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INTRODUCTION

The name “hawkweed” is applied to 10,000+ species, historically all assigned to the genus *Hieracium*. All hawkweed species have flower heads with only ray florets (Fig. 1), and all stems and leaves contain a milky latex. There are several dozen hawkweed species presently established in North America, including both native and introduced species. The majority of hawkweeds invasive in North America have more recently been separated into their own genus, *Pilosella*. This publication focuses on the invasive orange hawkweed and a few species of yellow-flowered hawkweeds in the genus *Pilosella*. These species are among the most problematic hawkweeds in North America and are also the target of biological control efforts. Identification of hawkweeds can be very difficult and often requires expert help. Consequently, yellow-flowered invasive hawkweeds are largely lumped together in this publication.



Figure 1. Typical hawkweed flower head (Joe Bartok, iNaturalist.org CC BY-NC 4.0)

SYNONYMS

Orange hawkweed: *Hieracium aurantiacum* L.
Meadow hawkweed: *Hieracium caespitosum* Dumort.
Whiplash hawkweed: *Hieracium flagellare* Willd.
Mouse-ear hawkweed: *Hieracium pilosella* L.

HISTORY AND DISTRIBUTION

The exotic hawkweed species covered in this publication are native to Europe. They were introduced to North America from the 1800s onwards, often as ornamentals. Orange hawkweed has been reported in 37 states in the USA and all 10 Canadian provinces (Fig. 2a), while invasive yellow-flowered hawkweeds have collectively been reported in 31 states and nine Canadian provinces (Fig. 2b).

CLASSIFICATION

RANKING	SCIENTIFIC NAME	COMMON NAME
Kingdom	Plantae	Plants
Subkingdom	Tracheobionta	Vascular plants
Superdivision	Spermatophyta	Seed plants
Division	Magnoliophyta	Flowering plants
Class	Magnoliopsida	Dicotyledons
Subclass	Asteridae	
Order	Asterales	
Family	Asteraceae	Sunflower family
Genus	<i>Pilosella</i>	Hawkweed
Species	<i>Pilosella aurantiaca</i> (L.) F.W.Schultz & Sch.Bip.	Orange hawkweed
Species	<i>Pilosella caespitosa</i> (Dumort.) P.D.Sell & C.West	Meadow hawkweed
Species	<i>Pilosella flagellaris</i> (Willd.) Arv.-Touv.	Whiplash hawkweed
Species	<i>Pilosella officinarum</i> Vaill.	Mouse-ear hawkweed

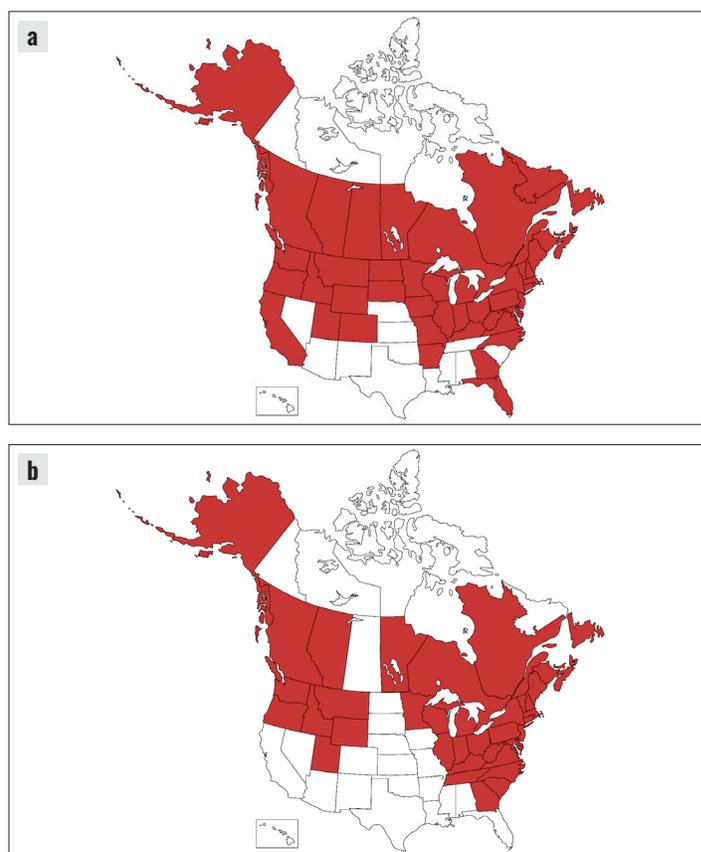


Figure 2. North American reported distribution of (a) orange hawkweed; (b) yellow-flowered invasive hawkweeds (Credit: EDDMapS, www.eddmaps.org; USDA PLANTS Database, plants.usda.gov [both accessed 10 October 2023])

IMPACT

Exotic invasive hawkweeds reduce forage and crop production and displace native plant species in natural areas. Some species have demonstrated allelopathy where they release compounds into the soil that inhibit the growth of other plant species. Orange hawkweed is allelopathic in that its pollen interferes with the reproduction of other plant species.

ECOLOGY

Invasive hawkweeds spread by seed, rhizome fragments, and stolons. Most hawkweed seeds germinate in spring, and plants develop small rosettes with a fibrous root system as well as short, stout rhizomes (Fig. 5a). Orange hawkweed and some invasive yellow-flowered hawkweeds also produce stolons that form daughter rosettes at their tips (Fig. 5b). Once daughter plants root, the stolons die, and the new plant becomes independent. Plants bolt in early summer, and flowering occurs from mid to late summer. Each floret can produce a seed without fertilization. Plants less than one year old are capable of producing seeds, and seeds can remain viable for up to seven years. Seeds are readily carried by wind and water. After flowering, the supporting rosette dies. New plants sprout each year from rhizomes and sometimes roots.

HABITAT

Exotic invasive hawkweeds capitalize on disturbance and prefer full sun or partial shade and soils that are well drained and coarse-textured. Dense infestations often occur in moist meadows, pastures, roadsides, forest openings, urban lawns, and riparian areas (Fig. 3).

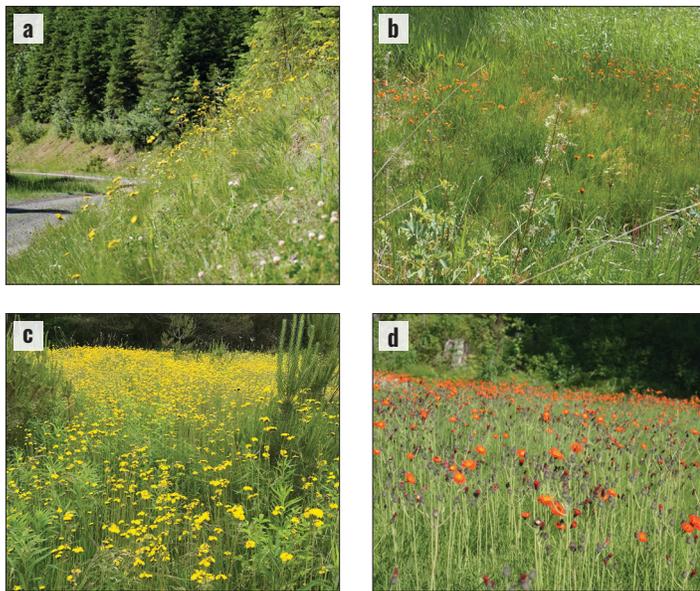


Figure 3. Invasive hawkweeds are frequently found in or along (a) roadsides, (b) streambanks, (c) meadows, and (d) pastures (a,b: Travis McMahon, MIA Consulting; c: Dustin Minalof, iNaturalist.org CC0; d: Caleb Slemmons, National Ecological Observatory Network Bugwood.org CC BY-3.0 US)

IDENTIFICATION

AT A GLANCE

Exotic invasive hawkweeds (Fig. 4) are upright perennials typically growing 2 in to 2 ft tall (5–60 cm) from a fibrous root system with short rhizomes. Some hawkweeds also produce stolons up to 1 ft (30 cm) long that produce daughter plants. Stems are largely unbranched. Leaves (up to 5 in/13 cm long) typically occur only in a basal rosette, though one or two smaller leaves may occur midway up the plant stem. Stems and leaves are covered with stiff hairs that can be simple, glandular, and/or star-shaped. Leaves and stems contain a milky latex. Flower heads are ≤ 1 in (2½ cm) in diameter with an average of 30 ray florets. Seed head bracts are covered in hairs. Seeds are topped by tufts of pappus, resembling dandelion seeds.

ROOT SYSTEMS

Invasive hawkweeds develop fibrous root systems with short, stout rhizomes (underground, horizontal stems) with vegetative buds that produce new shoots (Fig. 5a). Orange, meadow, mouse-ear, and whiplash hawkweeds also have

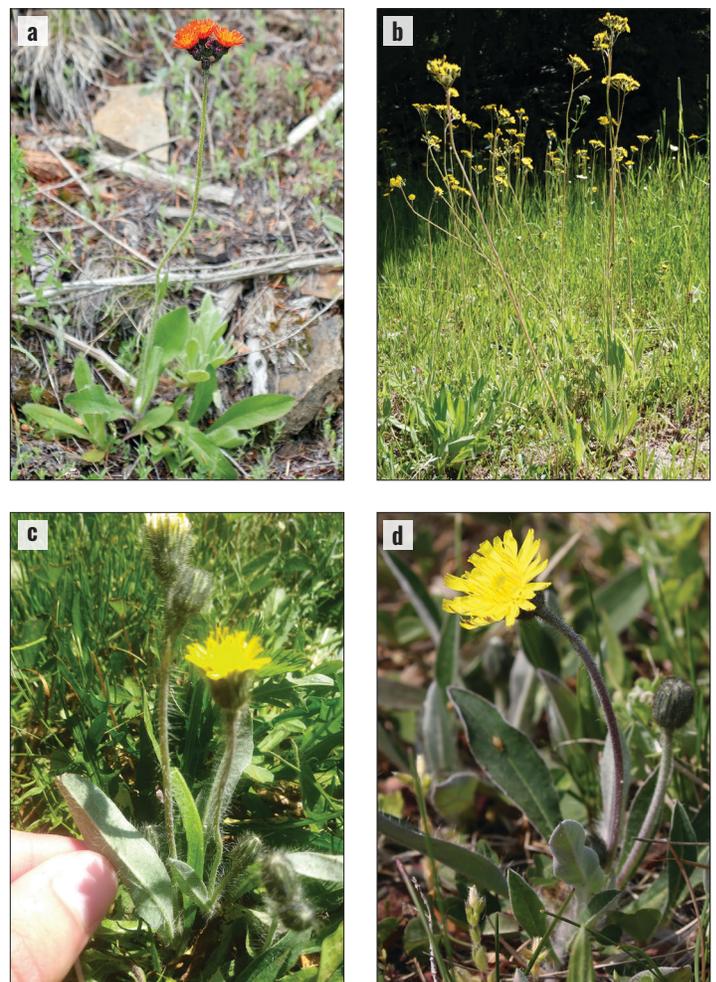


Figure 4. Invasive hawkweed plants (a) orange; (b) meadow; (c) whiplash; (d) mouse-ear (a,b: Travis McMahon, MIA Consulting; c: Lukkasblancanos, iNaturalist.org CC BY-NC 4.0; d: Luca Boscaïn, iNaturalist.org CC BY-NC 4.0)

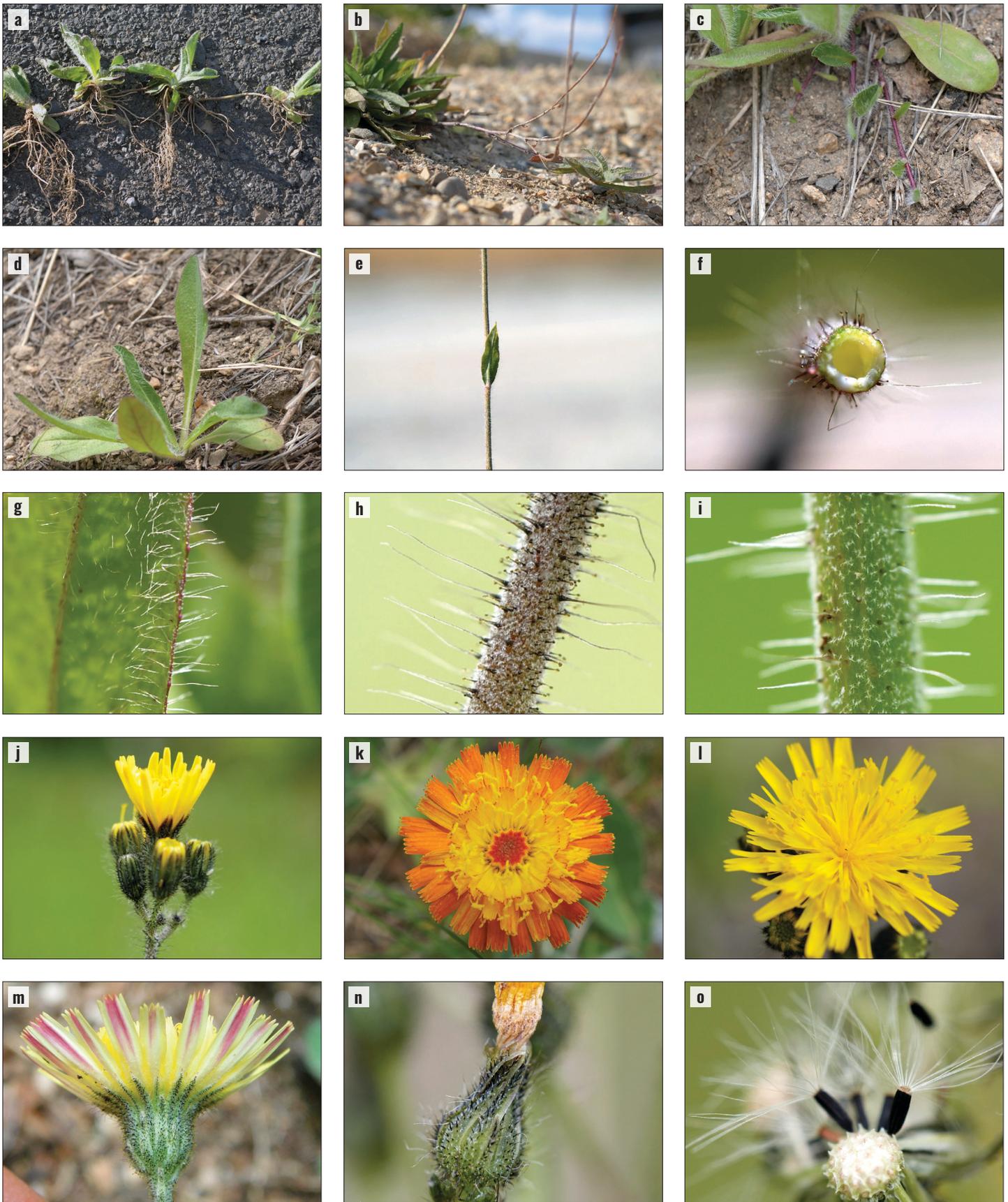


Figure 5. Traits of exotic invasive hawkweeds: (a) rhizomes connecting different rosettes; (b) daughter rosette at the tip of a stolon; (c) orange hawkweed stolons; (d) rosette; (e) stem leaf; (f) latex oozing from a broken stem; (g) simple hairs; (h) dark glandular hairs; (i) star-shaped hairs; (j) flower heads in clump; (k) orange hawkweed florets; (l) yellow-flower hawkweed florets; (m) red stripes on undersides of mouse-ear hawkweed florets; (n) glandular hairs on bracts; (o) seeds with pappus (a–j,l,n,o: Travis McMahon, MIA Consulting; k: Jon Sullivan; m: Klaus Wehrlin; k,m: iNaturalist.org CC BY-NC 4.0)

stolons that produce daughter rosettes at their tips (Fig. 5b). Orange hawkweed stolons are reddish-maroon and grow up to 1 ft (30 cm) long (Fig. 5c). The stolons of mouse-ear and whiplash hawkweed are reportedly longer, leafier, and mat-forming, while the stolons of meadow hawkweed may at times be short and inconspicuous. Once daughter plants root, the stolons die, and the new plant becomes independent. Small, severed rhizome segments can develop into new plants.

STEMS AND LEAVES

Invasive hawkweeds each produce a few to several flower stems that are largely unbranched until the inflorescence (Fig. 4). Orange and meadow hawkweed stems typically grow 1–2 ft (30–60 cm) tall, though some plants may grow as tall as 3 ft (90 cm). Mouse-ear and whiplash hawkweed (a hybrid species of mouse-ear and meadow hawkweed) are more commonly 2–12 in (5–30 cm) tall. Whiplash hawkweed stems are often branched once at any point along the stem. Invasive hawkweed leaves typically only occur in a basal rosette. Rosette leaves are 1–6 in (2½–15 cm) long by 1 in (2½ cm) wide. They are either lance-shaped or slightly wider at the tip than the base, and have a prominent midvein (Fig. 5d). Although stems are typically leafless, one or two smaller leaves may occur at the midway point or lower (Fig. 5e). Stems and leaves exude a milky sap when damaged (Fig. 5f). Stems and leaves are also covered with stiff hairs. These can be simple (unbranched; Fig. 5g), dark and glandular (Fig. 5h), or star-shaped (Fig. 5i). Stem and leaf hairs are often key traits for differentiating yellow-flowered invasive hawkweeds from each other (see Differentiating Invasive Hawkweeds).

FLOWER HEADS

One to several flower heads are produced at single or branched stem tips (Fig. 5j). Mouse-ear tends to bear heads singly, whiplash 2–6, and both meadow and orange often have several per stem. Flower heads are typically ½–1 in (1¼–2½ cm) across. Orange hawkweed flower heads contain orangish-red florets (Fig. 5k), while meadow, mouse-ear, and whiplash hawkweed florets are yellow (Fig. 5l). The florets of mouse-ear and whiplash hawkweed often have a red stripe on their undersides (Fig. 5m). The receptacle bracts of orange and yellow-flowered hawkweeds are covered in dark glandular hairs (Fig. 5n), though the amount varies by species.

FRUITS AND SEEDS

Each floret can produce a seed without fertilization. Seeds are small, brown, cylindrical, and topped by tufts of fine white pappus hairs (Fig. 5o).

DIFFERENTIATING INVASIVE HAWKWEEDS

During flowering, the orange florets of orange hawkweed easily differentiate it from all other hawkweeds established in

North America, which typically have yellow florets (though one native species has white). Differentiating yellow-flowered invasive hawkweeds can be very difficult due to variation in their expressed traits as well as extensive hybridization; please seek expert help when differentiating these species. Meadow (and orange) hawkweed typically has long simple hairs on the upper leaf surfaces and star-shaped hairs moderately scattered on the bottom surface. Meadow hawkweed also has long simple hairs scattered on the bottom surface. Mouse-ear and whiplash hawkweed tend to have simple hairs that are longer, more coarse, more loosely scattered, and are more concentrated near leaf margins and underside midveins. The bottom surfaces of mouse-ear and whiplash leaves are often densely covered with star-shaped hairs. The undersides of whiplash hawkweed leaves also have long simple hairs.

Additional species of invasive *Pilosella* are present in North America but are more restricted in their distributions. Tall hawkweed (*P. piloselloides*) lacks stolons, grows up to 3 ft (90 cm) tall and has longer leaves. If leaf hairs are present, they are restricted to leaf margins and the underside of midveins. Queendevil hawkweed, *Pilosella piloselloides* subsp. *praealta* is highly similar, but is a stolon-forming species. The two can also be distinguished by the lower leaf surface usually being smooth and hairless for tall hawkweed but having few to numerous star-shaped hairs for queendevil. Yellow-devil hawkweed (*P. glomerata*) is morphologically very similar to meadow hawkweed, but always lacks stolons. Additionally, both surfaces of its long thin leaves often have numerous star-shaped hairs as well as short and stiff simple hairs that give the plant a rough texture. Other invasive yellow-flowered hawkweeds are less widespread in North America and have not been the target of biological control.

SIMILAR SPECIES

There are several native hawkweeds in North America, similar in appearance to invasive hawkweeds. Native hawkweeds have stem leaves but never have stolons. Finally, many native species have leaves with toothed margins. While those are good rules of thumb, some native hawkweeds have leaves with smooth margins and some invasive hawkweeds don't have stolons. Differentiating hawkweed species can be very difficult and often requires advanced plant keys or expert help.

Common catsear (*Hypochaeris radicata*) is a less-related species that looks very similar to yellow invasive hawkweeds, and it occurs in similar habitat. However, it has non-hairy stems, larger flower heads, lobed leaves, and it doesn't have glandular hairs on the flower bracts. Select native hawkweed species and common catsear are all included in **Table 1** along with characteristics that can be used to differentiate them.

Table 1. Key traits for differentiating select native *Hieracium* hawkweeds and common catsear from the invasive hawkweeds covered in this publication

SPECIES	DIFFERENCES TO INVASIVE HAWKWEEDS	PLANT	LEAVES	FLOWER HEAD(S)
<p>White hawkweed</p> <p><i>Hieracium albiflorum</i> Asteraceae</p> <p>Native perennial</p>	<p>No stolons; 1–4 ft (30–130 cm) tall; leaves up stem; leaves with shallow teeth, simple hairs along margins; several flower heads in open inflorescences; flower receptacles narrow, typically with only simple and star-shaped hairs rather than glandular; florets white</p>			
<p>Scouler's hawkweed</p> <p><i>Hieracium scouleri</i> Asteraceae</p> <p>Native perennial</p>	<p>No stolons; 1–3¼ ft (30–100 cm) tall; leaves up stem; leaves of some varieties densely covered in long simple hairs; receptacle bracts densely covered in long simple hairs</p>			
<p>Alpine hawkweed</p> <p><i>Hieracium triste</i> Asteraceae</p> <p>Native perennial</p>	<p>More alpine habitats; no stolons; often ≤8 in (20 cm) tall; typically no leaves up stems; leaves usually hairless, or only with few scattered star-shaped hairs; may have smooth or slightly ruffled margins; leaves wider at tips, some almost spoon-shaped; flower heads smaller; 1–8 flower heads per open, spreading inflorescence</p>			
<p>Canada hawkweed</p> <p><i>Hieracium umbellatum</i> Asteraceae</p> <p>Native perennial</p>	<p>No stolons; basal leaves deciduous; stem leaves persistent, lance-shaped, stalk-less, irregularly toothed, some with dense, star-shaped hairs on undersides; some leaves with tiny, stiff, conical hairs around margins; several flower heads in open inflorescences; receptacle bracts largely hairless</p>			
<p>Common catsear</p> <p><i>Hypochaeris radicata</i> Asteraceae</p> <p>Exotic perennial</p>	<p>With several enlarged roots, appearing tap-rooted; no rhizomes or stolons; leaves with toothed lobes; stems mostly hairless; flower heads often > 1¼ in (3 cm) across; receptacle bracts hairless</p>			

Photo credits: white hawkweed: plant (Mart Hughes, iNaturalist.org CC BY-NC 4.0), leaves, flower heads (Melanie, iNaturalist.org CC BY-NC 4.0); Scouler's hawkweed plant, leaves, flower heads (Jason Headley, iNaturalist.org CC BY-NC 4.0); alpine hawkweed plant (Jane G. Smith), leaves, flower heads (Peter Zika, iNaturalist.org CC BY-NC 4.0); Canada hawkweed plant (Philip Careless, iNaturalist.org CC BY-NC 4.0), leaves (Pat Deacon, iNaturalist.org CC BY-NC 4.0), flower heads (Erin Faulkner, iNaturalist.org CC BY-NC 4.0); common catsear plant (Olekje, iNaturalist.org CC BY-NC 4.0), leaves, flower head (Rachel Winston, MIA Consulting)

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SUGGESTED CITATION

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