

Iris pseudacorus

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INTRODUCTORY

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Pale-yellow iris flower.

Photo by Nancy Loewenstein, Auburn
University, Bugwood.org

AUTHORSHIP AND CITATION:

Stone, Katharine R. 2009. *Iris pseudacorus*. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: <http://www.fs.fed.us/database/feis/> [2010, January 29].

FEIS ABBREVIATION:

IRIPSE

NRCS PLANT CODE [[82](#)]:

IRPS

COMMON NAMES:

pale-yellow iris
paleyellow iris
water flag
yellow iris
yellow flag
yellow flag iris

TAXONOMY:

The scientific name of pale-yellow iris is *Iris pseudacorus* L. (Iridaceae) [[18,34](#)].

Several pale-yellow iris cultivars are available (review by [[73](#)]).

SYNONYMS:

None

LIFE FORM:

Forb

FEDERAL LEGAL STATUS:

None

OTHER STATUS:

Information on state-level noxious weed status of pale-yellow iris in the United States is available at [Plants Database](#).

DISTRIBUTION AND OCCURRENCE

SPECIES: [Iris pseudacorus](#)

- [GENERAL DISTRIBUTION](#)
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GENERAL DISTRIBUTION:

Pale-yellow iris is native to Europe, northern Africa, and temperate Asia (reviews by [[73,90](#)]). A valued horticultural plant, pale-yellow iris was brought to North America and escaped cultivation [[47,60,91](#)], often spreading down watercourses [[47,50,54](#)] or washing downstream in floods [[77](#)]. A review of early floras documented pale-yellow iris in Virginia as early as 1771 [[91](#)]. Pale-yellow iris is widely distributed across most of the United States and Canada. It occurs in almost every state, with the exceptions of North Dakota, South Dakota, Iowa, Wyoming, Colorado, Oklahoma, New Mexico, and Arizona. The [Plants Database](#) provides a distributional map of pale-yellow iris.

HABITAT TYPES AND PLANT COMMUNITIES:

Pale-yellow iris occurs in plant communities associated with water. In its native European range, pale-yellow iris is found in moderately moist meadow communities in northeastern France [[86](#)], hardwood floodplain forest in France [[64](#)], and alkaline peat (fen) communities in Britain [[23](#)]. Lists of associated species in Europe are available in these publications: [[23,64,86](#)]. Though it is a widespread species in North America, as of this writing (2009), there were few published descriptions of plant communities where pale-yellow iris occurs in North America. The plant community descriptions that follow are divided geographically into the [eastern United States](#) and [central and western United States](#).

Eastern United States: In the eastern United States, pale-yellow iris is found in forested wetlands, open wetlands,

and in riparian and floodplain communities.

Forested wetlands: In Van Cortland Park, Bronx, New York, pale-yellow iris occurred in a swamp forest dominated by red maple (*Acer rubrum*), river birch (*Betula nigra*) and green ash (*Fraxinus pennsylvanica*) [55]. At the Ipswich River Wildlife Sanctuary in northeastern Massachusetts, pale-yellow iris occurred in both red maple- and shrub-swamp plant communities. Red maple swamps were dominated by red maple, though green ash was an indicator species of this community type. Shrub swamps were comprised of a mixture of wetland herbs and shrubs including sweetgale (*Myrica gale*), swamp rose (*Rosa palustris*), hazel alder (*Alnus serrulata*), and the nonnatives glossy buckthorn (*Frangula alnus*) and purple loosestrife (*Lythrum salicaria*) [1].

Open wetlands: Pale-yellow iris occurred in both natural and constructed tidal freshwater marshes along the Delaware River in New Jersey. Natural marshes in this area were dominated by the perennial species rice cutgrass (*Leersia oryzoides*), pickerelweed (*Pontederia cordata*), and/or cattails (*Typha* spp.) [41]. On Theodore Roosevelt Island in the Potomac River near Washington, DC, pale-yellow iris occurred in a freshwater tidal marsh inundated daily by high tide. The most abundant species in the marsh included green arrow arum (*Peltandra virginica*), calamus (*Acorus calamus*), narrow-leaved cattail (*Typha angustifolia*), and yellow pond-lily (*Nuphar lutea*) [77]. In Maryland, pale-yellow iris was found in marshes dominated by calamus and in swamps with longbeak arrowhead (*Sagittaria australis*), Gray's sedge (*Carex grayi*), shallow sedge (*C. lurida*), golden ragwort (*Packera aurea*), marsh blue violet (*Viola cucullata*), sweet woodreed (*Cinna arundinacea*), goldenclub (*Orontium aquaticum*), common winterberry (*Ilex verticillata*), hazel alder (*Alnus serrulata*), southern arrowwood (*Viburnum dentatum*), Virginia sweetspire (*Itea virginica*), sweetbay (*Magnolia virginiana*), green ash, and buttonbush (*Cephalanthus occidentalis*) [66]. In southern West Virginia, pale-yellow iris occurred in fringed sedge (*Carex crinita*) table wetlands containing a high diversity of mostly native sedges (*Carex* spp. and *Scirpus* spp.) and rushes (*Juncus* spp.). These wetlands were often associated with beaver activity [71].

Riparian and floodplain communities: Pale-yellow iris occurred but was rare in the late 1960s on flats along the Potomac River dominated by bottomland forest species such as sycamore (*Platanus occidentalis*), boxelder (*Acer negundo*), American elm (*Ulmus americana*), and silver maple (*A. saccharinum*) [76]. At Mt Vernon, Virginia, pale-yellow iris established outside of cultivation in a "low woods" plant community occurring along the Potomac River, in lower reaches of small streams, and along edges of an infilled marsh. Common species in this community included boxelder, red maple, river birch, green ash, and sycamore [91].

Pale-yellow iris was an uncommon species on floodplain and lowland "woodlands" on the edges of swamps in Maryland. These areas were dominated by swamp white oak (*Quercus bicolor*), willow oak (*Q. phellos*), pin oak (*Q. palustris*), Shumard oak (*Q. shumardii*), sweetgum (*Liquidambar styraciflua*), and red maple [66].

In southern West Virginia, pale-yellow iris occurred in both floodplain and riparian plant communities. On wooded upper beach areas, pale-yellow iris occurred in sycamore-river birch forest. This community was often inundated with high water, and substrate varied from sand and mud flats to gravel to large cobble. In this region, pale-yellow iris also occurred in American eelgrass-pondweed (*Vallisneria americana*-*Potamogeton* spp.) instream wetlands, establishing from shoreline to well within the streambed. It was also found in black willow (*Salix nigra*)-river birch communities within tributary streambeds and on riverside beach areas. Inundation with high water was common. Substrates included cobblestone, gravel, or sand. Pale-yellow iris also occurred in Lizard's tail (*Saururus cernuus*) silt accumulations in shallow stretches of slow moving water, often associated with backwater channels and beaver activity [71].

Central and western United States: As of 2009, the only published descriptions of plant communities with pale-yellow iris in the central and western United States were broadleaf cattail (*T. latifolia*) communities. Near Duluth, Minnesota, pale-yellow iris appeared the third season after the construction of a sandbar. Dominant plants included sandbar willow (*Salix interior*) and broadleaf cattail [38]. In Montana, pale-yellow iris occurred in "extensive" stands by itself and intermixed with broadleaf cattail and other aquatic plants [54]. In Sonoma County, California, pale-yellow iris occurred in a marsh with broadleaf cattail, broadleaf arrowhead (*Sagittaria latifolia*), Cusick's sedge (*Carex cusickii*), awlfruit sedge (*C. stipata*), and the nonnative yellow marsh marigold (*Caltha palustris*) [61].

BOTANICAL AND ECOLOGICAL CHARACTERISTICS

SPECIES: *Iris pseudacorus*

- [GENERAL BOTANICAL CHARACTERISTICS](#)
- [SEASONAL DEVELOPMENT](#)
- [REGENERATION PROCESSES](#)
- [SITE CHARACTERISTICS](#)
- [SUCCESSIONAL STATUS](#)

GENERAL BOTANICAL CHARACTERISTICS:

- [Botanical description](#)
- [Raunkiaer life form](#)

Botanical description: This description covers characteristics that may be relevant to fire ecology and is not meant for identification. Keys for identification are available (e.g., [[15,21,22,25,28,29,51,56,62,69,88,92,97](#)]).

Aboveground description: The few to several leaves of pale-yellow iris are stiff and erect [[21](#)], linear, and 10 to 35 inches (25-90 cm) long [[92](#)]. Single or multiple flowering stems are 20 to 39 inches (50-100 cm) tall, usually shorter than or equaling leaves [[21](#)]. Plants take 3 years to mature before flowering (review by [[35](#)]). Flowers are bright yellow or cream-colored and 3 to 4 inches (7-9 cm) wide [[21](#)]. Pale-yellow iris fruits are 6-angled capsules, 2 to 4 inches (5-9 cm) long [[21](#)]. The dark brown, smooth, disk-like seeds are closely packed into 3 rows within the capsule (review by [[73](#)]). Seeds have a hard seed coat beneath which there is a gas space, allowing seeds to float in water [[11](#)].

Belowground description: Pale-yellow iris has rhizomes that are 0.4 to 2 inches (1-4 cm) in diameter (reviews by [[73,90](#)]). Pale-yellow iris invests heavily in root development, particularly as a young plant, allowing it to establish in habitats with fluctuating water levels [[93](#)]. Roots are usually 4 to 8 inches (10-20 cm) long but can be up to 12 inches (30 cm) long (review by [[73](#)]).

Raunkiaer [[57](#)] life form:

[Hemicryptophyte](#)

[Geophyte](#)

[Helophyte](#)

SEASONAL DEVELOPMENT:

Pale-yellow iris flowers from late May to early July in North America [[12,18,56,69,76,77,96](#)]. In the Carolinas, pale-yellow iris fruits from August to October [[56](#)]. In Poland, there are 3 bursts of seed germination; the majority of germination occurs in spring, followed by limited summer and autumn germination (review by [[73](#)]).

REGENERATION PROCESSES:

- [Pollination and breeding system](#)
- [Seed production](#)
- [Seed dispersal](#)
- [Seed banking](#)
- [Germination](#)
- [Seedling establishment and plant growth](#)
- [Vegetative regeneration](#)

Pale-yellow iris reproduces both vegetatively and by seed. In Poland, reproduction from vegetative fragmentation was more common than seedling establishment (review by [73]). In Montana, reproduction by seed was thought to be more important than vegetative reproduction [54]. The method of reproduction used may depend on local site conditions. On the fringes of saltmarshes in Ireland, shore level influenced reproductive method. On high saltmarsh sites, rhizomes were long-lived and seedlings were rare, whereas at low saltmarsh sites, rhizomes were short-lived and there were "considerable" numbers of seedlings [72].

Pollination and breeding system: Pale-yellow iris is a cross-fertilizing species [20]. In its native range, pale-yellow iris is pollinated by bees (*Bombus* spp.) and long-tongued flies (review by [73]). Pale-yellow iris was visited by a syrphid fly in Europe (review by [10]). It attracts hummingbirds and butterflies in its nonnative range (review by [44]).

Seed production: In its native range, pale-yellow iris produced an average of 5.6 capsules/plant with an average of 120 seeds/capsule. At least 30% of these seeds failed soon after fertilization (review by [73]). In Montana, flowering stalks produced 3 to 4 capsules, each containing 50 to 60 seeds [54].

Seed dispersal: Pale-yellow iris seeds are dispersed by water [93] (reviews by [35,90]). Seeds float on the water surface in fall and early spring [93] and germinate along shorelines when water recedes (reviews by [35,78]). In laboratory tests, 100% of pale-yellow iris seeds floated during their 1st week, and at least 95% continued to float for 2 months (review by [73]). In other buoyancy tests, 25% of pale-yellow iris seeds were still floating 354 days after placement in water, and 10% were still floating after 429 days, the longest time period of any of the species tested [83].

Seed banking: It is not clear how long pale-yellow iris seeds persist in the soil seed bank. Pale-yellow iris was abundant in a wet meadow in northeastern France but was absent from the soil seed bank [86]. Though present at 84% of the quaking fen locations sampled in the Netherlands, pale-yellow iris germinated from only 25% of the seed bank samples. Similarly, though present at 50% of floating forest locations sampled, pale-yellow iris germinated from only 14% of the seed bank samples [84]. Pale-yellow iris seedlings emerged from soil samples taken from tidal freshwater marshes along the Delaware River in New Jersey [41].

Germination: Pale-yellow iris germination is best in moist [11,77] but not waterlogged [42,77] conditions. One review suggests that pale-yellow iris germination may be more dependent on temperature than light [78]. In the field, pale-yellow iris germination in its native range is said to be poor due to fat-like substances present on the inner seed coat. Seedlings were rare in most habitats (review by [73]). However, one author states that a "large number" of pale-yellow iris seeds in Great Britain germinate and put out roots [93]. In Montana, one author suggests that pale-yellow iris germination rates were high based on the high number of seedlings observed in the field and from observations of field-collected seed [54].

In the laboratory, only 25% of fresh-collected seeds from the Netherlands germinated in drained soil in 6 weeks [11]. Germination rates for nonscarified seeds in Great Britain varied from 48% after 15 days to 40% after 12 months (review by [73]). Fresh seed collected from established plants in northern Florida exhibited a germination rate of 62% (Jacono and Ramsey unpublished data cited in [52]). Fall-collected seed from the Theodore Roosevelt Island in the Potomac River had a germination rate of 33% after 97 days of inundated conditions and 90 days of moist conditions [77].

Scarification improves pale-yellow iris germination ([11,26], review by [73]). In a laboratory study in northern England, scarified pale-yellow iris seeds germinated at a significantly higher rate than those that were not scarified (70% versus 48%) ($P < 0.01$) [26]. In laboratory studies in the United States, pale-yellow iris seeds that had their "caps" removed and were placed in water experienced much higher germination; in 30 days, 97% of seeds with caps removed had germinated, while no seeds with intact caps germinated in this time period [13].

Seedling establishment and plant growth: Pale-yellow iris generally establishes in areas that are moist but not waterlogged. In many cases, pale-yellow iris establishes on the edges of water features (see [Site characteristics](#)), as

water-dispersed seeds are often deposited along the high water mark (reviews by [35,78]). On Theodore Roosevelt Island in the Potomac River, pale-yellow iris established on trash, river debris, and tree roots that were above the general water level of the marsh [77]. As a young plant, pale-yellow iris invests heavily in developing a root system to adapt to fluctuating water levels [93].

Water plays a key role in pale-yellow iris growth. While pale-yellow iris needs moisture, laboratory experiments show that inundated conditions reduce seedling growth [11,43]. Seedlings may recover after inundation [11]. On Theodore Roosevelt Island in the Potomac River near Washington, DC, the length of time that pale-yellow iris was inundated by water was the factor most limiting to its growth; areas experiencing short inundation exhibited greater growth than areas with long inundation [77]. In contrast, in Montana, pale-yellow iris plants growing in 2 to 3 feet (1 m) of water were larger and more "vigorous" than plants that were not inundated [54]. Pale-yellow iris occurred in areas that were flooded for as long as 6 months in its native range [53,86]. One author reports that in England, pale-yellow iris seeds germinated and seedlings grew well in marshes burned in late summer and flooded over winter (review by [73]).

Studies in Poland show most mortality of pale-yellow iris seedlings occurs in the first 2 months after germination, most likely due to desiccation. Heavy seedling mortality also occurs the first winter due to freezing surface water. In Poland, between 28% and 72% of seedlings survive their 1st year; only 3% to 6% grow to a size at which the rhizomes fragment (review by [73]) (see [Vegetative regeneration](#)).

Light conditions impact the growth pattern of pale-yellow iris. In its native range, pale-yellow iris tends to flower more in open habitats, which leads to a more clumped distribution as rhizome branching is associated with flowering. In wooded or shaded habitats, less flowering occurs and plants tend to spread linearly. Shaded plants tend to have fewer and longer leaves than plants in open areas (review by [73]). One study suggests that low light may limit seedling establishment but not growth of mature pale-yellow iris plants [77].

On the fringes of saltmarshes in Ireland, shore level influenced pale-yellow iris growth. On high saltmarsh sites plants had more and longer leaves and high rhizome terminal bud survival compared to low saltmarsh sites [72].

Vegetative regeneration: Pale-yellow iris regenerates vegetatively via rhizomes [15,28,93], (review by [73]). When plants reach about 10 years of age (review by [73]) rhizomes fragment and contribute to new plant establishment (reviews by [35,73,90]).

Rhizomes may break off during floods (review by [73]) and are moved to new locations by water (reviews by [73,90]). Dry rhizomes remain viable for more than 3 months and may establish if they encounter moisture (reviews by [35,73]). Individual rhizomes may persist for 10 years ([72], review by [73]). In its native range, the conditions in wet fens preserve pale-yellow iris rhizomes for many years, making it possible to observe 30 to 40 years of flowering extent, branching, and annual incremental increases in plant size [93].



Pale-yellow iris roots and cross-section of rhizomes.
Photo by Leslie J. Mehrhoff, University of Connecticut,
Bugwood.org

Thick rhizomes tend to prevent mixing of adjacent clones, but often 2 or 3 clones may lie on top of each other, with the bottom rhizome occurring at a depth of about 4 inches (10 cm) (review by [73]). Up to several hundred flowering plants may be connected rhizomatously (review by [35]). Rhizomes may grow over the soil (review by [90]), rocks (review by [73]), or as mats floating in water (reviews by [73,90]).

SITE CHARACTERISTICS:

Pale-yellow iris needs moisture to establish and survive [36,87,94]. Consequently, it often occurs on the wet edges of lakes [15,18,29,74,88,96], ponds [15,21,28,29,60,65,92,94], rivers [18,19,53,88], and streams [21,22,25,29,32,54,56,71]. Pale-yellow iris also occurs in marshes [16,22,25,26,54,56,69,77,88,96], tidal marshes [70,77], wetlands ([8,71], reviews by [35,89,90]), swamps [18,21,56,96], swampy woodlands [22], open woods [25], wood edges [25], and glacial potholes ([54], review by [58]). Pale-yellow iris occurs on beach swales [65] and rocky coastal shorelines (review by [89]).

Pale-yellow iris is associated with human-made structures such as ditches ([16,28,59,88], review by [35]), irrigation canal banks ([54,92], Lake County Weed District, Pablo, Montana, 2001 personal communication cited in [52]), constructed gravel trails through wetlands [77], man-made pools [31,37,59], meadows [22,25], wet pastures (review by [35]), and other disturbed sites [71,77,97].

Water characteristics: Pale-yellow iris is found in fresh (reviews by [78,90]), brackish ([16,70], review by [78]) and salt (reviews by [78,90]) water. In its native range, pale-yellow iris persists in the high zones of saltmarshes and may be found surrounded by estuarine water with a salinity of 24‰ during high tides (review by [73]).

Pale-yellow iris can tolerate water with low levels of oxygen (reviews by [53,73]). One source suggests that it prefers cool water, which may limit its expansion into warm-water areas [52]. Because deep water can prevent seed germination [42,77] and impairs seedling growth [11,43], pale-yellow iris generally grows in shallow water, but it may create extensive mats floating over deeper water (review by [35]). In New Zealand, pale-yellow iris occurred in water ranging from 0 to 2.6 feet (0 to 0.8 m) in depth [74]. In Montana, pale-yellow iris grew in 2 to 3 feet (1 m) of standing water [54].

Soils: Pale-yellow iris usually grows on water-deposited substrates such as silt ([26,38,52,71], review by [35]), sand ([38,71], reviews by [35,73]), gravel ([71,77], review by [73]), and cobbles [52,71]. One review notes that pale-yellow iris may be found on "rocky" sites [35]. It is associated with calcareous [17,53], sandy loams, clay loams, and other loamy or clayey [17] soils derived from sandstone and schist [53] in its native range. It is present on peat soils in both its native (review by [73]) and nonnative [70] ranges.

Pale-yellow iris occurred on soils with pH ranging from 6.65 to 7.55 in Turkey [17] and 3.6 to 7.7 in Britain (review by [73]). In England, pale-yellow iris occurred in spring and seepage waters with pH ranging from 6.8 to 7.2 [53]. One review from its nonnative range suggests that pale-yellow iris prefers acidic soils ranging from pH 3.6 to 7.7 and averaging 6.0 [78]. Pale-yellow iris prefers high nutrient sites in both its native ([36], review by [73]) and nonnative (review by [78]) ranges.

Climate: Pale-yellow iris occurs in temperate climates (review by [78]). Few authors report climate data for sites with pale-yellow iris in North America. The Ipswich River Wildlife Sanctuary in northeastern Massachusetts has a mean low temperature of 27.0 °F (-2.8 °C) in January and a mean high of 71.6 °F (22.0 °C) in July. Mean annual precipitation is 44 inches (1,120 mm) [1]. In southwestern Louisiana average maximum temperatures range from 60.1 °F (15.6 °C) in January to 90.0 °F (32.2 °C) in July and average precipitation is 56.32 inches (143.05 cm) [16].

Elevation: Pale-yellow iris occurs from sea level to 1,080 feet (330 m) in Britain (review by [73]). In North America, it occurs at sea level in Louisiana [16] up to 328 feet (100 m) in California [28]. Pale-yellow iris occurs at 4,200 to 4,315 feet (1,280-1,315 m) near Salt Lake City, Utah [92].

Topography: In North America, pale-yellow iris generally occurs on flat ground (review by [73]), but in England it may be found on the wet and waterlogged slopes of hills, mountains, and associated wet valleys where groundwater seepage or springs are present. Pale-yellow iris is rare on extensive wet upper slopes and crests of hills and mountains with perched water tables [53].

SUCCESSIONAL STATUS:

Pale-yellow iris grows best in full sun to partial shade ([87], reviews by [48,75]) and is intolerant of deep shade [93]. Low light may limit seedling establishment but not necessarily mature pale-yellow iris growth [77]. Along the Upper

Rhine in France, pale-yellow iris occurred only on sites that had high light levels within a hardwood floodplain forest [64].

Disturbances such as flooding play a key role in pale-yellow iris establishment. Rhizomes may break off during floods (review by [73]) and are moved to new locations by water (reviews by [73,90]). Floods may also transport pale-yellow iris seeds ([93], reviews by [35,90]).

There is concern that pale-yellow iris may alter historical patterns of plant succession ([77], review by [78]) by displacing native vegetation ([52,77], reviews by [9,35,48,58,78,89,90]). See [Impacts](#) for more information on this topic.

FIRE EFFECTS AND MANAGEMENT

SPECIES: [Iris pseudacorus](#)

- [FIRE EFFECTS](#)
- [FUELS AND FIRE REGIMES](#)
- [FIRE MANAGEMENT CONSIDERATIONS](#)

FIRE EFFECTS:

Immediate fire effect on plant: As of this writing (2009), no information was available in the published literature regarding the immediate effects of fire on pale-yellow iris plants and seeds. Fire would likely kill pale-yellow iris seedlings and mature plants growing near the ground surface. However, one review suggests that underground rhizomes of pale-yellow iris may survive fire and sprout [9].

Postfire regeneration strategy [67]:

Surface [rhizome](#) and/or a [chamaephytic root crown](#) in organic soil or on soil surface

Rhizomatous herb, [rhizome](#) in soil

[Ground residual colonizer](#) (on site, initial community)

[Initial off-site colonizer](#) (off site, initial community)

Fire adaptations and plant response to fire:

Fire adaptations: Like many wetland plants, pale-yellow iris is not specifically adapted to survive fire. Its tendency to grow at or near the ground surface suggests that fire would likely kill plants and seedlings. Rhizomes located below the soil surface or floating on water may survive fire and sprout (review by [9]). Dispersal of seeds ([93], reviews by [35,90]) and rhizomes (reviews by [73,90]) via water may allow pale-yellow iris to establish in burned areas adjacent to wetlands, streams, or rivers. No studies report that pale-yellow iris seeds respond to heat scarification, but the high germination rates resulting from scarification ([11,26], review by [73]) suggest that fire may improve germination by scarifying seed coats. Because low light may limit seedling establishment and growth [77], it is possible that the open conditions present after fire may benefit seedlings. One review suggests that fire may encourage seed germination due to increased light and disturbance [78].

Plant response to fire: As of this writing (2009), there were no studies documenting the response of pale-yellow iris to fire. One review states that pale-yellow iris may sprout after fire [9], though no time frame is specified. Another review suggests that fire may encourage seed germination due to increased light and disturbance [78]. One author reports that in England, pale-yellow iris seeds germinated and seedlings grew well in marshes burned in late summer and then flooded over winter. No specific details were presented (review by [73]).

FUELS AND FIRE REGIMES:

Fuels: No information is available on this topic.

Fire regimes: Fire regimes in wetland and riparian areas vary widely across the United States. For example, fire is unusual in northeastern riparian communities and may only occur in times of severe drought or wetland drainage. Riparian plants may not be fire-adapted in these systems. Long fire-return intervals are typical in wetlands of the Northeast (review by [14]). In contrast, fires are a common occurrence in southeastern wetlands, which support large quantities of flammable, herbaceous vegetation that is well-adapted to frequent fires. Stand-replacement fires may occur in coastal wetlands at 1- to 10-year fire-return intervals (review by [68]). As of 2009, there was insufficient information to predict how pale-yellow iris might respond to these fire regimes. It is not clear if or how pale-yellow iris may influence fire regimes, though it is likely that the impact of pale-yellow iris varies given its occurrence in communities with very different fire regimes. See the [Fire Regime Table](#) for further information on fire regimes of vegetation communities in which pale-yellow iris may occur.

FIRE MANAGEMENT CONSIDERATIONS:

Potential for postfire establishment and spread: As of 2009, there were no studies documenting the establishment and spread of pale-yellow iris after fire. One review from England suggests that the removal of aboveground material and plants after a late summer fire and winter flooding facilitated pale-yellow iris seed germination and seedling growth [73].

Preventing postfire establishment and spread: Preventing invasive plants from establishing in weed-free burned areas is the most effective and least costly management method. This can be accomplished through early detection and eradication, careful monitoring and follow-up, and limiting dispersal of invasive plant seed or rhizomes into burned areas. Specific recommendations include:

- Incorporate cost of weed prevention and management into fire rehabilitation plans
- Acquire restoration funding
- Include weed prevention education in fire training
- Minimize soil disturbance and vegetation removal during fire suppression and rehabilitation activities
- Minimize the use of retardants containing nitrogen and phosphorus
- Avoid areas dominated by high priority invasive plants when locating firelines, monitoring camps, staging areas, and helibases
- Clean equipment and vehicles prior to entering burned areas
- Regulate or prevent human and livestock entry into burned areas until desirable site vegetation has recovered sufficiently to resist invasion by undesirable vegetation
- Monitor burned areas and areas of significant disturbance or traffic from management activity
- Detect weeds early and eradicate before vegetative spread and/or seed dispersal
- Eradicate small patches and contain or control large infestations within or adjacent to the burned area
- Reestablish vegetation on bare ground as soon as possible
- Avoid use of fertilizers in postfire rehabilitation and restoration
- Use only certified weed-free seed mixes when revegetation is necessary

For more detailed information on these topics see the following publications: [2,5,24,81].

Use of prescribed fire as a control agent: Prescribed fire may or may not be an appropriate management tool in the wetland and riparian ecosystems where pale-yellow iris occurs. Prescribed fire is not likely to be a useful control measure for invasive species like pale-yellow iris in plant communities where fires are typically rare and native species are not fire-adapted. For example, prescribed fire is probably not appropriate in the forested wetlands of the Northeast. Prescribed fire may be an appropriate tool in herbaceous wetlands that commonly support native species adapted to frequent fire (review by [14]), but its effects on pale-yellow iris were unknown as of 2009. Reviews caution against this control method because fire may stimulate pale-yellow iris sprouting [9,35], seed germination, and/or seedling growth [35].

MANAGEMENT CONSIDERATIONS

- [IMPORTANCE TO WILDLIFE AND LIVESTOCK](#)
- [OTHER USES](#)
- [IMPACTS AND CONTROL](#)

IMPORTANCE TO WILDLIFE AND LIVESTOCK:

Pale-yellow iris is generally of little value to wildlife or livestock.

Palatability and/or nutritional value: Pale-yellow iris is considered poisonous ([15], review by [78]) due to large amounts of glycosides found in foliage and rhizomes (review by [78]). In grazing experiments in Belgium, pale-yellow iris was considered unpalatable to cattle and ponies [4]. In its native range pale-yellow iris is usually ignored by domestic ponies, cattle, sheep, goats, and rabbits, though foliage was eaten down to the rhizomes by domestic cattle in autumn when other vegetation was unavailable. Domestic sheep have been observed browsing early-season leaves. Fallow deer browsed pale-yellow iris in England. In Britain, gastroenteritis occurred after livestock ate hay containing pale-yellow iris, and acute diarrhea occurred in domestic cattle after rhizome consumption (review by [73]).

Cover value: No information is available on this topic.

OTHER USES:

Pale-yellow iris has been used as a rehabilitation plant to reduce bacterial loads (review by [73]), absorb heavy metals from contaminated water ([3], reviews by [73,78]), and provide erosion control (review by [78]). One review states that it is "one of the few plants flourishing after a nuclear holocaust" (review by [73]). Pale-yellow iris was smoked by people during World War II (review by [73]). In Turkey, pale-yellow iris rhizomes are used as a diuretic, to prevent gas, and to treat eczema. Seeds are used as a coffee substitute after drying [17]. One author experienced severe attacks of dermatitis from contact with the syrupy covering of the endosperm of pale-yellow iris seeds [13].

IMPACTS AND CONTROL:

Impacts: The tendency for pale-yellow iris to grow in large, radially spreading clones allows it to form dense stands that may replace native vegetation ([52,54,77], reviews by [9,35,48,58,78,89,90]), including 2 native irises in Massachusetts (review by [89]) and characteristic California marsh plants such as cattails (*Typha* spp.) (Fuller personal communication cited by [58]). Pale-yellow iris may also reduce habitat needed by waterfowl and fish ([77], reviews by [35,78]), including several important salmon species (review by [35]). Pale-yellow iris may also reduce available forage for livestock [54].



Stand of pale-yellow iris.

Photo by Joseph M. DiTomaso, University of California-Davis,
Bugwood.org

On Theodore Roosevelt Island in the Potomac River near Washington, DC, pale-yellow iris changed local site conditions to the extent that it facilitated its own spread; rhizome growth compacted the soil, a hardpan developed, and species other than pale-yellow iris were unable to establish and persist. Pale-yellow iris clones eventually replaced the native green arrow arum, an important plant for wood ducks. Mats of pale-yellow iris rhizomes also prevented the germination and seedling development of willows (*Salix* spp.), particularly black willow. By suppressing willows and providing a raised surface, pale-yellow iris promoted the spread of species not needing a mineral surface for

establishment (e.g., green ash). In turn, this change in species composition facilitated the succession from marsh to swamp vegetation communities. The author concluded that pale-yellow iris "apparently speeds up the destruction of the marsh by promoting expansion of the swamp and apparently preempts space and thus reduces the food supply of the wood duck which occurs on the island" [77].

As of 2001, pale-yellow iris occurred along 1,300 miles (2,100 km) of irrigation canals and lateral channels near Flathead Lake in northwestern Montana (Lake County Weed District, Pablo, Montana, 2001 personal communication cited in [52]). Pale-yellow iris plants may clog small streams and irrigation systems, and seeds clog water control structures and pipes ([54], review by [35]). One review cites a study from Montana suggesting that pale-yellow iris plants may reduce stream width by up to 10 inches (25 cm) annually by trapping sediment. This process creates new streambanks which may be dominated by pale-yellow iris seedlings (Tyron 2006 unpublished study cited in [35]).

Rate of spread: Pale-yellow iris was first observed along the Frio River in south-central Texas in 1988, establishing under a bridge where silt accumulated in the stream bed. Additional silt deposition in the area encouraged pale-yellow iris rooting and spread. A colony over 300 feet (90 m) long developed between 1988 and 2001. Colonies also expanded out of the silt substrate into riffle areas with gravelly or rocky substrates [52].

The largest intact pale-yellow iris clone in its native range measured 2.17 feet (0.66 m) across. While individual pale-yellow iris clones may be small, populations of pale-yellow iris may cover large areas. Large clumps of pale-yellow iris measured up to 66 feet (20 m) across in Ireland (review by [73]). On Theodore Roosevelt Island in the Potomac, pale-yellow iris occurred in clumps about 1 m² in area [77]. In southern New York, pale-yellow iris occurred in a 0.75-acre (0.30-hectare) patch along a creek [50].

Control: In all cases where invasive species are targeted for control, no matter what method is employed, the potential for other invasive species to fill their void must be considered [6]. Pale-yellow iris occurs with many other nonnative species of concern in wetlands; removal of pale-yellow iris may lead to the expansion of populations of other nonnative species. For example, pale-yellow iris occurs in the freshwaters of the Hudson River Basin, though it does not exhibit "significant ecological impacts" like the associated nonnatives curly pondweed (*Potamogeton crispus*), onerow yellowcress (*Rorippa nasturtium*), water chestnut (*Trapa natans*), Eurasian watermilfoil (*Myriophyllum spicatum*), and purple loosestrife [49]. In England, herbicide removal of common reed (*Phragmites australis*) produced open areas in which pale-yellow iris established (review by [73]). It is possible that pale-yellow iris may show a similar response in other areas where other nonnative species are targeted for control. Care should be taken to minimize local site disturbance to prevent pale-yellow iris seedlings from germinating (review by [35]).

Fire: For information on the use of prescribed fire to control this species, see [Fire Management Considerations](#).

Prevention: It is commonly argued that the most cost-efficient and effective method of managing invasive species is to prevent their establishment and spread by maintaining "healthy" natural communities [45,63] (e.g., avoid road building in wildlands [80]) and by monitoring several times each year [33]. Managing to maintain the integrity of the native plant community and mitigate the factors enhancing ecosystem invasibility is likely to be more effective than managing solely to control the invader [30].

Weed prevention and control can be incorporated into many types of management plans, including those for logging and site preparation, grazing allotments, recreation management, research projects, road building and maintenance, and fire management [81]. See the [Guide to noxious weed prevention practices](#) [81] for specific guidelines in preventing the spread of weed seeds and propagules under different management conditions.

Cultural control: As of 2009, there were no studies on controlling pale-yellow iris using cultural methods. There is some evidence to suggest that dense cover of other plant species may inhibit pale-yellow iris growth; on Theodore Roosevelt Island in the Potomac River near Washington, DC, pale-yellow iris growth was limited by calamus cover in swamp-marsh transition areas [77].

Physical and mechanical control: Physical and mechanical methods may be effective in controlling small

populations of pale-yellow iris. Some sources suggest physical removal of the entire plant and rhizome system (reviews by [35,78,90]), though all rhizomes must be removed for this method to be effective (reviews by [35,90]). Repeated mowing or cutting of aboveground foliage may eventually kill pale-yellow iris ([53], reviews by [35,78]). One review states that pale-yellow iris leaves are brittle and susceptible to damage by trampling. Consequently, pale-yellow iris is generally absent from areas of pronounced human or animal activity in its native range [73]. A horticultural guide suggests the removal of seed pods to prevent future establishment from seed [75]. Draining wetlands to remove pale-yellow iris was "slow to succeed" in Montana [54].

Physical and mechanical control methods may be preferable in wetland settings where use of herbicides is problematic (review by [89]). However, mechanical removal of pale-yellow iris in sensitive areas may cause extensive substrate disturbance, leading to the establishment of other unwanted plants [52].

Biological control: Biological control of invasive species has a long history that indicates many factors must be considered before using biological controls. Refer to these sources: [85,95] and the [Weed Control Methods Handbook](#) [79] for background information and important considerations for developing and implementing biological control programs.

As of 2009, there were no biological control agents for pale-yellow iris. A horticultural guide states that pale-yellow iris in New Jersey suffers from borers, rot slugs, and black vine weevils [75], and one review states that several invertebrates and fungi feed on pale-yellow iris [78]. In its native range, damage to pale-yellow iris by invertebrate grazers was negligible in woodland, grassland, ponds, saltmarsh, fens and reedswamp plant communities (review by [73]). Pale-yellow iris is susceptible to pale-yellow iris root rot (*Pseudomonas iridis*) in its native range, which causes premature yellowing of the leaves as the rhizomes rot (review by [73]). Pale-yellow iris hosts and is susceptible to the rust of pale-yellow iris (*Puccinia iridis*) but is generally considered resistant [46].

Chemical control: Herbicides are often effective in gaining initial control of a new invasion or a severe infestation, but they are rarely a complete or long-term solution to weed management [7]. See The Nature Conservancy's [Weed control methods handbook](#) [79] for considerations on the use of herbicides in natural areas and detailed information on specific chemicals.

Herbicides are effective at controlling pale-yellow iris ([53], reviews by [73,90]), though care must be taken when applying herbicides in wetland ecosystems (review by [78]). Small populations can be spotsprayed by herbicides (review by [35]), while foliar applications may be needed in large populations (review by [78]). Herbicide treatments may be most effective during the growing season because the herbicide is transported to the rhizome (review by [78]).

Integrated management: Cutting or mowing followed by herbicide application to cut stems and leaves may effectively control pale-yellow iris ([52], reviews by [35,78]).

APPENDIX: FIRE REGIME TABLE

SPECIES: *Iris pseudacorus*

This Fire Regime Table summarizes characteristics of fire regimes for vegetation communities in which pale-yellow iris may occur based on descriptions in available literature. Follow the links in the table to documents that provide more detailed information on these fire regimes. This table does not include plant communities across the entire range of pale-yellow iris. For information on other plant communities in which pale-yellow iris may occur, see the complete [FEIS Fire Regime Table](#).

Fire regime information on vegetation communities in which pale-yellow iris may occur. This information is taken from the LANDFIRE Rapid Assessment Vegetation Models [40], which were developed by local experts using available literature, local data, and/or expert opinion. This

table summarizes fire regime characteristics for each plant community listed. The PDF file linked from each plant community name describes the model and synthesizes the knowledge available on vegetation composition, structure, and dynamics in that community. Cells are blank where information is not available in the Rapid Assessment Vegetation Model.

Northeast					
Vegetation Community (Potential Natural Vegetation Group)	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)
Northeast Grassland					
Northern coastal marsh	Replacement	97%	7	2	50
	Mixed	3%	265	20	
Southern Appalachians					
Vegetation Community (Potential Natural Vegetation Group)	Fire severity*	Fire regime characteristics			
		Percent of fires	Mean interval (years)	Minimum interval (years)	Maximum interval (years)
Southern Appalachians Forested					
Bottomland hardwood forest	Replacement	25%	435	200	≥1,000
	Mixed	24%	455	150	500
	Surface or low	51%	210	50	250
*Fire Severities:					
Replacement: Any fire that causes greater than 75% top removal of a vegetation-fuel type, resulting in general replacement of existing vegetation; may or may not cause a lethal effect on the plants.					
Mixed: Any fire burning more than 5% of an area that does not qualify as a replacement, surface, or low-severity fire; includes mosaic and other fires that are intermediate in effects.					
Surface or low: Any fire that causes less than 25% upper layer replacement and/or removal in a vegetation-fuel class but burns 5% or more of the area [27,39].					

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