Photo courtesy of: Oscar Thomas, iNaturalist.
Available: <https://www.inaturalist.org/observations/105302298>,
licensed under CC-BY-NC-ND



King rail (*Rallus elegans*)

Photo courtesy of: Carol Foil, iNaturalist.
Available: <https://www.inaturalist.org/photos/1095733>, licensed under
CC-BY-NC-ND

Table 4: Species at risk birds that may be impacted by yellow iris in Ontario

Species and Status	Habitat/Details	Threats from Yellow iris
<p>Black tern (<i>Chlidonias niger</i>)</p> <p>Provincial: Special Concern Federal: Not at Risk</p>	<p>Occupies marshes with abundant emergent vegetation along rivers and lakes. Prefers shallow water for nesting and feeding.</p>	<p>High: May alter suitable habitat by replacing native vegetation. Alters hydrology and structure of wetlands.</p>
<p>Horned grebe (<i>Podiceps auritus</i>)</p> <p>Provincial: Special Concern Federal: Endangered</p>	<p>Prefers shallow wetlands where it nests on the edges in emergent vegetation. Structure of wetland vegetation provides concealment and protection of their young, as well as nest material.</p>	<p>Potential: May alter suitable nesting habitat by creating dense monoculture of emergent or vegetation altering hydrology. Changing wetlands to drier environments.</p>
<p>King rail (<i>Rallus elegans</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Freshwater marshes that have dense vegetation and surrounded by shrubby areas. Large coastal wetlands.</p>	<p>High: May degrade suitable habitat and reduce the abundance of native vegetation by forming dense vegetation mats that can lower water levels.</p>
<p>Least bittern (<i>Ixobrychus exilis</i>)</p> <p>Provincial: Threatened Federal: Threatened</p>	<p>Preference for cattail marshes with a mix of open pools. Nests in stands of vegetation above the water among vegetation. Needs open water to forage.</p>	<p>Moderate to Low: Competes with native cattails and converts wetlands to drier environments.</p>

<p>Prothonotary warbler (<i>Protonotaria citrea</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Nests in large, mature deciduous swamp forests and floodplains. Nests are usually found over standing or slow-moving water in cavities of dead or dying trees.</p>	<p>Moderate to Low: Alter suitable habitat for nesting by creating dense monocultures and outcompeting native plants.</p>
<p>Yellow rail (<i>Coturnicops noveboracensis</i>)</p> <p>Provincial: Special Concern Federal: Special Concern</p>	<p>Secretive bird. Found in marshes and shallow wetlands among reeds and sedges. Prefers short vegetation.</p>	<p>Moderate to Low: Competes with native species of bur-reeds and sedges lowering suitable habitat.</p>

Amphibians

Yellow iris likely has indirect impacts on amphibians by altering preferred foraging, reproduction and breeding habitat. At the time of publication, no amphibians have been reported to be impacted by yellow iris. The following list of eight amphibian species at risk may be impacted by yellow iris due to potential impacts on habitat needed for breeding and foraging.



Small-mouthed salamander
(*Ambystoma texanum*)

Photo courtesy of: Scott Gillingwater



Blanchard's cricket frog
(*Acris blanchardi*)

Photo courtesy of: Scott Gillingwater



Allegheny mountain
dusky salamander
(*Desmognathus ochrophaeus*)

Photo courtesy of: Scott Gillingwater

Table 5: Species at risk amphibians that may be impacted by yellow iris in Ontario

Species and Status	Habitat/Details	Threats from Yellow iris
<p>Allegheny mountain dusky salamander (<i>Desmognathus ochrophaeus</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Forested areas with small streams or springs fed by groundwater. Lays eggs in underground cavities or shallow depressions.</p>	<p>Unknown: May alter suitable habitat.</p>
<p>Blanchard's cricket frog (<i>Acris blanchardi</i>)</p> <p>Provincial: Extirpated Federal: Endangered</p>	<p>Open wetlands, sparse vegetation, muddy or sandy shores. Prefers dense areas with dense vegetation and muddy substrate. Edges of lakes, ponds, rivers, streams. On Pelee Island, this frog was found in ditches, flooded fields and irrigation canals.</p>	<p>Unknown: Alter suitable habitat, convert wetlands to drier habitats.</p>

<p>Fowler's toad (<i>Anaxyrus fowleri</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Found only along shoreline of Lake Erie in Rondeau, Long Point and Niagara region. Requires different habitats for lifecycle. For feeding it requires shorelines. For breeding, it requires wetlands with few plants or streams that open up to sand beaches. It hibernates in sand dunes with little vegetation.</p>	<p>High: Alter suitable breeding habitat, converting wetlands to drier habitats.</p>
<p>Jefferson salamander (<i>Ambystoma jeffersonianum</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Found in deciduous or mixed upland forests. Utilizes ephemeral woodland ponds (i.e., vernal pools) for breeding. Requires ponds with woody vegetation such as dogwood (<i>Cornus</i> spp.) shrubs and downed woody debris for egg attachment sites.</p>	<p>Potential: May alter function or structure of woodland ponds by outcompeting woody vegetation.</p>
<p>Northern dusky salamander (<i>Desmognathus fuscus</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Forested areas near intermittent streams or moist areas fed by seepage or springs. Utilizes rocks, logs, or leaf litter for cover and breeding.</p>	<p>Unknown: May alter suitable habitat. Invasive plants within/near salamander habitat may affect natural groundcover in existing significant habitat</p>
<p>Small-mouthed salamander (<i>Ambystoma texanum</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Deciduous forests, seasonally flooded deciduous swamps, and naturalized agricultural lands with suitable breeding ponds.</p>	<p>Unknown: May alter suitable habitat.</p>
<p>Unisexual ambystoma</p> <p>Jefferson Salamander Dependent Population</p> <p>(<i>Ambystoma laterale – jeffersonianum</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Found in deciduous or mixed upland forests. Utilizes ephemeral woodland ponds (i.e., vernal pools) for breeding. Requires ponds with woody vegetation such as dogwood (<i>Cornus</i> spp.) shrubs and downed woody debris for egg attachment sites.</p>	<p>Potential: May alter function or structure of woodland ponds by outcompeting woody vegetation.</p>
<p>Unisexual ambystoma</p> <p>Small-mouthed Salamander Dependent Population</p> <p>(<i>Ambystoma laterale – texanum</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Deciduous forests, seasonally flooded deciduous swamps, and naturalized agricultural lands with suitable breeding ponds.</p>	<p>Unknown: May alter suitable habitat.</p>



Fowler's toad (*Anaxyrus fowleri*)

Photo courtesy of: Scott Gillingwater

Reptiles

Yellow iris may indirectly impact species at risk reptiles through altering habitat usage. Dense stands of yellow iris may impede movement and decrease suitable habitat needed for different life processes such as thermoregulation (basking) and nesting. No species at risk reptiles have been reported to be impacted by yellow iris.



Blanding's turtle
(*Emydoidea blandingii*)

Photo courtesy of: Scott Gillingwater



Eastern ribbonsnake
(*Thamnophis sauritus*)

Photo courtesy of: Scott Gillingwater



Northern map turtle
(*Graptemys geographica*)

Photo courtesy of: Riley Walsh, iNaturalist.
Available: <https://www.inaturalist.org/photos/143090353>, licensed by CC-BY-NC

Table 6: Species at risk reptiles that may be impacted by yellow iris in Ontario

Species and Status	Habitat/Details	Threats from Yellow iris
<p>Blanding's turtle (<i>Emydoidea blandingii</i>)</p> <p>Provincial: Threatened Federal: Endangered</p>	<p>Semi-aquatic species inhabiting shallow water habitats (i.e., wetlands and shallow lakes). Needs muddy substrate for hibernation in permanent water bodies. Nests in full-sun, open areas with low vegetation cover and exposed substrate.</p>	<p>Moderate to Low: May alter function and structure of wetlands over time with the creation of dense monocultures shifting hydrology to drier conditions through trapping sediment.</p> <p>Dense stands of yellow iris may prevent movement through habitat or reduce available nesting area.</p>
<p>Eastern foxsnake (<i>Pantherophis gloydi</i>)</p> <p>(Carolinian population)</p> <p>Provincial: Endangered Federal: Endangered</p> <p>Threatened (Georgian Bay population)</p> <p>Provincial: Threatened Federal: Endangered</p>	<p>Carolinian population is often found in old fields, hedgerows, marshes, drainage canals, and shorelines.</p> <p>Georgian Bay population is often found within 150 m of shorelines using trees and shrubs in rocky habitats.</p>	<p>Unknown: May alter suitable habitat.</p>

<p>Eastern musk turtle (<i>Sternotherus odoratus</i>)</p> <p>Provincial: Special Concern Federal: Special Concern</p>	<p>Highly aquatic species. Stagnant or slow-moving areas of shallow wetlands, lakes, and watercourses. Basks just below the water's surface, using floating vegetation for cover. Requires vegetation and soft substrate for hibernation.</p>	<p>Potential: Alter habitat by trapping sediment and changing wetlands to drier habitats. Limit movement through habitat by forming dense mats of vegetation.</p>
<p>Eastern ribbonsnake (<i>Thamnophis sauritus</i>)</p> <p>Provincial: Special Concern Federal: Special Concern</p>	<p>Open wetlands with still or flowing water (i.e., bogs, fens, marshes).</p>	<p>Potential: Alter habitat by creating dense mats of floating vegetation and lower water open water.</p>
<p>Northern map turtle (<i>Graptemys geographica</i>)</p> <p>Provincial: Special Concern Federal: Special Concern</p>	<p>Water bodies such as lakes, rivers, and streams with areas of shallower water and soft substrates. Nests in areas with low vegetation cover, exposed substrates, and full sun exposure.</p>	<p>Moderate to Low: May reduce available nesting area.</p>
<p>Queensnake (<i>Regina septemvittata</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Highly aquatic species. Typically found in rivers, streams, and lakes with high amounts of cover (e.g., rocks) and large populations of crayfish for prey.</p>	<p>Moderate to Low: Can alter suitable habitat by creating drier environments.</p>
<p>Snapping turtle (<i>Chelydra serpentina</i>)</p> <p>Provincial: Special Concern Federal: Special Concern</p>	<p>Found in most freshwater habitats across Ontario, preferring slow-moving water with soft substrates (mud or sand) and dense vegetation cover.</p> <p>Nests in areas with low vegetation cover, exposed sand or gravelly substrates, and full sun exposure.</p>	<p>High: May alter suitable (gestation, nursery, thermoregulation) habitat by creating dense mats of floating vegetation or changing wetland habitat to drier areas. May reduce available nesting area.</p>
<p>Spiny softshell (<i>Apalone spinifera</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Highly aquatic species. Usually found in rivers, oxbows, and lakes with soft substrate. Require exposed sand or gravel close to the water for nesting. Utilizes muddy or sandy areas underwater in deep pools for juvenile nurseries. Fallen trees, rocks, and concrete for basking.</p>	<p>High: May alter suitable (gestation, nursery, thermoregulation) habitat by creating dense mats of floating vegetation or changing wetland habitat to drier areas. May reduce available nesting area.</p>
<p>Spotted turtle (<i>Clemmys guttata</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Semi-aquatic species. Often found in ponds, marshes, fens, bogs and sometimes ditches with slow-moving water and soft substrates. Utilizes habitat with high graminoid cover (e.g., sedges, cattails, grasses).</p> <p>Nests in areas with full sun exposure.</p>	<p>High: May alter suitable (gestation, nursery, thermoregulation) habitat by creating dense mats of floating vegetation or changing wetland habitat to drier areas. May reduce available nesting area.</p>



Spotted Turtle (*Clemmys guttata*)

Photo courtesy of: Scott Gillingwater

Plants

Yellow iris outcompetes native plants by creating dense monocultures and converting aquatic environments to drier habitats. At the time of publication, yellow iris is listed as a direct threat only to American water-willow (*Justicia americana*). Yellow iris may pose a direct threat to the other seventeen plant species listed; however, research is lacking.



Eastern prairie fringed orchid
(*Platanthera leucophaea*)

Photo courtesy of: David Featherstone



American water-willow
(*Justicia americana*)

Photo courtesy of: Yianni Laskaris , iNaturalist. Available: <https://www.inaturalist.org/observations/125479060>, licensed under CC-BY-NC



Dwarf lake iris
(*Iris lacustris*)

Photo courtesy of: Laurel J. Ramseyer, iNaturalist. Available: <https://www.inaturalist.org/observations/144899516>, licensed under CC-BY-NC

Table 7: Species at risk plants that may be impacted by yellow iris in Ontario

Species and Status	Habitat/Details	Threats from Yellow iris
American water-willow (<i>Justicia americana</i>) Provincial: Threatened Federal: Threatened	Occurs along riparian areas (rivers, streams, shallow lakes). Prefers gravel, sand or organic material substrate.	High: Displaces native vegetation by creating monocultures.
Bluehearts (<i>Buchnera americana</i>) Provincial: Endangered Federal: Threatened	Occurs in open habitats with sandy or gravelly soils. In Ontario, this species is found in moist areas between dunes or in swales along the shores of southern Lake Huron. Found in graminoid coastal meadow marsh and shrubby cinquefoil coastal meadow marsh communities.	Moderate to Low: May invade suitable habitat.
Bent spike-rush (<i>Eleocharis geniculata</i>) Provincial: Endangered Federal: Endangered	Prefers wet, sandy to muddy soils on open flats. Also found on edges of wet meadows.	Moderate to Low: May invade suitable habitat.
Dwarf lake iris (<i>Iris lacustris</i>) Provincial: Special Concern Federal: Special Concern	Prefers sandy or thin soils on limestone gravel. Occurs in cedar swamps and alvars.	Unknown: May alter suitable habitat

<p>Eastern prairie fringed-orchid (<i>Platanthera leucophaea</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Typically found in fens, shorelines (limestone), wet prairies and old wet fields.</p>	<p>Potential: May alter suitable habitat.</p>
<p>Engelmann's quillwort (<i>Isoetes engelmannii</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Prefers sand or silty-sand soil over clay substrates. Found in lakes and streams.</p>	<p>Moderate to Low: Competes with and invades suitable habitat in lakes and streams.</p>
<p>False hop sedge (<i>Carex lupuliformis</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Found in swamps and marshes. It prefers open areas with lots of sunlight.</p>	<p>Unknown: May alter suitable habitat and compete with this species.</p>
<p>Hairy valerian (<i>Valeriana edulis</i> ssp. <i>ciliata</i>)</p> <p>Provincial: Threatened Federal: Not on Schedule 1</p>	<p>Found in wet to moderately wet prairies and fens. Sometimes found on hillsides and bluffs that have groundwater flow.</p>	<p>Potential: May occur in similar habitat and outcompete this species.</p>
<p>Heart-leaved plantain (<i>Plantago cordata</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Found in wet woods often along slow-moving streams.</p>	<p>Potential: May compete with this species along shorelines.</p>
<p>Hill's pondweed (<i>Potamogeton hillii</i>)</p> <p>Provincial: Special Concern Federal: Species Concern</p>	<p>Prefers slow-moving streams, ditches, ponds, lakes and wetlands in clear and cold alkaline waters</p>	<p>Potential: May compete with this species and alter suitable habitat. Although may not compete with this species in deeper water.</p>
<p>Horsetail spike-rush (<i>Eleocharis equisetoides</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Shallow water on edges of ponds. Prefers sandy organic muddy soils.</p>	<p>Moderate to Low: Compete with this species and invade suitable habitat along shorelines.</p>
<p>Ogden's pondweed (<i>Potamogeton</i> × <i>ogdenii</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Clear, alkaline, slow-moving ponds and lakes.</p>	<p>Potential: May invade suitable habitat and convert aquatic environments to dryer habitats. Although may not compete with this species in deeper water.</p>
<p>Scarlet ammannia (<i>Ammannia robusta</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Edges of wetlands and ponds that are seasonally flooded. Needs fluctuating water levels.</p>	<p>High: Invade suitable habitat and outcompete.</p>
<p>Small-flowered lipocarpa (<i>Cyperus subsquarrosus</i>)</p> <p>Provincial: Threatened Federal: Endangered</p>	<p>Typically found on sandy beaches that are seasonally flooded. It prefers sites protected from high waves or strong currents in open, sunny areas with sparse vegetation</p>	<p>Potential: May occur in the same habitat and outcompete this plant</p>

<p>Small white lady's slipper (<i>Cypripedium candidum</i>)</p> <p>Provincial: Endangered Federal: Threatened</p>	<p>Typically found in moist prairies or fens in full sun conditions.</p>	<p>Potential: May occur in the same habitat and outcompete this species</p>
<p>Swamp rose-mallow (<i>Hibiscus moscheutos</i>)</p> <p>Provincial: Special Concern Federal: Sepcial Concern</p>	<p>Prefers meadow marshes and deep-water cattails marshes. Restricted to shorelines marshes in Carolinian and Great Lakes region.</p>	<p>High: Alters suitable habitat by creating dense mats of floating vegetation.</p>
<p>Tuberous Indian-plantain (<i>Arnoglossum plantagineum</i>)</p> <p>Provincial: Special Concern Federal: Special Concern</p>	<p>Typically found in shoreline fens or wet meadows in open, sunny areas</p>	<p>Potential: May occur in same habitat and outcompete this plant.</p>
<p>Virginia mallow (<i>Ripariosida hermaphrodita</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Prefers riparian habitats that flood in most years. Found in sunny to partial-shade areas.</p>	<p>Potential: May alter suitable habitat. Mature <i>R. hermaphrodita</i> plants likely outcompete yellow iris; however, seedlings may be affected.</p>



Small white lady's slipper
(*Cypripedium candidum*)

Photo courtesy of: Matthew Thompson, iNaturalist. Available: <https://www.inaturalist.org/observations/80182795>, licensed under CC-BY-NC.



Small-flowered lipocarpa
(*Cyperus subsquarrosus*)

Photo courtesy of: Jay Horn, iNaturalist. Available: <https://www.inaturalist.org/observations/135027203>, licensed under CC-BY



Virginia mallow
(*Ripariosida hermaphrodita*)

Photo courtesy of: Anthony Zammitt iNaturalist. Available: <https://www.inaturalist.org/observations/88895986>, licensed under CC-BY

Insects

Three insect species may be indirectly impacted by yellow iris due to loss of preferred habitat however, research is lacking.



Hine's emerald (*Somatochlora hineana*)

Photo courtesy of: Greg Lasley, iNaturalist. Available: <https://www.inaturalist.org/photos/265965>, licensed under CC-BY-NC

Table 8: Species at risk insects that may be impacted by yellow iris in Ontario

Species and Status	Habitat/Details	Threats from Yellow iris
<p>Bogbean moth (<i>Hemileuca</i> sp. 1)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Open and low shrub fens where bogbean (<i>Menyanthes trifoliata</i>) occurs.</p>	<p>Potential: May compete with bogbean in fen habitat.</p>
<p>Hine's emerald (<i>Somatochlora hineana</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Found in wetlands that are dominated by grassy vegetation.</p>	<p>Potential: May invade suitable wetlands habitat.</p>
<p>Monarch (<i>Danaus plexippus</i>)</p> <p>Provincial: Special Concern Federal: Special Concern</p>	<p>Caterpillar uses meadows and open areas where wetland milkweeds grows and adults feed on nectar from wildflowers</p>	<p>Unknown: May alter habitat and compete with milkweed (the host plant).</p>

Fish

Yellow iris may indirectly impact fish species by altering hydrology and habitat. Further research is needed to understand direct impacts. At the time of publication, yellow iris is not listed as a threat to fish species at risk in Ontario. The following nine species of fish may be impacted by yellow iris.



Grass pickerel (*Esox americanus vermiculatus*)

Photo courtesy of: Daniel Folds, iNaturalist. Available: <https://www.inaturalist.org/observations/98701794>, Licensed under CC-BY-NC

Table 9: Species at risk fish that may be impacted by yellow iris in Ontario

Species and Status	Habitat/Details	Threats from Yellow iris
<p>Blackstripe topminnow (<i>Fundulus notatus</i>)</p> <p>Provincial: Special Concern Federal: Special Concern</p>	Small, low gradient rivers and aquatic and riparian vegetation.	Unknown: Alters habitat and food sources (terrestrial arthropods) by growing in dense monoculture.
<p>Bridle Shiner (<i>Notropis bifrenatus</i>)</p> <p>Provincial: Special Concern Federal: Special Concern</p>	Clear rivers and lakes that have an abundance of aquatic vegetation.	Moderate to Low: Outcompetes native aquatic vegetation and creates dense stands that are impenetrable, lowering habitat needed for spawning, feeding and shelter from predators.
<p>Grass pickerel (<i>Esox americanus vermiculatus</i>)</p> <p>Provincial: Special Concern Federal: Special Concern</p>	Slow moving water. Wetlands, ponds, streams, bays of larger lakes. Muddy substrate.	Unknown: May alter suitable habitat by lowering availability of shallow water aquatic habitat. Creates dense monoculture and alters hydrology.
<p>Lake chubsucker (<i>Erimyzon sucetta</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	Clear, warm, shallow, well-vegetated wetlands.	Unknown: May alter suitable habitat by reducing shallow water through the creation of dense mats of vegetation. May convert wetlands to drier environments.

<p>Northern sunfish (<i>Lepomis peltastes</i>)</p> <p>Great Lakes- Upper St. Lawrence Population</p> <p>Provincial: Special Concern Federal: Special Concern</p>	<p>Prefers shallow, vegetated areas of slow flowing rivers or streams and is also found in warm lakes or ponds that have sand banks or rocky substrate</p>	<p>Potential: Alters hydrology and increased water turbidity which lowers suitable habitat.</p>
<p>Pugnose minnow (<i>Opsopoeodus emiliae</i>)</p> <p>Provincial: Threatened Federal: Threatened</p>	<p>Clear, slow-moving water with vegetation.</p>	<p>Unknown: Converting wetlands to drier environments. Altering hydrology and increasing turbidity.</p>
<p>Pugnose shiner (<i>Notropis anogenus</i>)</p> <p>Provincial: Threatened Federal: Threatened</p>	<p>Clear water with sand, mud or organic matter and with aquatic vegetation.</p>	<p>Unknown: Alters suitable habitat increase turbidity and outcompetes native aquatic plants.</p>
<p>Redside dace (<i>Clinostomus elongatus</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Pools and slow-moving small streams and headwaters. Prefers gravel bottoms</p>	<p>Unknown: Alters suitable habitat by increasing sedimentation and changing stream flow and shape.</p>
<p>Spotted gar (<i>Lepisosteus oculatus</i>)</p> <p>Provincial: Endangered Federal: Endangered</p>	<p>Shallow and slow moving water and abundant vegetation.</p>	<p>Unknown: May alter suitable habitat by creating dense monocultures. May alter hydrology and sedimentation, changing wetlands to forests.</p>
<p>Warmouth (<i>Lepomis gulosus</i>)</p> <p>Provincial: Endangered Federal: Special Concern</p>	<p>Vegetated shallow, warm waters. Muddy substrate. Lakes, shallow bays, ponds, wetlands with slow moving water.</p>	<p>Unknown: May alter suitable habitat of Warmouth and efforts to control invasive species by mechanical or chemical removal is expected to have negative impacts on Warmouth.</p>



Redside dace (*Clinostomus elongatus*)

Photo courtesy of: iNaturalist. Available: <https://www.inaturalist.org/observations/85833144>, Licensed under CC-BY-NC



Northern sunfish (*Lepomis peltastes*)

Photo courtesy of: iNaturalist. Available: <https://www.inaturalist.org/observations/30389141>, Licensed under CC-BY-NC

Management Considerations



Yellow iris being managed in a wetland.

Photo courtesy of: Lexi Armstrong, Nature Conservancy of Canada.

Avoid planting yellow iris, especially in areas where it could escape, particularly into environmentally sensitive areas, and preventing its spread before it becomes established will significantly reduce its impact on native ecosystems, the economy and society. A plan to control yellow iris should follow an Integrated Pest Management (IPM) approach. This incorporates existing knowledge about the plant species (i.e., biology and life cycle) and its surrounding environment and uses a combination of control measures to prevent and fight infestations. This approach also incorporates preventative actions such as reducing disturbance caused by human activities that facilitate the movement of invasive species. Early detection and rapid response is also essential for long-term management of yellow iris to prevent further spread. Yellow iris may spread unintentionally on equipment covered in mud, gravel, water, soil and plant material. This spread can be minimized by thoroughly cleaning equipment before moving between sites. For more information consult [Ontario Invasive Plant Council's Clean Equipment Protocol](#).

Once yellow iris is confirmed at a location, a control plan should be developed taking into consideration infestation size, site accessibility, potential for spread and risk of impacts to the environment, economy or society. Control plans should also consider site specific conditions such as native plant richness and diversity and wildlife usage.

If yellow iris has become widely established, a strategic and landscape-level management approach should be considered. The goal of this approach is to encourage partners, landowners and managers to work towards common and shared goals. It incorporates information that highlights how an invasive plant spreads across a landscape including pathways of introduction and site conditions that promote establishment. This approach also focuses on determining the likely impact an invader will have once established. Because it is often unrealistic to try and eliminate the infestation all at once, a landscape-level approach can help determine the desired plant community, areas most vulnerable to invasion and land use objective. From here, it is possible to develop an appropriate IPM management strategy. Failure to examine the site at a broader context can result in increased management costs, be more labour intensive and may not produce desired results across larger areas.

Considerations for Minimizing Unintended Ecological Effects

In some areas, species at risk may be forced to use yellow iris stands as habitat when quality habitat has been lost. As such, it is important to consider that managing yellow iris has the potential to disturb or harm native species or species at risk. Mitigative actions and planning should be undertaken following the suggestions in the following sections.

Habitat Assessments



Conducting habitat assessments is a way to minimize potential ecological effects on species at risk.

Photo courtesy of: Cayla Darling, Blazing Star Environmental

One mitigative action to minimize potential ecological effects on species at risk is to conduct habitat assessments. If possible, existing and up-to-date range distribution data should be incorporated into management strategies to determine what species may occur in an area. However, often large-scale surveys on species at risk are unavailable due to the rarity and cryptic nature of the species in question. As such, conducting habitat assessments may help detect any species at risk occurring in the yellow iris infestation.

Habitat assessments are a key component to categorize and protect habitat for species at risk based on the best available scientific information, community knowledge and Indigenous traditional knowledge. Often these assessments will be required under a permit depending upon the site and proposed control method prior to management activities taking place. By identifying key habitat features, it is then possible to infer which species at risk are likely to occupy the habitat. These assessments should be done by species at risk experts or qualified biologists. Habitat assessments should consider key habitat to all taxa (such as those listed in Tables 3 to 8) and take into consideration that time of year, habitat, weather conditions and survey method will influence which species are detected. As such, it should not be assumed that if a species is not found during a habitat assessment it is not present in the yellow iris stand.

Information from habitat assessments can also be incorporated into monitoring practices during and following management activities.

Existing surveying protocols for species at risk in Ontario can be found here: <https://www.ontario.ca/page/species-risk-guides-and-resources>

Consider Species at Risk Timing Windows

Since it is likely that species at risk will be utilizing stands of yellow iris, timelines of when taxa are actively breeding, nesting, spawning or in an active growth phase, should be considered when conducting management activities. The table below provides a general example of activity timelines for different taxa throughout the year. These timelines should be tailored to your region as they will vary depending on the species as well as climatic and site conditions. Prior to conducting yellow iris management, consult relevant legislation and expertise to acquire necessary permits. The table below is not to be taken as legal advice as it provides general timing windows for species in Ontario. You are responsible to act in accordance with legal requirements (i.e. under permits).

Table 10: General yearly activity timelines for different taxa

Taxa	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Birds*	Active	Active	Active	Breeding	Breeding	Breeding	Breeding	Breeding	Active	Active	Active	Active
Reptiles			Active	Active	Breeding	Breeding	Breeding	Active	Active	Active		
Amphibians			Breeding	Breeding	Breeding	Breeding	Breeding	Active	Active	Active		
Fish**	Breeding	Breeding	Breeding	Breeding	Breeding	Breeding	Breeding	Active	Active	Active	Active	Active
Insects	Active	Active	Active	Breeding	Breeding	Breeding	Breeding	Active	Active	Active	Active	Active
Native Plants	Active	Active	Active	Breeding	Breeding	Breeding	Breeding	Active	Active	Active	Active	Active

Legend



General timing when taxa are breeding/
nesting/spawning.



General timing when taxa are active or in the
growth phase.

*The Migratory Bird Convention Act governs activity windows for migratory birds. Consult the following for more information:

<https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/general-nesting-periods/overview.html>

**The Ontario Ministry of Northern Development, Mines, Natural Resources and Forestry is responsible for establishing timing window guidelines for fish. These are restricted timelines for spawning activity and other critical life stages (i.e. development of eggs and fry). Consult the following for more information:

<https://www.dfo-mpo.gc.ca/pnw-ppe/timing-periodes/on-eng.html>

Mitigative Actions to Prevent Impacts to Species at Risk

Below is a summary of potential impacts to species at risk during different phases of a management project and suggested mitigative actions.

Table 11: Activities during yellow iris management that may impact species at risk and proposed mitigative actions.

Management Activity	Potential Impacts to Species at Risk	Proposed Mitigative Actions
Surveying (pre and post control)	Accidental disturbance or damage to habitats. Disturb or harm species in the area	Have qualified professionals conduct surveys. Individuals with experience managing species at risk and their habitats are preferable. It is preferable to conduct surveys on foot to minimize disturbance to habitat. Special care should be taken to avoid stepping on habitat features for species at risk (i.e. rocks, logs, brush piles and vegetation). Do not handle or capture species at risk.
Control Benthic Barriers	Applying a benthic barrier, a cover that is placed over the bottom sediment of a waterbody, will significantly disturb habitat	Survey for native species and species at risk prior to placing a barrier. Minimize disturbance to adjacent habitat.
Control Tarping	Applying a tarp is non-selective and will kill all plant species under it	Survey for native species prior to tarping. Minimize the area that needs to be tarped.



Yellow iris growing in a wetland

Photo courtesy of: Lexi Armstrong, Nature Conservancy of Canada.

Developing a Strategy for Management

Yellow iris is unlikely to respond to a single management technique and often requires an adaptive management approach. This approach must consider management and monitoring over multiple years. Therefore, developing an appropriate strategy before conducting management is crucial for effective control. Suggested planning steps include:

1. Site Evaluation and Mapping
2. Defining Management Goals
3. Setting Priorities
4. Long-term Management and Monitoring

These steps are further described below.

1. Site Evaluation and Mapping

If you suspect that yellow iris is nearby or on your property, site evaluation and mapping should be done to determine the scope of the infestation. This includes conducting an ecological survey and consulting existing maps and data associated with the site. Survey your property to identify infestations to document current and future distribution of yellow iris. Site evaluation and mapping could include the following:

- **Size of the infestation and location:** Determine the location and extent of the infestation (i.e., how long the stand has been established, stand density, life cycle stage).
- **Pathways of spread:** Identify potential ways that yellow iris has entered the site including natural pathways (i.e., rhizomes and seeds spreading via water) or human-made pathways (i.e., use of boats, all-terrain vehicles where plant material can become stuck and spread between sites). Identify if yellow iris has been intentionally planted in areas adjacent to ponds, lakes, stream etc.
- **Ideal site characteristics:** Identify site characteristics that will encourage the establishment of yellow iris (e.g., soils with high moisture and nitrogen content and areas with full-sun and recent disturbance).
- **Habitat types and species presence:** Identify critical habitat for species at risk to determine which species may be present. Conduct and include information from habitat assessments. Identify any other invasive plants on site.
- **Important features:** Identify features that yellow iris may be affecting (i.e., irrigation ditches and storm water management ponds).
- **Adjacent areas:** Identify other areas on the property that may impede management (i.e., site accessibility) or how yellow iris may impact adjacent areas if not managed.
- **Permitting and authorization:** Determine if permits are needed based on property ownership, presence of protected habitat and species at risk or proposed control method.

For detailed information on mapping techniques, consult the [Landowners Guide for Managing and Controlling Invasive Plants in Ontario](#).

2. Defining Management Goals

Prior to commencing an invasive plant removal project, it is important to define management goals to ensure that control will be effective based on resources available and timelines. Yellow iris management usually requires multiple years of consistent removal, monitoring and often a combination of management techniques.

It is first important to clearly define the intended outcome of management at a site. This could be complete restoration of a site, removal to protect habitat for species at risk, or removal to prevent clogging of irrigation ditches or storm water management ponds. Regardless of the intended outcome, the goal needs a balance between available resources and the size of the infestation. Depending on how established the infestation is, management efforts and timelines will be constrained by available resources and control strategies.

Available resources also need to be considered when defining management goals. Resources will determine the extent and scope of management. Failing to consider necessary resources will result in ineffective management. The following should be considered:

- Seek out potential partners (i.e., landowners, land managers, community-based organizations such as municipalities and conservation authorities) and local knowledge and expertise needed. This also includes identifying subject matter experts to be consulted for further information (i.e., expert ecologists, botanists and biologists).
- Seek out funding over multiple years to ensure availability of necessary resources (i.e., staff or volunteers and needed equipment).
- Secure funding for native plantings if this is a requirement of the management plan for the site.
- Determine what control methods are available which will depend on permitting/authorization, access to necessary equipment or if specialized training is needed.
- Determine timelines for the control project by considering dedicating a certain time of year for control.



Yellow iris taking over a swamp.

Photo courtesy of: Chris Poling, iNaturalist. Available: <https://www.inaturalist.org/observations/26085979> Licensed under CC-BY-NC

3. Setting Priorities

In order for management to be successful, establishing the location of the highest priority sites is imperative. This allows you to develop the best course of action. Take the following suggestions into consideration:

1. If you have limited resources, first attempt to remove the outlying populations (isolated plants or satellite populations) where yellow iris is not yet established to prevent spread into non-infested areas. Remove yellow iris in gardens near natural areas to prevent spread.
2. If you have more resources, address larger “core” populations of yellow iris to reduce the spread of seeds and rhizomes into non-infested areas. Often resources will limit the possibility of addressing the entire populations. Thus, priority areas in the larger population and address management strategically.
3. Focus on protecting areas where yellow iris poses the greatest risk. These areas include environmentally sensitive areas or protected habitats or areas where species at risk or desirable native plants occur.
4. Focus on protecting federally, provincially and regionally rare species and communities. Remove yellow iris and ensure that control efforts do not negatively impact these species.
5. Consider the type of habitat, time of year and land use (i.e., high-traffic recreational areas) and choose the most appropriate control options (e.g., chemical control vs manual/mechanical control).
6. Ensure to identify and consult all landowners prior to beginning management.
7. If possible, dedicate a certain time of year to management.
8. Assess if regeneration or restoration is needed at a site including if seeding or planting native species is needed to help natural succession or increase biodiversity following the removal of yellow iris.

Prioritizing Within a Control Area

(This section is modified from The Landowners Guide to Managing and Controlling Invasive Plants, published by Credit Valley Conservation).

1. Focus on large blocks of un-invaded areas and keep them free of invaders.
2. Control small, younger, outlier (satellite) populations first.
3. Reverse the invasion, expand the cleared area outward and ensure that un-invaded areas are kept free of invasive plants (with regular monitoring).

This flow chart can help land managers choose where to first focus control efforts if controlling satellite populations due to limited resources:

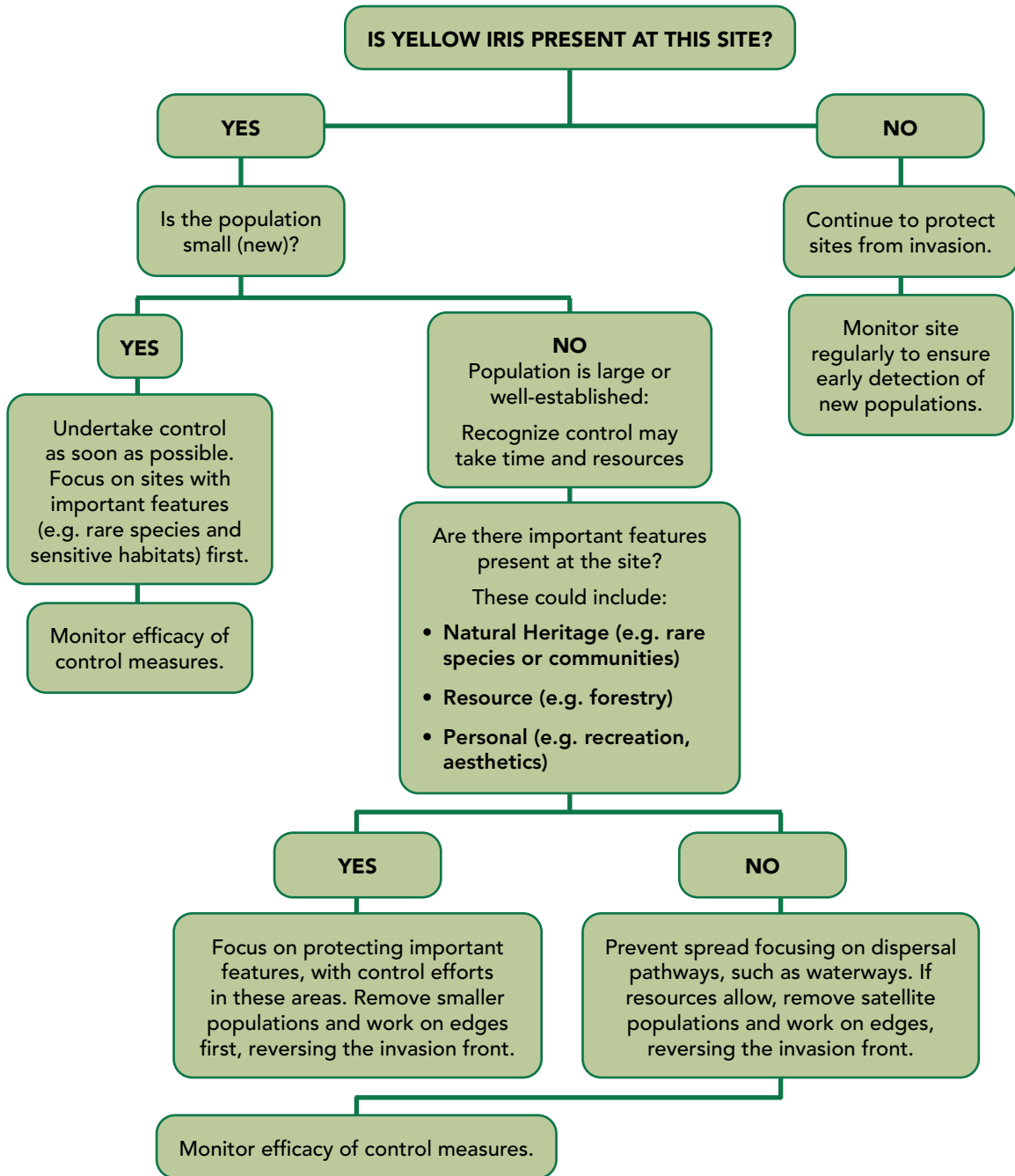


Figure 1: How to prioritize yellow iris sites for effective control.

4. Long-term Management and Monitoring

Prior to implementing control measures, consider developing a long-term management and monitoring plan to help prevent the re-establishment of yellow iris. Monitoring sites after management efforts will allow assessment of the efficacy of current management techniques and determine the types of follow-up treatments that are necessary. Long-term management is crucial to the success of a control project and helps prevent re-invasion from nearby sites or by other invasive plants.

Depending on the site, monitoring can be as simple as taking photos or performing visual assessments. More complex monitoring strategies such as extensive vegetation surveys can also be used. Follow-up control should be done annually and focus on removing individual plants or isolated populations. This is called “spot treatment” and helps ensure that invasive plant population remains controlled and provides ideal conditions for the regeneration of native plant species. For more information on follow-up monitoring, consult the [Landowners Guide for Managing and Controlling Invasive Plants in Ontario](#).

After Management: Assessing Regeneration vs. Restoration

Consider the following factors:

1. **Level of disturbance at the site:**
 - a. Was this a heavily invaded site (e.g., was much disturbance caused during control measures)?
 - b. Will it continue to be disturbed (e.g., through urban management activities or recreational use)?
2. **Biology of the invasive species removed:**
 - a. Is there a seed bank to consider?
 - b. Are there seedbanks from other invasive plants in the area?
3. **Re-invasion risk:**
 - a. Are there invasive species nearby that could re-invade the site from nearby trails, watercourses or other pathways of introduction?
 - b. Are people dumping yard waste that could contain yellow iris?
4. **Existing native vegetation:**
 - a. Will any native vegetation that still exists on the site regenerate quickly?
 - b. Does the existing native vegetation need help? Species with specific habitat requirements or reproductive strategies resulting in low fecundity, including species at risk, may require reintroduction. The majority of plant species should be able to recover naturally, especially if healthy populations exist adjacent to the controlled area

If you answered Yes to most of the questions under 1 to 3, it is most likely that (a) the site will be re-invaded before it has a chance to regenerate on its own or (b) that yellow iris will continue to invade and be present among the native species so that annual control of yellow iris may be required. Restoration will need to reduce the risk of re-invasion. If you answered Yes to the questions under 4, your site may have a lower risk of invasion but could still require some restoration measures to help re-establish native vegetation.

Control Measures



Yellow iris flowering

Photo courtesy of: Josue Amoroso, iNaturalist. Available: <https://www.inaturalist.org/observations/79076510> Licensed under CC-BY-NC

Prevent the Threat:

The spread of yellow iris is often linked to escapes from gardens introductions to nearby natural areas. One of the best methods to control yellow iris is to not plant it in your garden. There are a variety of native alternatives to consider planting in place of yellow iris. Some alternatives to consider are:

- Harlequin blue flag (*Iris versicolor*)
- Yellow marsh marigold (*Caltha palustris*)
- Pickerelweed (*Pontederia cordata*)
- Blue vervain (*Verbena hastata*)
- American sweetflag (*Acorus americanus*)
- Water smartweed (*Polygonum amphibium*)
- Canada anemone (*Anemone canadensis*)
- Purple-stemmed aster (*Symphyotrichum puniceum*)
- Swamp milkweed (*Asclepias incarnata*)
- Michigan lily (*Lilium michiganense*)
- White turtlehead (*Chelone glabra*)

For more information and suggestions of alternative native and non-invasive to plant, consult the [Ontario Invasive Plant Council's Grow Me Instead](#) guides.

Summary of Available Control Strategies:

Control of yellow iris is best achieved using an Integrated Pest Management approach which utilizes information about site conditions (i.e. substrate type, water depth and stand density), information about the plant's life cycle and combines multiple control strategies.

Once established, yellow iris becomes difficult to eradicate. As such, controlling yellow iris when the infestation is small will be most effective. Its ability to regenerate from rhizome fragments can make control difficult. Hand pulling and digging is often counterproductive because this fragments the rhizomes which can generate new plants. When handling yellow iris, ensure that you are wearing gloves as the sap of this plant can cause skin irritation and is toxic if ingested.

If yellow iris is detected early, individual plants or small populations can be effectively managed with hand pulling and digging ensuring that the whole rhizome is removed. When individual plants or small populations occur and remain under at least 5 cm of standing water throughout the growing season, they can be effectively managed by selective cutting or spading. If the goal of management is to prevent the spread of seeds, seed pods can be removed from plants before they dry out (July – September). Finally, large and well-established populations can often be effectively managed using tarping or benthic barriers.

At the time of publication, there are currently no chemical or biological control options available for yellow iris in Canada.

Control efforts should limit disturbance to soil to prevent establishment of other invasive plants and should avoid damaging nearby native plants. The site should be monitored throughout the growing

season and any new growth should be removed ensuring to remove the entire rhizome.

Timing of Management:

The time at which a yellow iris population is managed will impact the effectiveness of control. The following should be considered:

- The life cycle of yellow iris and when control is likely to be most effective. Digging, hand pulling, selective spading, tarping and benthic barriers, should be done when the plant is actively growing between April – June. Removing seed pods should be done prior to them drying out between July – September.
- Avoid management when native species and species at risk are active and may be affected (i.e. using the habitat for breeding, nesting, spawning etc., see Table 9).
- If possible, conduct management at the same time each year when resources such as staff/ volunteers and equipment are available.



Yellow iris stand in early spring

Photo courtesy of: Scott Gillingwater

Manual

Hand Pulling and Digging:

Hand pulling or digging yellow iris involves using shovels or spades to remove all above and below ground vegetation. It can be an effective management technique for individual plants or small and isolated populations so long as the entire rhizome is removed.

Ideal Site Conditions:	<ul style="list-style-type: none">• Individual plants or small and isolated populations (< 1 m²).• Larger infestations can be very time consuming and labor intensive.• Areas where soil is moist or in shallow water.
Goal:	<ul style="list-style-type: none">• Prevent and control spread.
Timing:	<ul style="list-style-type: none">• April – June.
Frequency:	<ul style="list-style-type: none">• Several times throughout the growing season as regrowth can occur. Repeated for 3 – 4 years (Coggon 2013).
Method:	<ul style="list-style-type: none">• Wear gloves as the sap of yellow iris can cause skin irritation. For hand pulling, grasp the plant from the base and ensure the entire rhizome is removed. For digging, use a sharp shovel or spade, cut down to a depth of at least 30 cm in 10 cm – 15 cm strips (Tu 2003). Remove entire rhizome and any rhizome fragments.
Efficacy:	<ul style="list-style-type: none">• Moderate – Can be effective after several years.
Benefits:	<ul style="list-style-type: none">• Easily accessible and requires minimal training.• Selective.• Low risk to the environment if disturbance is minimized.
Disadvantages:	<ul style="list-style-type: none">• Unless the entire rhizome is removed, the plant will regenerate. Even small pieces of rhizomes (2 cm long) can grow a new plant.• Ensure to remove non-vegetative rhizomes (those that have not yet produced leaves).• Digging can fragment the rhizome and encourage regrowth.• Can be time and labor intensive, depending upon the size of the infestation.• Can increase water turbidity, potentially dislodge native plant species and cause soil disturbance encouraging the establishment of other invasive plants (DiTomaso and Kyer 2016).



Volunteers digging out yellow iris from a wetland

Photo courtesy of: Jennifer Lamoureux, Rideau Valley Conservation Authority

Mechanical

Selective Cutting in Water:

Selective cutting of yellow iris below suitable water depths (at least 10 cm) can drown the plant by inhibiting oxygen supply and trapping toxic gases in the lower plant parts (rhizomes). If plants are maintained below the waterline, new shoots will be unable to reach the surface to obtain oxygen.

Ideal Site Conditions:	<ul style="list-style-type: none">• Individual plants or small infestations in standing water that can remain submerged.
Goal:	<ul style="list-style-type: none">• Prevent and control spread.
Timing:	<ul style="list-style-type: none">• Prior to flowering (April – June).
Frequency:	<ul style="list-style-type: none">• Shoots should be maintained below water level by cutting for at least one year (Tarasoff et al. 2016).
Method:	<ul style="list-style-type: none">• Remove leaves and cut stems below waterline ensuring that stems will be submerged at least 10 cm throughout the growing season (Tarasoff et al. 2016). The shorelines portion of the infestation should be treated with a benthic barrier into at least 10 cm of water depth.
Efficacy:	<ul style="list-style-type: none">• High – Can be very effective if plants are continually submerged. Be sure to cut the base of the rhizome and ensure it is not exposed because it can act as a “snorkel” providing oxygen to the rhizomes and preventing them from decaying (Tarasoff et al. 2016).
Benefits:	<ul style="list-style-type: none">• Selective.• Low risk to environment.
Disadvantages:	<ul style="list-style-type: none">• Plants need to be continually submerged.• Might be difficult to implement in some waterbodies.



If the base of the rhizome is not cut, it can act as a “snorkel” providing oxygen to the rhizomes.

Photo courtesy of: Dr. Catherine Tarasoff, Agrowest Consulting Scientists Ltd

Removing Seed Pods:

Removing seed pods from yellow iris is an effective technique to prevent seed development and dispersal. However, it will not kill plants or prevent them from spreading via rhizomes.

Ideal Site Conditions:	<ul style="list-style-type: none">• Small to large infestations.
Goal:	<ul style="list-style-type: none">• Prevent seed development and dispersal.
Timing:	<ul style="list-style-type: none">• Prior to capsules drying out and releasing seeds (July – August).
Frequency:	<ul style="list-style-type: none">• Once per year, following up for at least 3 – 4 years.
Method:	<ul style="list-style-type: none">• Wearing gloves, use garden clippers to sever seed pods and place in thick garbage bags.
Efficacy:	<ul style="list-style-type: none">• High – Can prevent the spread of the plant via seed if repeated for several years.
Benefits:	<ul style="list-style-type: none">• Prevent plants from spreading via seeds.• Easily accessible method with minimal training.• Ideal for environmental sensitive areas where digging would cause too much disturbance.
Disadvantages:	<ul style="list-style-type: none">• Time consuming and labor intensive for larger infestations.• Will not prevent the plant from spreading via rhizomes.• Will not kill the plants.



Yellow iris seed pods.

Photo courtesy of: Lexi Armstrong, Nature Conservancy of Canada

Cultural

Benthic Barriers:

Benthic barriers, also known as bottom mats or bottom barriers, are covers placed on the bottom sediment of a waterbody over an invasive plant population. The goal of this barrier is to prevent light penetration, disrupt photosynthesis and to kill rhizomes by trapping toxic compounds. Yellow iris can withstand anoxic conditions because it metabolizes a compound that allows it to get energy in these circumstances. Acetaldehyde gas is a toxic byproduct of this anaerobic (no oxygen) respiration. Growth that occurs above water allows the gas to escape. Severing above water vegetation traps acetaldehyde gas in the rhizomes, causing them to die.

Ideal Site Conditions:	Small to large dense infestations.
Goal:	Block light to disrupt photosynthesis and kill rhizomes in anoxic conditions.
Timing:	Early spring.
Frequency:	Once a year and will need to be in place for several growing seasons. Revisit the site multiple times to inspect for growth beyond the barrier. Remove only when rhizomes have turned dark brown and mushy (Streichert and Tarasoff 2015; Tarasoff et al. 2016).
Method:	<p>Cut the plant down to base (2 cm – 5 cm) prior to applying the barrier. Use heavy PVC pond liner (18 oz PVC vinyl). Tarps or plastic sheeting will not work as the rhizomes can penetrate thin material. Dig a trench and push the liner into the sediment. Cover all rhizomes, extending 20 cm beyond the edge of the infestation. If using multiple liners, overlap them by at least 15 cm and connect them using 50 cm spikes with washers to have no open seams where rhizomes could penetrate. Secure the barrier to the sediment using bricks or rocks (Streichert and Tarasoff 2015; Tarasoff et al. 2016; Capital Region District BC 2021).</p> <p>See this YouTube playlist for directions on how to apply this technique: Yellow iris - Instructional Videos on Using Benthic Barrier Technique - YouTube.</p>
Efficacy:	High – Can eradicate a population within a few years if maintained.
Benefits:	<p>Very effective.</p> <p>Low risk to environment if desirable native plants are avoided.</p> <p>18 oz PVC vinyl is reusable for at least 10 years and is fish-friendly.</p>
Disadvantages:	Non-selective and will kill all rhizomes under the barrier.



A benthic barrier installed in a wetland. The barrier is secured to the sediment with rocks.

Photo courtesy of: Dr. Catherine Tarasoff, Agrowest Consulting Scientists Ltd

Tarping:

Tarping is similar to benthic barriers and is applicable to yellow iris infestations that occur on land. This method involves covering the infestation with material that is completely opaque where no sunlight is able to penetrate such as thick, non-woven landscape fabric, black plastic tarps, sheeting or cardboard. It can be an effective method if the infestation is confined to land. If the infestation also occurs in water, tarping should be used in conjunction with applying a benthic barrier.

Ideal Site Conditions:	Small to large infestations on land.
Goal:	Block sunlight and prevent plants from photosynthesizing.
Timing:	Early spring (Simon 2008).
Frequency:	Once during the spring and follow-up monitoring throughout the growing season to remove any growth beyond the tarp.
Method:	First, cut or mow plants close to the ground. Cover the infestation with a thick tarp made of opaque material where sunlight cannot penetrate. Extend the tarp at least 1 m beyond edges of infestation and secure edge with rocks or bricks (Simon 2008).
Efficacy:	High – Can eradicate a population within a few years if maintained and if infestation is confined to land.
Benefits:	If infestation is contained to land, it will effectively kill rhizomes.
Disadvantages:	Can be ineffective if infestation is also in water. This is because the rhizomes are connected and the infestation in water still allows plants under the tarp to collect oxygen. Non-selective will kill all plants under the tarp.



Tarping a yellow iris infestation on land.

Photo courtesy of: Dr. Catherine Tarasoff, Agrowest Consulting Scientists Ltd

Prescribed Burning:

NOT RECOMMENDED.

Yellow iris can survive burning due to its extensive underground root system (Tu 2003; DiTomaso and Kyser 2016). In addition, seeds have been reported to germinate well post-burn (Sutherland 1990; Jacobs *et al.* 2010). Many native wetlands species are not adapted for fire and this method could kill desirable native plant species.

Grazing:

NOT RECOMMENDED.

Yellow iris is toxic to many livestock species (Washington State Noxious Weed Control Board n.d.; Jacobs *et al.* 2010). Many species will avoid consuming this plant.

Biological

Non-native and invasive plants such as yellow iris often escape their natural predators and experience lower herbivore pressure than they would in their native range. This eliminates natural controls in their new habitats, leading to higher competitive advantages. Biological control uses highly host-specific natural controls (i.e., predatory insects and fungal pathogens) to re-establish an ecological balance between the invasive species and its natural controls. These biological control agents come from the country (or countries) of origin and are introduced to the country where the invasive species is a problem. Prior to this, biological control agents undergo rigorous host-range testing in the country of origin or under quarantine to ensure host specificity to the targeted invasive species.

Currently, the flea beetle *Aphthona nonstriata*, is undergoing host-specificity testing in South Africa and early results are promising (Minuti *et al.* 2021, 2022). There are currently no approved biological control agents for yellow iris in Canada. For more information on the status of biological control agents in Canada, visit: <https://inspection.canada.ca/plant-health/invasive-species/biological-control-agents/eng/1514956211166/1514956212112>

Chemical

Chemical control of yellow iris in Canada is currently unavailable at the time of this document's publication. While aquatic-safe herbicides that are glyphosate-based or imazapyr-based are currently used to control yellow iris in the USA, no products are currently approved for use in Canada.

The management of pesticides is a joint responsibility of the federal and provincial governments. The federal government, through the Pest Management Regulatory Agency (PMRA), is responsible for approving the registration of pesticides across Canada under the *Pest Control Products Act*. Ontario regulates the sale, use, storage, transportation and disposal of pesticides including issuing licenses and permits under the *Pesticides Act* and Ontario Regulation 63/09. Federally registered pesticide products are assigned one of four product class designations (i.e., Manufacturing, Restricted, Commercial and Domestic). The class of pesticides determines who can sell or use the pesticides products as well as what restrictions are placed on its use (e.g., requires a license and/or permit)

The Ontario's *Cosmetic Pesticides Ban Act* prohibits the non-essential use of pesticides in, on or over land. Pesticides can only be used for cosmetic purposes if the use is permitted under the ban, or the active ingredient in the pesticide is included on the Allowable List. The cosmetic pesticide ban has requirements for training that promotes reducing reliance on pesticides through an integrated pest management approach. In addition, Ontario has specific rules with respect to the sale of domestic pesticides that fall under the Ontario's Cosmetic Pesticide Ban. For more info, please visit the guide to pesticide classes.

Herbicides must be applied in accordance with the federal *Pest Control Products Act*, the *Ontario Pesticides Act*, Ontario Regulation 63/09 and in accordance with all label directions. The easiest way to find a chemical label is by using the Pesticide Management Regulatory Agency (PRMA) label search tool which can be found here: <https://pr-rp.hc-sc.gc.ca/lr-re/index-eng.php>. Using a pesticide to treat a species not listed on the label violates the *Pest Control Products Act* and may incur penalties. Consult this tool to ensure you have the most current label and are aware of any re-evaluation decisions.

Disposal

After control

Plant material should be removed from the site to prevent regeneration via rhizomes and germination of seeds. Plant material should be placed in thick, garbage bags and left in the sun for 2 – 3 weeks. Following this, material can be disposed of in a landfill. Care should be taken to dispose of all rhizomes. Yellow iris can re-root and sprout new plants via rhizome fragments even as small as 2 cm long.

Do not burn

Yellow iris rhizomes can survive extreme temperatures and will likely not be killed by burning. Seeds can also germinate after burning.

Do not backyard compost

Backyard composters do not reach the temperatures necessary to kill seeds and rhizomes. Do not compose any viable plant material (i.e., fruits, seeds, rhizomes).

Municipal compost

Large-scale municipal composting facilities where compost pile reaches temperatures high enough to kill living plant material can be used to dispose of viable plant material. Ontario composting facilities are required to routinely monitor the compost process and meet strict, provincially regulated time-temperature parameters for pathogen kill. Consult your local municipality to determine if this is an appropriate course of action

Solarize

Place viable plant material (i.e., fruits, seeds, rhizomes) into thick plastic garbage bags. Seal the bags tightly and leave them in direct sunlight for 2 – 3 weeks. This will “cook” or kill viable plant material. The rotten material can then be composted or disposed of in a landfill. You should contact municipal landfills in advance to determine if they will take yellow iris biomass.



Yellow iris can be bagged and taken off site to decompose.

Photo courtesy of: Jennifer Lamoureux, Rideau Valley Conservation Authority

Restoration

After Control

Ideally when yellow iris is removed from a site, native plants can start to germinate from the soil seed bank and fill the areas. When native species no longer have to compete with yellow iris for space and resources, natural succession may occur. Yellow iris infestations are often dense which limits the number of native plants remaining after removal. While native plant species may grow and re-establish, restoration may be needed especially if the infestation has been long established.

Monitoring the site for the regeneration of native plant species following the removal of yellow iris will dictate restoration requirements. Restoration plantings can be expensive and it is often better to wait and see which native plants re-establish. Following this, select native plant species that will thrive in the site taking into consideration soil characteristics, light regime and co-occurring native plants. Native plants chosen should also take into consideration habitat needs of species at risk and mitigate any negative impacts. Some native and non-invasive plants to consider are:

- Harlequin blue flag (*Iris versicolor*)
- Yellow marsh marigold (*Caltha palustris*)
- Pickerelweed (*Pontederia cordata*)
- Blue vervain (*Verbena hastata*)
- American sweetflag (*Acorus americanus*)
- Water smartweed (*Polygonum amphibium*)
- Canada anemone (*Anemone canadensis*)
- Canada lily (*Lilium canadense*)
- Purple-stemmed aster (*Symphotrichum puniceum*)
- Swamp milkweed (*Asclepias incarnata*)
- Michigan lily (*Lilium michiganense*)
- White turtlehead (*Chelone glabra*)



Native plants establishing after the removal of yellow iris.

Photo courtesy of: Catherine Tarasoff, Agrowest Consulting Scientists Ltd

Preventing the Spread

Prevention and early detection are the most effective tools for controlling the spread of yellow iris and everyone can help by following these suggestions:

✔ Report it.

If you think you see yellow iris, take a picture, record the location, and report it using the following tools: contact the Invading Species Hotline at **1-800-563-7711** or report online at www.eddmaps.org or <http://www.iNaturalist.ca/>. For more information, call the Invading Species Hotline at **1-800-563-7711**, visit www.invadingspecies.com or contact the Ontario Invasive Plant Council at info@oninvasives.ca.

✔ Watch for it.

Learn to recognize yellow iris and then monitor property boundaries, forested areas, fence lines, and trails. Early detection of invasive plants can make it easier and less expensive to remove or control them.

✔ Stop the spread.

Inspect, clean, and remove mud, seeds and plant parts from clothing, pets (including horses), vehicles (including bicycles, trucks, ATVs, etc.) and equipment such as mowers and tools. Clean vehicles and equipment in an area away from natural areas where plant seeds or parts are not likely to spread (e.g., wash vehicles in a driveway or at a car wash) before travelling to a new area.

✔ Keep it natural.

Try to avoid disturbing soil and never remove native plants from natural areas. This leaves the soil bare and vulnerable to invasive species.

✔ Use native species

Try to use local native species in your garden. Do not plant yellow iris and if you have removed it, replant with native species. Encourage local garden centres and nurseries to sell non-invasive or native plants. The Grow Me Instead guide lists alternative species to plant instead of invasive species. For more information on alternative species to plant instead of invasive species, consult the Grow Me Instead guide at <https://www.ontarioinvasiveplants.ca/resources/grow-me-instead/>.

Tracking the Spread (Outreach, Monitoring, Mapping)

Several reporting tools have been developed to assist the public and resource professionals to report goutweed sightings, track the spread, detect it early and respond to it quickly. These include:

1. Early Detection and Distribution Mapping System (EDDMapS): An online reporting tool and free mobile application (iPhone and Android) where users can report sightings, review distribution maps, and explore educational resources of invasive plants and other invasive species. This tool is free to use at www.eddmaps.org and can be downloaded from your app store.
2. The Invading Species Hotline: A toll-free telephone number (1-800-563-7711) operated by the Invading Species Awareness Program where individuals can report sightings verbally.

iNaturalist: An online citizen science reporting tool where users can report sightings and review distribution maps. This tool is free to use at <http://www.iNaturalist.ca/> and can be downloaded from your app store.

If you suspect you have encountered yellow iris or other invasive species, please take detailed photographs (e.g., entire plant, leaves, stem, flowers, or other identifying features), mark your location, and report it using one of the above methods. Do not touch any parts of the plants without gloves on as the sap of the plant is toxic if ingested and can cause skin irritation.



Do not plant yellow iris!

Photo courtesy of: Severn Sound Environmental Association

Additional Information

Eradication of Yellow iris. Glen Lake Association [Video]

<https://www.youtube.com/watch?v=leelnxuewjc>

Invasive Yellow iris Removal. Mid-Vancouver Island Habitat Enhancement Society (MVIHES) [Video]

<https://www.youtube.com/watch?v=fs1LbX8MX4M>

A Landowner's Guide to Managing and Controlling Invasive Plants in Ontario

https://www.ontarioinvasiveplants.ca/wp-content/uploads/2016/07/35266_LandOwnerGuide_June262013_FINAL_WEB.pdf

Ontario Ministry of Natural Resources and Forestry. 2017. Remove Invasive Aquatic Plants. Available at:

<https://www.ontario.ca/page/remove-invasive-aquatic-plants>

Yellow iris- Instructional Videos on Using Benthic Barrier Technique [Videos]

https://www.youtube.com/playlist?list=PL4KIJJaWS-V5EdAI_ief05_JS2wv-6TyYP

Best Management Practices Documents Series from the OIPC

Autumn Olive
Black Locust
Buckthorn
Dog-strangling Vine
Erect Hedge-parsley
Eurasian Water-milfoil
European Black Alder
European Frog-bit
Flowering Rush
Garlic Mustard
Giant Hogweed
Goutweed
Invasive Honeysuckles
Invasive Phragmites
Japanese Knotweed
Multiflora Rose
Norway Maple
Purple Loosestrife
Reed Canary Grass
Scots Pine
Spotted Knapweed
White Mulberry
White Sweet Clover
Wild Parsnip

Invasive Plant Technical Bulletin Series from the OIPC

Black Locust
Dog-strangling Vine
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European Buckthorn
Garlic Mustard
Giant Hogweed
Himalayan Balsam
Invasive Honeysuckles
Invasive Phragmites
Japanese Knotweed
Purple Loosestrife
Reed Canary Grass
White Mulberry
White Sweet Clover
Wild Parsnip

Additional Publications from the OIPC

A Landowner's Guide to Managing and Controlling Invasive Plants in Ontario

A Quick Reference Guide to Invasive Plant Species

Clean Equipment Protocol for Industry

Creating an Invasive Plant Management Strategy: A Framework for Ontario Municipalities

Grow Me Instead! Beautiful Non-Invasive Plants for Your Garden, a Guide for Southern Ontario, Edition 3, 2020 (EN)

Grow Me Instead! Beautiful Non-Invasive Plants for Your Garden, a Guide for Southern Ontario, Summer 2017 (EN, FR)

Grow Me Instead! Beautiful Non-Invasive Plants for Your Garden, a Guide for Northern Ontario

Invasive Aquatic Plant Species: A Quick Reference Guide

Invasive Terrestrial Plant Species: A Quick Reference Guide

The Landowners Guide to Controlling Invasive Woodland Plants

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