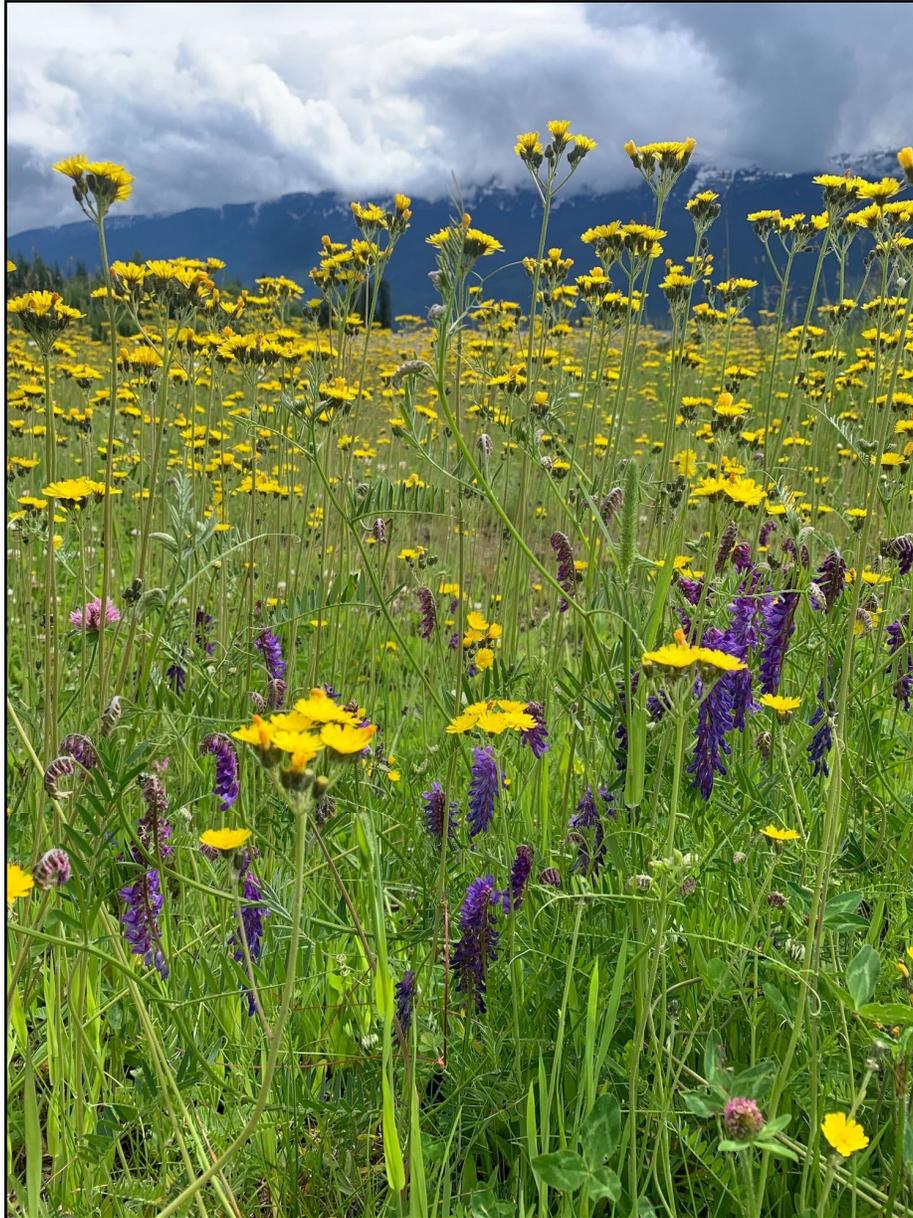


Key to Identification of Invasive and Native Hawkweeds in the Pacific Northwest



Revised May 2023



Ministry of Forests
Range Branch
Invasive Plant Program



Agriculture and
Agri-Food Canada

Authors: Linda Wilson¹, Susan Turner², Sandy Cesselli³, Chandra Moffat⁴, and David Ensing⁵

1. Linda Wilson, PhD, PAg (Retired)

2. Susan Turner, BSc, PAg, British Columbia Ministry of Forests, Range Branch, Kamloops, B.C. (Retired).

3. Sandy Cesselli, British Columbia Ministry of Forests, Range Branch, Kamloops, B.C.

4. Chandra Moffat, PhD, Agriculture and Agri-Food Canada, Summerland Research and Development Centre, Summerland, B.C.

5. David Ensing, PhD, Agriculture and Agri-Food Canada, Summerland Research and Development Centre, Summerland, B.C.

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Literature Cited:

Moffat, CE, DJ Ensing, JF Gaskin, RA De Clerck-Floate, and J Pither. 2015. Morphology delimits more species than molecular genetic clusters of invasive *Pilosella*. *American Journal of Botany* 102: 1145-1159.

Wilson, Linda M 2007. Key to Identification of Invasive and Native Hawkweeds (*Hieracium* spp.) in the Pacific Northwest Revised March 2007. B.C. Min. For. Range, For. Prac. Br., Kamloops, B.C.

Cover picture: Yellow hawkweed, near Revelstoke, B.C. (photo source: Ministry of Forests)

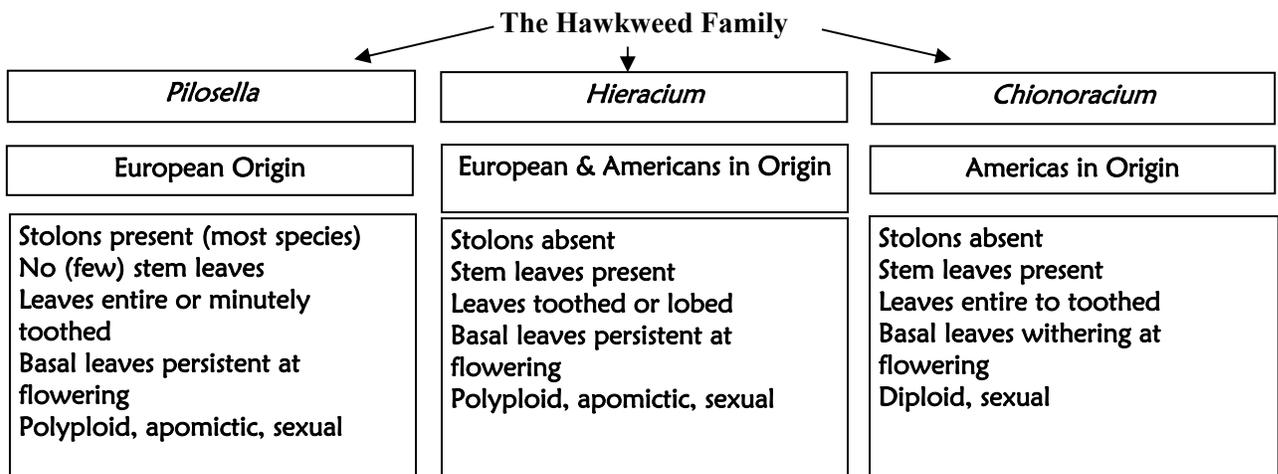
INTRODUCTION

The name *Hieracium* comes from the Greek ‘hierax’, meaning hawk; allegedly keen-sighted hawks of yore ate the sap of the brightly colored plants to sharpen their eyesight. In North America, invasive hawkweeds are an eyesore – and they are among the most troublesome weeds in the Pacific Northwest (PNW). The first species arrived in the region as recently as fifty years ago, probably from the western expansion of infestations from eastern Canada and the US during or shortly after the Second World War. There are now about 14 species of invasive hawkweeds in the PNW. Rapid spread of hawkweed has been possible because much of the land in British Columbia, coastal and northeastern Washington, northern Idaho, and northwestern Montana is considered susceptible to invasion by these aggressive weeds.

TAXONOMY

Hawkweeds are in the Tribe Lactuceae of the Family Asteraceae, having all strap-shaped (ligulate) flowers and a milky latex in stems and leaves. All hawkweeds were formerly considered part of the genus *Hieracium*, which was subsequently divided into three subgenera including *Hieracium*, *Chionoracium* (formerly subgenus *Stenotheca*) and *Pilosella*. *Hieracium* subgenus *Chionoracium* (represents the ± 20 native species in North America (partial list - Table 1; Beaman 1990). *Hieracium* occurs in both North America and Europe. Two native species occur in the PNW (Table 1); six species from central and eastern Europe also occur in the region; (Table 2).

Pilosella is best treated as a distinct genus in the most recent taxonomic treatment (Brautigam and Greuter. 2007. Willdenowia, 37(1): 123-137), upholding a view long argued by many hawkweed taxonomists. The genus *Pilosella* is entirely European in origin and represents most of the invasive species in the PNW. The eight known invasive species of *Pilosella* occurring in the PNW include orange hawkweed and seven yellow-flowered species (Table 2). *Pilosella glomerata* (syn. *Hieracium glomeratum*, yellowdevil hawkweed), was identified from southeastern British Columbia in 2001. This was the first report of this species in North America (Wilson et al. 2006. Can. J. Botany 84: 133–142).



DESCRIPTION of INVASIVE HAWKWEEDS

Hawkweeds are fibrous-rooted, perennial herbs growing from a stout rhizome. Plants reproduce by seeds and vegetatively by stolons, rhizomes, and adventitious root buds. The small, dandelion-like heads are borne singly at the top of long, hairy to hairless stems, or in compact, rounded or loose, elongated panicle-like clusters. All but one invasive species has yellow flowers (likewise, all but one native species has yellow flowers). Seed production is primarily asexual through apomixis (the production of seeds without pollen), although occasional sexual reproduction, outcrossing, and hybridization is believed to occur. Hawkweeds are distinguished largely on a few key morphological characters, including leaf, stem and phyllary (involucral bract) pubescence. Hairs, both type and abundance, are important characters used to distinguish hawkweed species. Three types of hairs are common: long simple hairs; dark, glandular hairs; and small, star-shaped (stellate) hairs. All invasive hawkweeds are polyploid ($n=9$) and typically asexual, compared to the entirely diploid and sexual native species.

Meadow hawkweed in northern Idaho



Invasive hawkweeds commonly occur as populations of intermediate types throughout the PNW, making identification of invasive hawkweed species difficult. Abundant variation in plant characteristics due to apomixis and perhaps occasional hybridization, environmental and site influences, and natural variation (polymorphism) has resulted in the description of thousands of species, subspecies and types worldwide. The purpose of this key is to enable land managers to distinguish among the entire complex of native and invasive hawkweeds in the Pacific and Inland Northwest.



Smooth hawkweed near Bellingham, WA

INVASION SUCCESS

Hawkweeds possess many characteristics that allow a species to become invasive: perennial, apomictic, high seed production and germinability, long distance seed dispersal, spread/regenerate from root fragments, root buds, rhizomes and stolons, rapid generation time (ca. 63 days), and broad latitudinal range. In addition, several hawkweed species, particularly orange hawkweed, are popular ornamentals. They have been and continue to be spread by intentional and accidental human activities.

HABITAT PREFERENCES

Invasive hawkweeds infest similar habitats in British Columbia, Washington, Idaho, Oregon and Montana. Found predominantly in open fields, mountain meadows and clearings in forest zones, hawkweeds also infest permanent pastures, cleared timber units, abandoned farmland and other modified habitats where the soil is well drained, coarse-textured, and moderately low in organic matter.

Hawkweeds are preadapted to many habitats in the Pacific and Inland Northwest, and mesic habitats in the Intermountain West. Throughout most of the PNW, hawkweeds are generally found at elevations ranging from 725 m (2400 feet) to over 1700 m (5500 feet). They occur more commonly at lower elevations above 51°N latitude. None of the invasive hawkweeds are found in the natural grasslands or shrub-steppe of the PNW, and they have not proven to be invasive in the dry habitats of southcentral British Columbia and central Washington.

MANAGEMENT

Management of hawkweed-invaded sites has had mixed results. Controlling hawkweed has relied mostly on selective herbicides. Herbicides are effective in suppressing hawkweeds but reinvasion occurs unless other plant species fill the gaps left by hawkweed removal. Control and management of meadow hawkweed has been complicated by the plant's ability to persist following chemical and cultural control inputs.

Hawkweeds often invade sites in cleared forest zones which are typically low in available nutrients. Hawkweeds are thought to persist in these sites because they capture nitrogen in nutrient-poor soils, thus limiting nutrients available to competing plants. Fertilizers and soil fertility management have been used to effectively control hawkweeds in some areas, especially in new hawkweed infestations or where hawkweed density is relatively low. Long-term management of hawkweed needs to emphasize altering conditions in the plant community to favor grasses and native forbs, following initial hawkweed control efforts.

A biological control program for invasive hawkweeds was initiated in the early 2000s. To this end, the Province of British Columbia, through the Ministry of Forests, together with the Montana Weed Trust Fund, through Montana State University, and USDA-APHIS-CPHST, are primary sponsors of the Biological Control Program in the Invasive Hawkweed Consortium which supports research efforts by scientists at Agriculture and Agri-Food Canada and CABI Europe-Switzerland.

Table 1
LIST OF NATIVE HAWKWEEDS IN WESTERN NORTH AMERICA
(including Alaska, Alberta, California, Colorado, British Columbia, Idaho,
Montana, Oregon, Utah, Washington, and Wyoming)

Scientific name	Common name	Distribution
Hieracium Subgenus Chionoracium		
<i>Hieracium albiflorum</i>	white hawkweed	AB, BC; AK, CA, CO, ID, MT, OR, UT, WA, WY
<i>Hieracium argutum</i>	southern hawkweed	CA
<i>Hieracium bolanderi</i>	Bolander's hawkweed	OR (serpentine soils of SW), CA
<i>Hieracium gracile</i>	slender hawkweed	BC; CA, CO, ID, MT, OR, WA, WY
<i>Hieracium greenii</i>	Green's hawkweed	OR, CA
<i>Hieracium horridum</i>	rough hawkweed	OR, CA
<i>Hieracium longiberbe</i>	long beard hawkweed	OR, WA (occurs only in Columbia River gorge)
<i>Hieracium parryi</i>	Parry hawkweed	OR (serpentine soils of SW), CA
<i>Hieracium scouleri</i> var. <i>albertinum</i>	western hawkweed	AB, BC; AK, CA, CO, ID, MT, OR, WA, WY
<i>Hieracium scouleri</i> var. <i>cynoglossoides</i>	houndstongue hawkweed	AB, BC; CA, ID, OR, WA
<i>Hieracium scouleri</i> var. <i>scouleri</i>	Scouler's hawkweed	AB, BC; CA, ID, MT, OR, WA, WY
<i>Hieracium triste</i>	woolly hawkweed	AB, BC, AK
Subgenus Hieracium		
<i>Hieracium canadense</i>	Canada hawkweed	BC; ID, MT, WA
<i>Hieracium umbellatum</i>	narrowleaf hawkweed	BC; ID, MT, OR, WA, WY

Table 2
LIST OF INVASIVE ALIEN HAWKWEEDS IN
WESTERN NORTH AMERICA
(including Alaska, Alberta, British Columbia, Idaho, Montana, Oregon, Washington, and
Wyoming)

Scientific name	Common name	Distribution
Genus Pilosella		
<i>Pilosella aurantiaca</i> (= <i>Hieracium aurantiacum</i>)	orange hawkweed	AB, BC; AK, ID, MT, OR, WA, WY
<i>Pilosella caespitosa</i> (= <i>Hieracium caespitosum</i>)	meadow hawkweed	AB, BC; ID, MT, OR, WA, WY
<i>Pilosella flagellaris</i> (= <i>Hieracium flagellare</i>)	whiplash hawkweed	BC; WY
<i>Pilosella floribunda</i> (= <i>Hieracium floribundum</i>)	kingdevil hawkweed	BC; ID, MT, OR, WA
<i>Pilosella glomerata</i> (= <i>Hieracium glomeratum</i>)	yellowdevil hawkweed	BC; ID, WA
<i>Pilosella officinarum</i> (= <i>Hieracium pilosella</i>)	mouse ear hawkweed	BC; OR, WA
<i>Pilosella piloselloides</i> (= <i>Hieracium piloselloides</i>)	tall hawkweed	BC; MT
<i>Pilosella praealta</i> (= <i>Hieracium praealtum</i> , <i>Pilosella piloselloides</i> subsp. <i>praealta</i>)	queendevil hawkweed	BC
Hieracium Subgenus Hieracium		
<i>Hieracium laevigatum</i>	smooth hawkweed	BC; WA
<i>Hieracium lachenalii</i> (= <i>H. vulgatum</i>)	common hawkweed	BC; ID, WA
<i>Hieracium sabaudum</i>	European hawkweed	BC; WA
<i>Hieracium atratum</i>	polar hawkweed	WA
<i>Hieracium maculatum</i>	spotted hawkweed	BC; WA
<i>Hieracium murorum</i>	wall hawkweed	BC; AK

Identification Key to Hawkweeds (*Hieracium* spp. and *Pilosella* spp.) in the Pacific Northwest

General Description: Hawkweeds are fibrous-rooted, perennial herbs growing from a short, stout rhizome, and commonly with short to long stolons (occasionally with shallow, lateral rhizomes), though sometimes stolons (rhizomes) are lacking; stems erect, ± solitary, generally unbranched (except near the top), smooth to moderately hairy, exuding a milky juice when broken. Leaves are narrowly to broadly lance-shaped, elliptic to ovate, generally tapering or rounded at the base; upper stem leaves absent or much reduced and often sessile; inflorescence ranging from one to many heads arranged in an open or compact, flat- to round-topped cluster (cyme). Flowers yellow, orange or white; all strap-shaped (ray flowers). Leaves, stems and phyllaries (involucral bracts) range from hairless (glabrous) to strongly pubescent; pubescence ranging from soft, simple hairs to stiff bristles, star-shaped (stellate) hairs, dark glandular (gland-tipped) hairs, and/or stiff, bulbous-based (conical) hairs. Seeds (achenes) are ribbed, and the pappus is dirty white to tawny.

How to Use this Key:

This is a *dichotomous key* – it is based on a numerical series of choices between two contrasting statements. Each paired number (referred to as a couplet) in the key describes contrasting characteristics about the hawkweed plant (e.g., 5a and 5b). Choose one statement out of each pair that happens to be true about the hawkweed you are trying to identify. The statement you choose may directly give you the name of the hawkweed or it may take you to another pair of statements. Continue making consecutive choices until you arrive at the species.

Example: Meadow hawkweed (*H. caespitosum*)

To start, look at both statements for couplet 1, 1a and 1b. The correct choice is 1a (plants with stolons), which directs you to couplet 2. Looking at couplet 2 and examining the plant, you select 2b (flowers yellow), which directs you to couplet 3, and so on until you arrive at 6a, which describes meadow hawkweed. The sequence of couplets you would choose to identify meadow hawkweed: 1a – 2b – 3b – 4b – 5a – 6a.

It is a good idea to first become familiar with the layout of the key. Always read both choices presented at each step of the key. A hand lens or microscope with at least 10x total magnification is required to discern stellate hair characters. A ruler may be necessary for measurement. There can always be variability between plants of the same species, so it is good to examine several different specimens. The bolded statements within each couplet indicate the most significant characters used to differentiate between the two choices.

Changes from Edition 2 (2007): Two species were added to the 2007 key (see also Fig. 2): the native, woolly hawkweed (*H. triste*) and the suspected invasive, pale hawkweed (*H. lactucella*). This latter species was collected in 1991 near Port Coquitlam, B.C. by F. Lomer. In 2006, it was tentatively identified as pale hawkweed (F. Lomer pers. comm. Feb. 9, 2018). Pale hawkweed closely resembles whiplash hawkweed (*H. flagellare*). Subsequently the specimen was identified by Dr. Günter Gottschlich, Botanist, Tübingen, Germany as a hybrid between *H. piloselloides* and *H. flagellare* which has been described as a garden hybrid from the Munic Botanical Garden under the name *Hieracium inops* Peter. In Europe, this hybrid is known only as a garden species as the parents have different ecological habitats (G. Gottschlich pers. comm. Feb. 20, 2018). *H. inops* is not known from other locations in B.C. at this time. Pale hawkweed has subsequently been removed from the remainder of this document.

Changes from Edition 3 (2018): We added Figures 3-6 representing key identification traits for the *Pilosella* species based on Moffat et al. (2015), have updated the dichotomous key to emphasize the importance of traits identified in that study, and added a glossary of botanical terms used in this document (p. 29-30).

Identification Key to Hawkweeds in the Pacific Northwest

- 1a. Plants with or without stolons; stems erect, stem leaves absent or much reduced (and only on the lower third of the stem); basal leaves lance-shaped to elliptic or egg-shaped and margins mostly entire (or minutely toothed), with leaves often tapered to the base of the petiole; inflorescence solitary to an open flat- or round-topped cluster. Introduced species **2**
- 1b. Plants without stolons; stems erect, leafy, or if stem leaves reduced, usually present to upper third of the stem (may be bract-like); basal leaves broadly lanceolate to ovate and margins entire to strongly toothed, with leaves often rounded or tapered to a ± elongate petiole; inflorescence an open, round-topped cluster. Native and introduced species **9**

Pilosella species

- 2a. Flowers orange to red-orange; basal leaves with numerous simple hairs on upper surface and simple and stellate hairs on lower surface (Fig. 1-A); stem and phyllaries with numerous stellate, glandular and simple hairs; heads 20-50 in an open, rounded cluster; plants generally 10-60 (100+) cm tall (= *H. aurantiacum*) **ORANGE HAWKWEED *P. aurantiaca* L.**
- 2b. Flowers yellow, sometimes with red stripes on underside; leaves and inflorescence various **3**
- 3a. **Heads solitary (rarely 2)**; basal leaves ovate and narrow at the base, upper surface medium to dark green with numerous long simple hairs; **lower surface appearing white due to a dense mat of short, stellate hairs** (Fig. 1-B); stems unbranched, without leaves, hairy at the base; stolons present, 10 - 25 cm long, leafy and mat-forming; phyllaries with numerous stellate, glandular and simple hairs; plants generally 5-30 cm tall (= *H. pilosella*) **MOUSE EAR HAWKWEED *P. officinarum* Vaill.**
- 3b. **Heads few to many** on long stalks (peduncles) in open clusters; basal leaves lanceolate to elliptic, smooth and hairless or sparsely to abundantly hairy, but **not white on lower surface**; with or without 1-3 small leaves, smooth or hairy at the base; stolons present or absent; phyllaries with or without stellate, glandular and simple hairs **4**
- 4a. Heads 2-6 (8), leaves lanceolate to spatulate; **upper leaf surface with few to numerous long simple hairs; lower surface with moderately to highly dense stellate and long simple hairs** (Fig. 1-C); stolons long and leafy; phyllaries with numerous stellate, glandular and simple hairs; **stems branching once or rarely twice at any point along the stem**, including areas very near the crown or immediately below the head, in rare instances some plants may have no branching; flowers close overnight and remain closed in very low light; flower petals often with red stripes or reddish-orange tinge on underside; plants generally 6-20 cm tall; (= *H. flagellare*) **WHIPLASH HAWKWEED *P. flagellaris* Dumort.**
- 4b. Heads 6-30 (many), leaves not as above, pubescence variable, stolons present or absent **5**
- 5a. Leaves narrowly to broadly lanceolate to elliptic and tapering to the petiole; **both surfaces with ± numerous simple hairs, lower surface with numerous stellate hairs** **6**
- 5b. Leaves narrowly lance-shaped to elliptical and tapering; **smooth and hairless or with few simple hairs on the upper surface, on the margins and/or on the lower midrib**, with or without stellate hairs on the lower surface **7**
- 6a. **Upper leaf surface with long simple hairs, and lacking (or few) stellate hairs; lower surface with moderately dense stellate and long simple hairs** (Fig. 1-D); lower stems with dense stellate, simple and glandular hairs; stolons generally present (though at times short and inconspicuous); heads 20-50 in a compact, flat-topped cluster, phyllaries sparsely covered with numerous stellate, glandular and simple hairs; plants generally 20-70 cm tall (= yellow hawkweed, *H. pratense*, *H. caespitosum*) **MEADOW HAWKWEED *P. caespitosa* Dumort.**
- 6b. **Upper and lower surface of leaves with numerous stellate hairs**, simple hairs short and stiff, **giving the plant a rough texture** (Fig. 1-E); lower stems with sparse to dense stellate and short simple hairs; stolons absent; heads 15-25 in an open, round-topped cluster; phyllaries densely covered with stellate and glandular hairs; plants generally 25-90 cm tall (= *H. glomeratum*) **YELLOWDEVIL HAWKWEED *P. glomerata* Froel.**

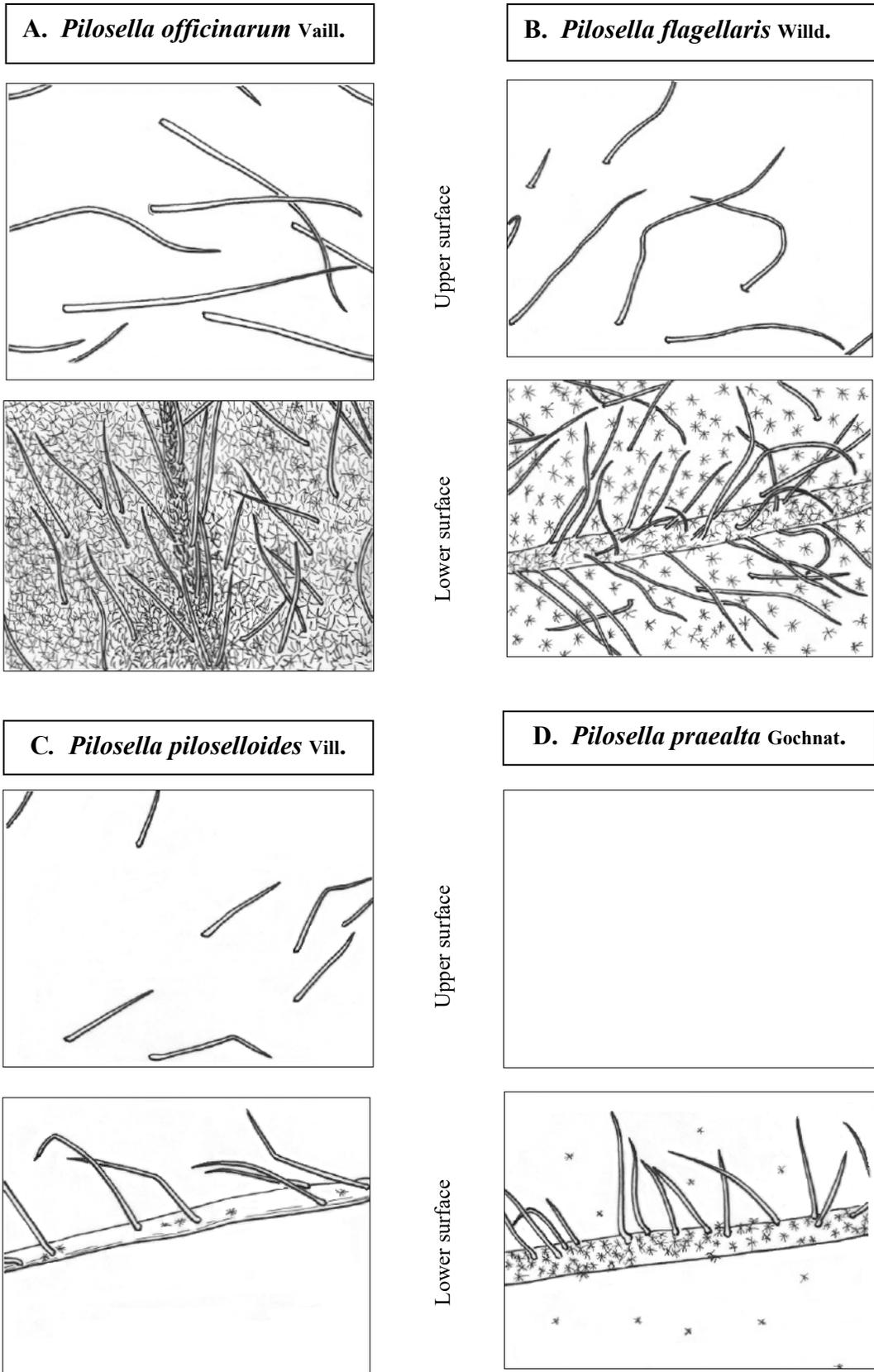
- 7a. Basal leaves narrowly lanceolate; upper leaf surface and margin with sparse, long, simple hairs or hairs lacking, lower leaf surface and midrib with short, simple hairs, **stellate hairs lacking on lower leaf surface** (Fig 1-F); **lower stem with abundantly dense simple hairs**; heads 15-25 in a loose, open cluster; phyllaries with numerous stellate, glandular and simple hairs; stolons usually present and leafy; flowers occasionally with red stripes on underside; plants generally 15-50 cm tall (= *H. floribundum*) ..
 KINGDEVIL HAWKWEED *P. floribunda* Wimm & Grab.
- 7b. Basal leaves narrowly elliptic to lanceolate; **leaves hairless or with a few simple and stellate hairs**; **lower stem with sparse simple hairs**; heads in an open cluster; phyllaries with numerous simple, glandular and/or stellate hairs; stolons present or absent **8**
- 8a. Upper leaf surface hairless or with only a few simple hairs along margin, stellate hairs lacking, **lower leaf surface smooth and hairless** except for few simple hairs on the midvein (Fig.1-G); plants without stolons; heads 11-20 in an open, round-topped cluster; floret involucre often with yellow gland tip hairs; plants generally 40-90 cm tall (= *H. piloselloides*)
 TALL HAWKWEED *P. piloselloides* Vill.
- 8b. Upper leaf surface hairless, **lower surface with few to numerous stellate hairs**, and with long, simple hairs only along midvein (Fig.1-H); plants with long, leafy stolons; heads 15-30 in a compact, round-topped cluster; phyllaries often with grey, brown or clear gland tip hairs; plants generally 25- 80 cm tall (= *H. praealtum*) QUEENDEVIL HAWKWEED *P. praealta* Gochnat.

Hieracium species

- 9a. Leaf margins entire or wavy toothed; basal leaves elliptic to narrowly lance-shaped, may be withered and lacking at flowering (deciduous); stem leaves reduced; heads 2-25, small, with sparse to copious hairs **10**
- 9b. Leaf margins coarsely to sharply toothed; basal leaves egg-shaped to broadly lance-shaped, well-developed and persistent at flowering; stem leaves well-developed; heads 4-30, large, with few or no hairs **17**
- 10a. Flowers white; leaves entire to wavy toothed, sparsely to moderately hairy, stellate hairs absent; stem bases long-hairy, phyllaries with dark glandular hairs; plants generally 30-60 cm tall; native species, widespread in dry, open woodlands WHITE HAWKWEED *H. albiflorum* Hook.
- 10b. Flowers yellow; leaves and inflorescences variable **11**
- 11a. Leaf margins entire **12**
- 11b. Leaf margins finely to coarsely toothed **15**
- 12a. Basal leaves ovate to spatulate, narrowing to base, smooth and ± hairless or with a few short hairs; stems unbranched, stem leaves ± absent; heads 2-6; plants generally 3-35 cm tall; native, subalpine species **13**
- 12b. Basal leaves slender, narrowly elliptic to lanceolate; plants slightly to copiously hairy; stems branched or unbranched; stem leaves 2-6, reduced; heads 7 to many **14**
- 13a. Upper part of stem, peduncles and phyllaries sparsely to moderately grey-hirsute, glandular hairs present; achenes red SLENDER HAWKWEED *H. gracile* Lindeb.
- 13b. Upper part of stem, peduncles and phyllaries black-villous, without glandular hairs; achenes black
 WOOLLY HAWKWEED *H. triste* Willd.
- 14a. Basal leaves and stems with long, conspicuously shaggy hairs (hairs 3-7 mm); stems sparsely to moderately leafy; heads 7-15, plants 30-60 cm tall; native species of moist, rocky outcroppings in the Columbia River Gorge LONG BEARD HAWKWEED *H. longiberbe* Howell.
- 14b. Basal leaves sparsely to moderately hairy; stems moderately leafy and hairy; heads 10-20; plants generally 30-100 cm tall *H. scouleri* Hook. **complex**
- b1. plants sparsely or moderately hairy **var. scouleri** SCOULER'S HAWKWEED
- b2. plants densely hairy **var. cynoglossoides** HOUNDSTONGUE HAWKWEED
- b3. plants very densely and conspicuously long-hairy on leaves, stems and heads
 **var. albertinum** WESTERN HAWKWEED

- 15a. Plants without bulbous-based, conical hairs; stems stout, with long spreading hairs, stem leaves abundant; lower stem leaves strongly toothed, ovate to broadly lanceolate, sometimes hairless or with stellate and simple hairs; mid-stem leaves mostly lance-shaped, entire to sparingly toothed; heads 6-20 (many) in an open, spreading cluster, phyllaries hairless or nearly so; plants generally 20-100 cm tall; native species..... **CANADA HAWKWEED *H. canadense* Michx.**
- 15b. Plants with bulbous-based, conical hairs on leaves or leaf margins; other characters variable..... **16**
- 16a. Stems slender; leaves \pm linear, 4-12 times as long as wide, entire or only weakly toothed, narrowed to a sessile base; leaves somewhat stiff hairy, usually with stellate hairs; leaf margins rolled under (revolute) and rough from short, firm, conical hairs; stems uniformly leafy, leaves \pm sessile; heads few to many (5-16) in an umbellate panicle; plants generally 30-80 cm tall; native species
.....**NARROWLEAF HAWKWEED *H. umbellatum* L.**
- 16b. Stems robust; leaves oblong and narrowly tapered to a long petiole; leaf margins flat (not revolute) and smooth; lower leaf surfaces and lower stem with long, firm, subconic hairs; stellate hairs lacking throughout; stem leaves \pm 50, crowded at the base; rapidly becoming smaller upwards; lower stem densely covered with long simple hairs; phyllaries with many glandular and numerous long simple hairs; heads few to numerous (3-12) in an open, flat-topped cluster; plants generally 40-130 cm tall; introduced species.....**EUROPEAN HAWKWEED *H. sabaudum* L.**
- 17a. Leaves purple-mottled or blotched above; plants generally 20-80 cm tall; introduced species
.....**SPOTTED HAWKWEED *H. maculatum* Schrank**
- 17b. Leaves uniformly green **18**
- 18a. Leaf bases rounded **19**
- 18b. Leaf bases tapered and narrowing..... **20**
- 19a. Leaves nearly entire or slightly toothed; basal leaves broadly elliptic, cordate or somewhat truncate at base, not tapered to petiole, hairless or with simple hairs on the upper surface or sparse stellate hairs on the lower surface; stem leaves absent or 1-2 near the base; heads 4-15, with dense stellate and dark glandular hairs; plants generally 20-80 cm tall; introduced species
.....**WALL HAWKWEED *H. murorum* Fr.**
- 19b. Leaves strongly dentate (a few coarse teeth along the margin, with the teeth facing outward); basal leaves narrowly ovate, abruptly tapering to petiole, with numerous simple hairs on upper surface and stellate hairs on lower surface; stem leaves 2-4; heads 2-10, with many dark, glandular and simple hairs and a few stellate hairs; plants generally 20-40 cm tall; introduced species
.....**POLAR HAWKWEED *H. atratum* Fr.**
- 20a. Heads 4-12, with numerous stellate and simple hairs (sometimes with few dark, glandular hairs); stems with sparse stellate hairs and numerous glandular hairs; basal leaves grey-green, broadly elliptical to lance-shaped, strongly toothed, narrowly tapering to a petiole; stem leaves 4-7, upper leaves smaller and sessile; plants generally 20-80 cm tall; introduced species (= *H. vulgatum*)
.....**COMMON HAWKWEED *H. lachenalii* Suter.**
- 20b. Heads 10-25, without stellate and simple hairs; stems with numerous stellate and glandular hairs; basal leaves green, broadly elliptical, coarsely to strongly toothed, abruptly tapering to a petiole; stem leaves 7-10; upper leaves smaller and sessile; plants generally 40-110 cm tall; introduced species
.....**SMOOTH HAWKWEED *H. laevigatum* Willd.**

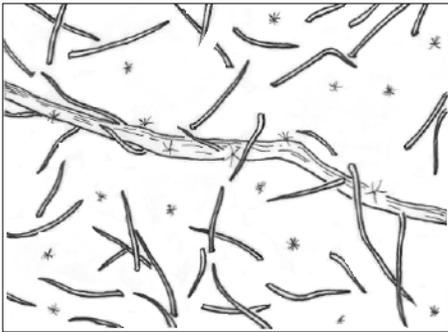
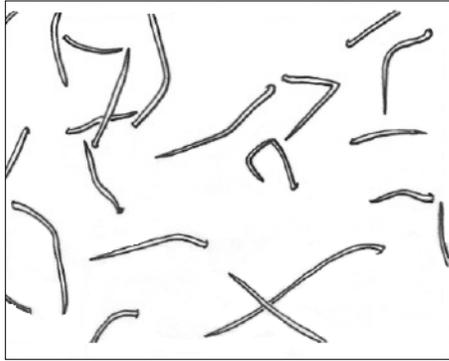
Figure 1. Leaf surface pubescence of invasive hawkweeds, subgenus *Pilosella* (continues on next page).



Line drawings by C. Roché

2 cm

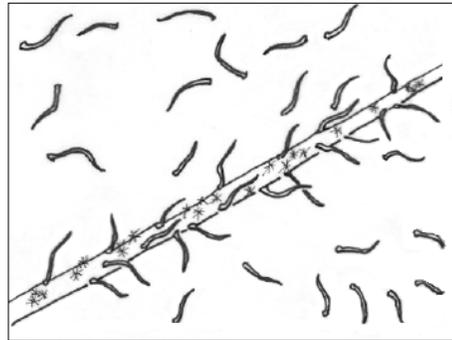
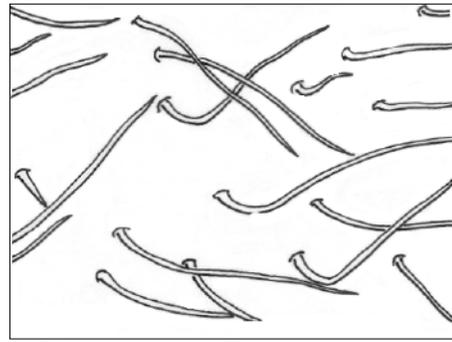
E. *Pilosella aurantiaca* L.



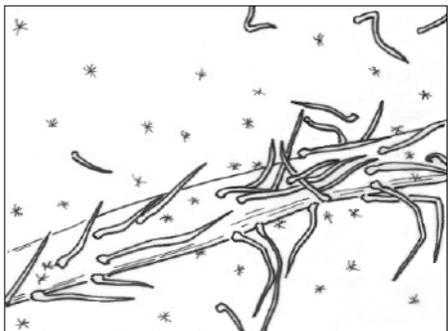
Upper surface

Lower surface

F. *Pilosella floribunda* Winn. & Grab.



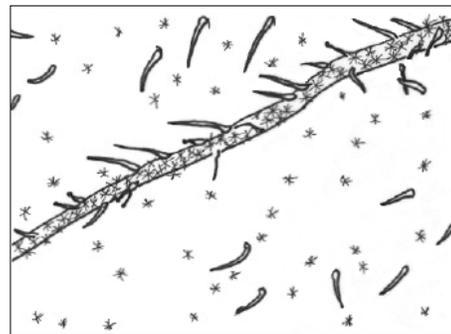
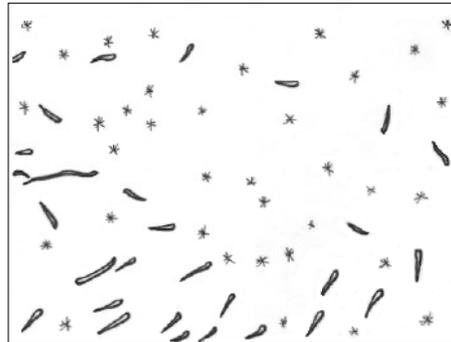
G. *Pilosella caespitosa* Dumort.



Upper surface

Lower surface

H. *Pilosella glomerata* Froel.



Line drawings by C. Roché

2 cm

Figure 2. Schematic of hawkweed species relationships (numbers refer to species' position in key).

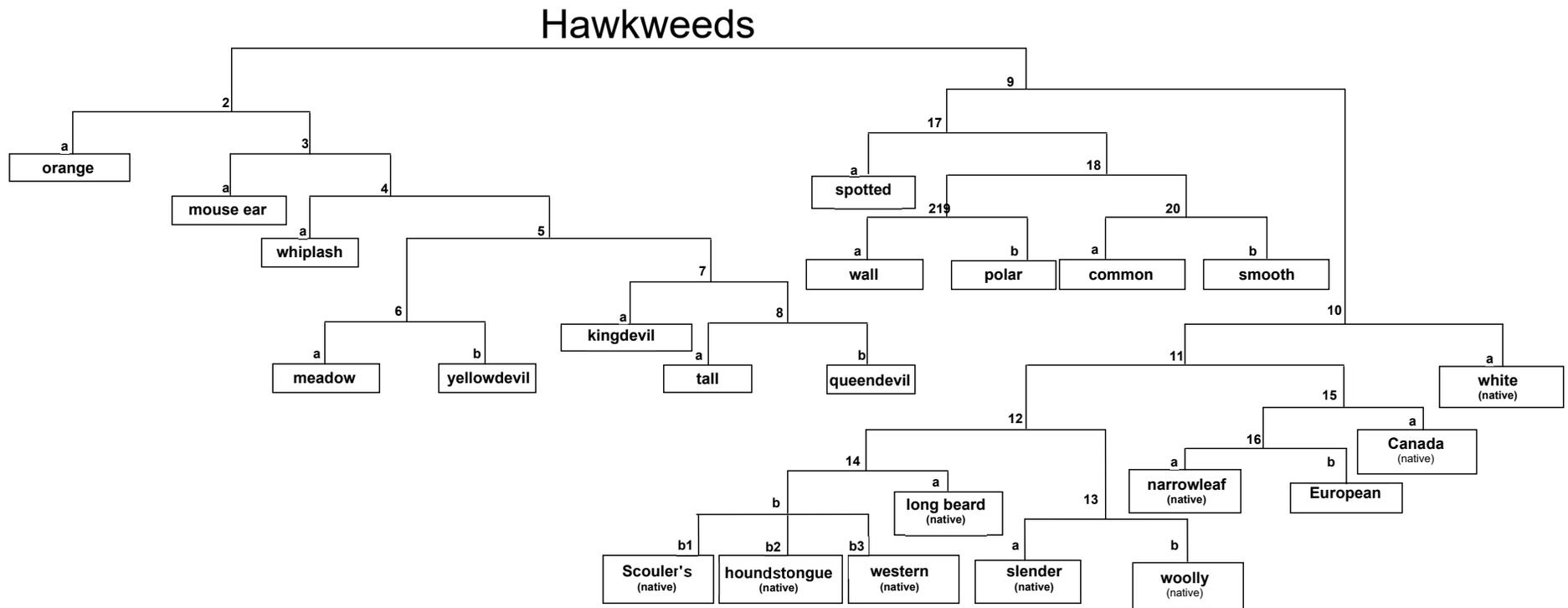
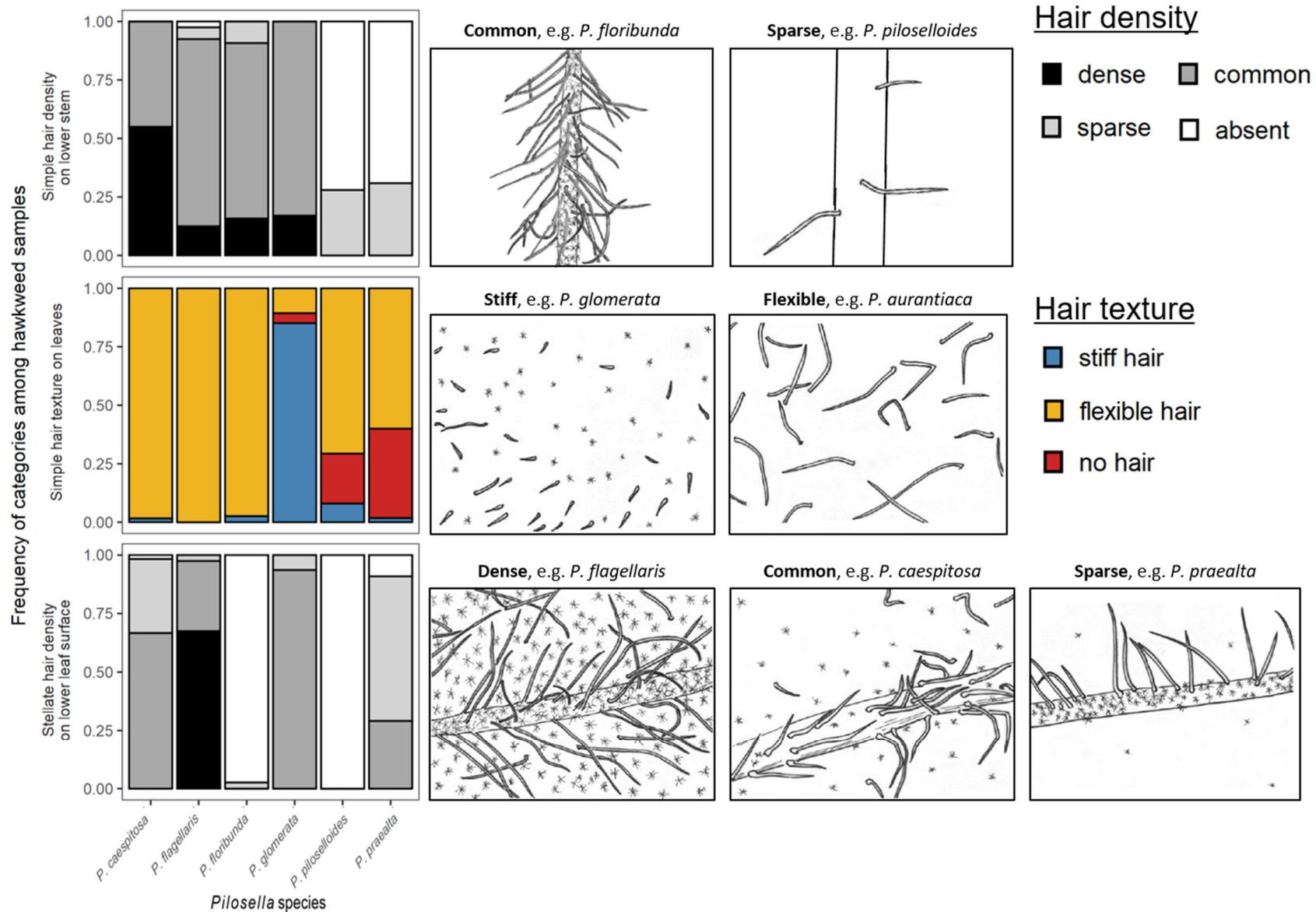
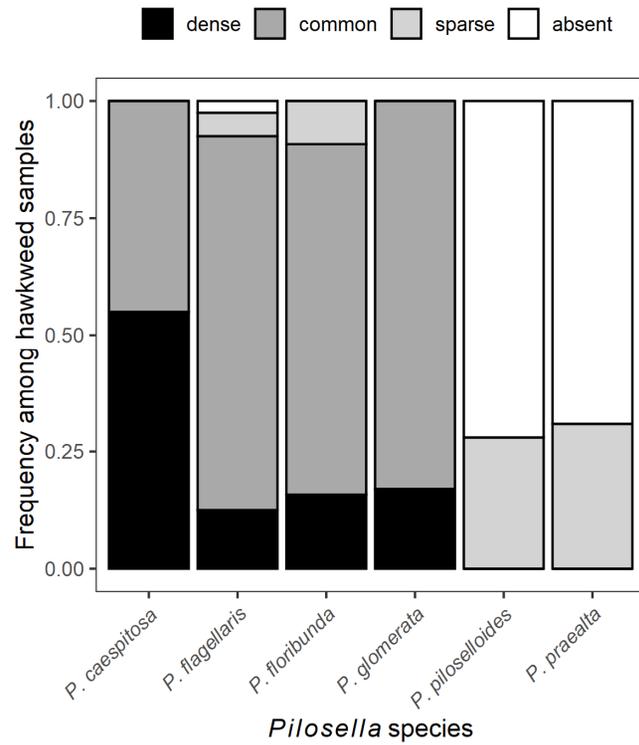


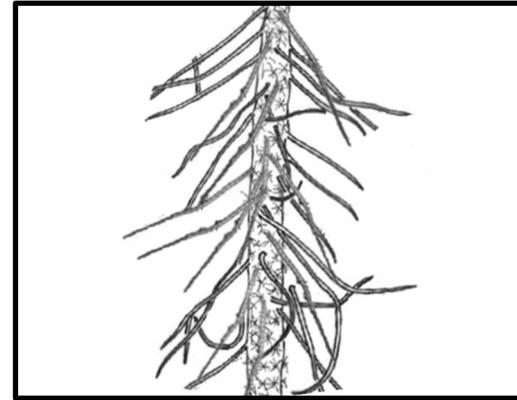
Figure 3. Three pubescence traits (simple hair density on lower stem, simple hair texture on leaves, stellate hair density on lower leaf surface; shown in rows) reliably identify the six, common invasive *Pilosella* spp. present in BC with 90% accuracy (Adapted from Moffat and Ensing, et al. 2015). Detailed explanations can be found in Figs. 4-6 on the next three pages. Line drawings in Figs. 3-6 adapted from C. Roché herein.



Simple hair density on lower stem



Common, e.g. *P. floribunda*



Sparse, e.g. *P. piloselloides*

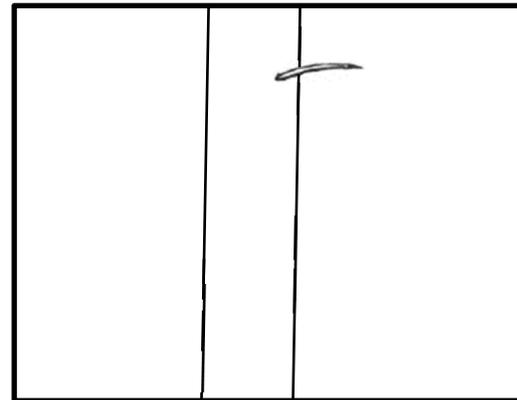
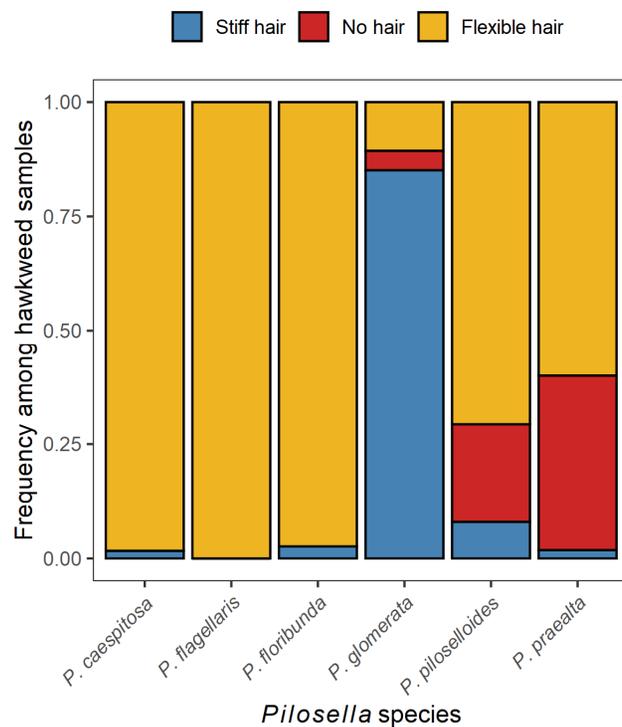
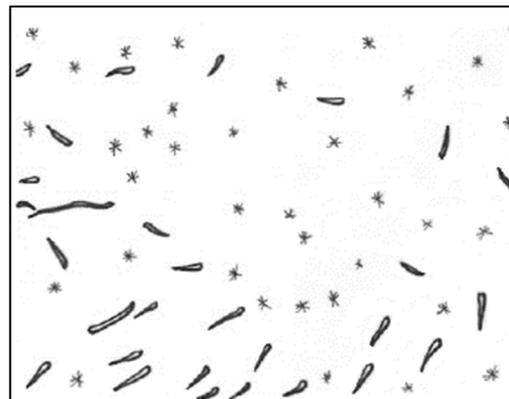


Figure 4. The six *Pilosella* species are first split into two groups by the abundance of simple hairs on the lower 10% of the stem.

Simple hair texture on leaves



Stiff, e.g. *P. glomerata*



Flexible, e.g. *P. floribunda*

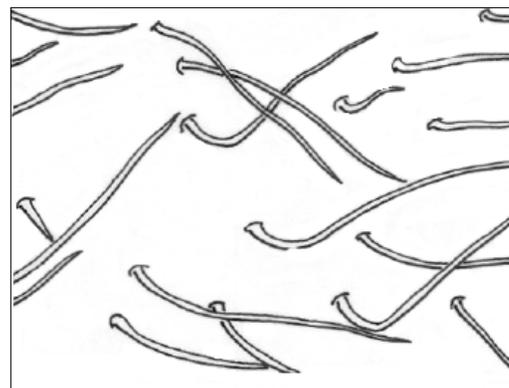


Figure 5. *Pilosella glomerata* is readily differentiated from the other *Pilosella* species by its stiff simple leaf hairs, which give a rough or sandpaper-y feel to the leaves.

Stellate hairs on lower leaf surface

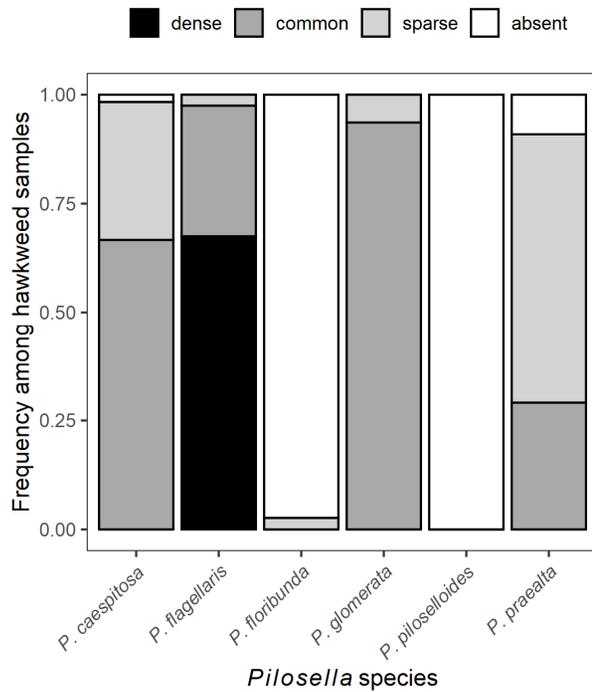
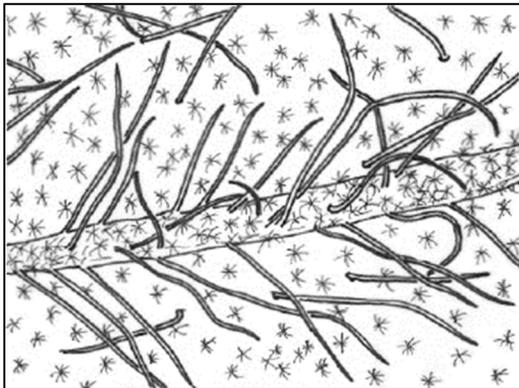
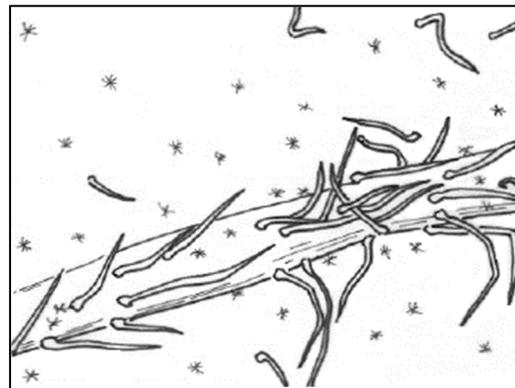


Figure 6. Stellate hairs on the lower leaf surface differentiate among species within the clusters identified by the lower stem hair density and leaf texture. For instance, while *P. piloselloides* and *P. floribunda* have similar stellate densities on the lower leaf surface, *P. piloselloides* has few if any hairs on the lower stem, while *P. floribunda* is common to densely hairy on the lower stem. Similarly, while *P. glomerata* and *P. caespitosa* have similar densities of stellate hairs on the lower leaf surface, the simple hairs are stiff for *P. glomerata* and flexible for *P. caespitosa*.

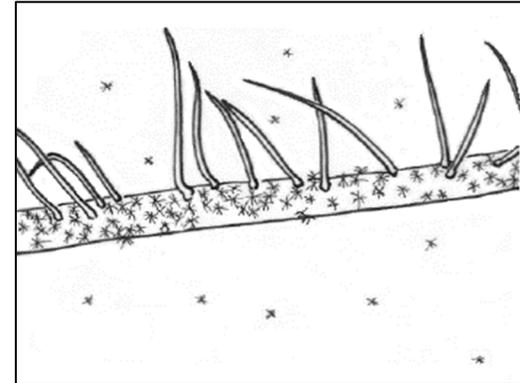
Dense, e.g. *P. flagellaris*



Common, e.g. *P. caespitosa*



Sparse, e.g. *P. praealta*



Meadow hawkweed (*P. caespitosa*)
(Previously known as *H. caespitosum*)

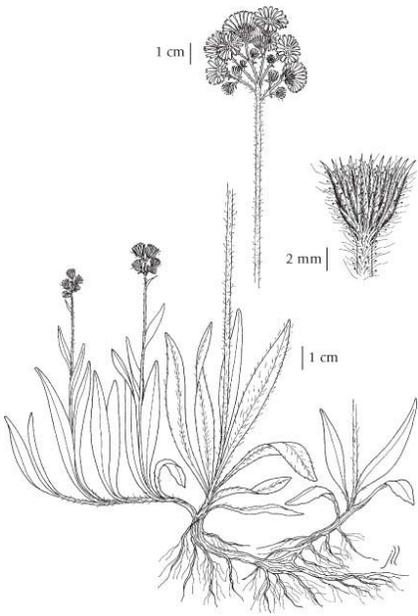


Illustration Source: The *Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20caespitosum>

Orange hawkweed (*P. aurantiaca*)
(Previously known as *H. aurantiacum*)



Illustration Source: The *Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20aurantiacum>

Mouse ear hawkweed (*P. officinaum*)
(Previously known as *H. pilosella*)



Photo Source for all pictures above: Ministry of Forests

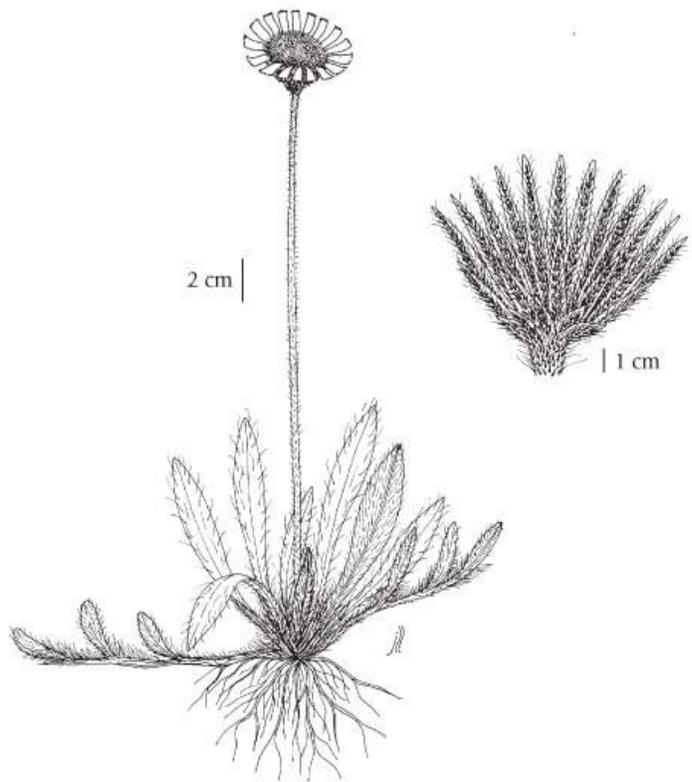


Illustration Source: The *Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20pilosella>

Whiplash hawkweed (*P. flagellaris*)
(Previously known as *H. flagellare*)



Photo Source: Ministry of Forests

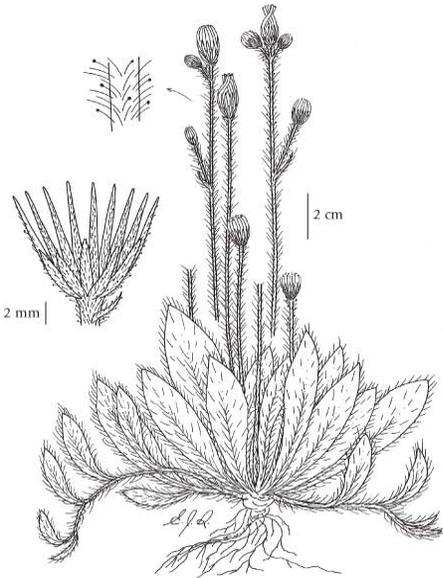


Illustration Source: *The Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20flagellare>



Photo Source: Ministry of Forests

Yellowdevil hawkweed (*P. glomerata*)
(Previously known as *H. glomeratum*)



Kingdevil hawkweed (*P. floribunda*)
(Previously known as *H. floribundum*)



Queendevil hawkweed (*P. praealta*)
(Previously known as *H. praealtum*)

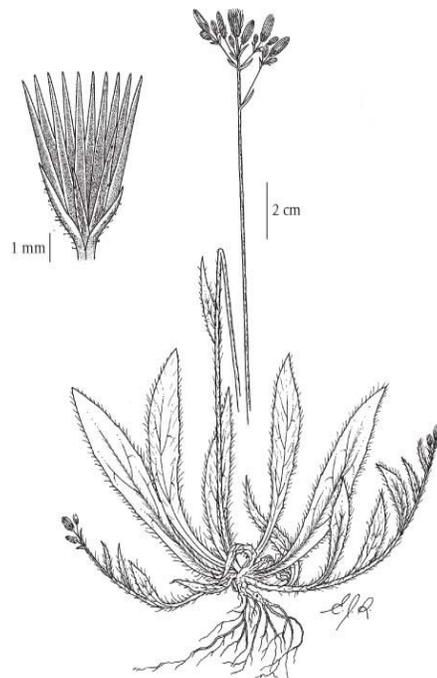


Illustration Source: *The Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20praealtum>

Tall hawkweed (*P. piloselloides*)
(Previously known as *H. piloselloides*)



Tall hawkweed near Yoho National Park, B.C., 2004

Woolly hawkweed (*H. triste*) (native)

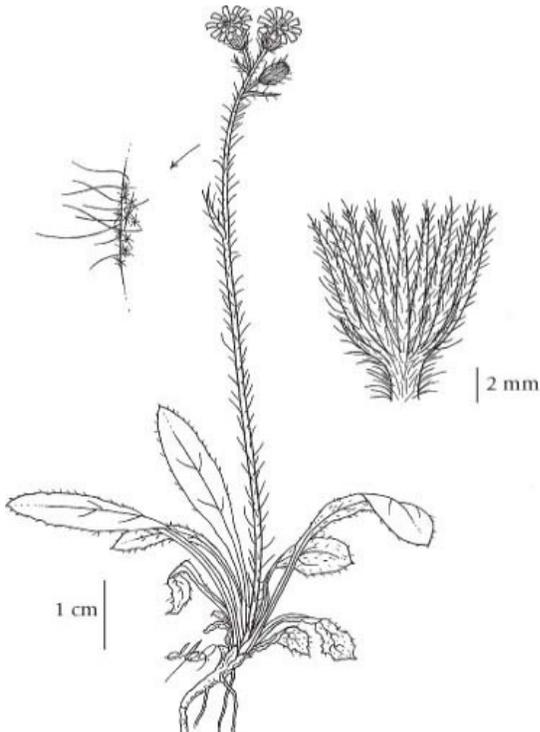


Illustration Source: The *Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20triste&redblue=both&lifeform=7>

Slender hawkweed (*H. gracile*) (native)

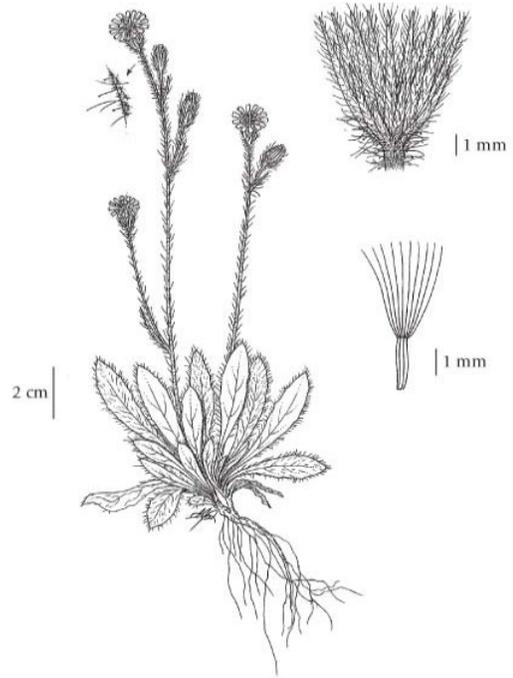


Illustration Source: The *Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20gracile>

Narrowleaf hawkweed (*H. umbellatum*) (native)

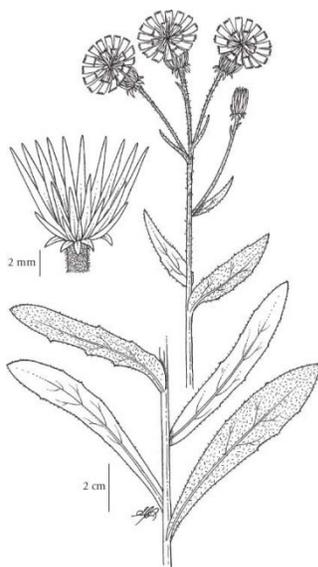


Illustration Source: The *Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20umbellatum>

European hawkweed (*H. sabaudum*)

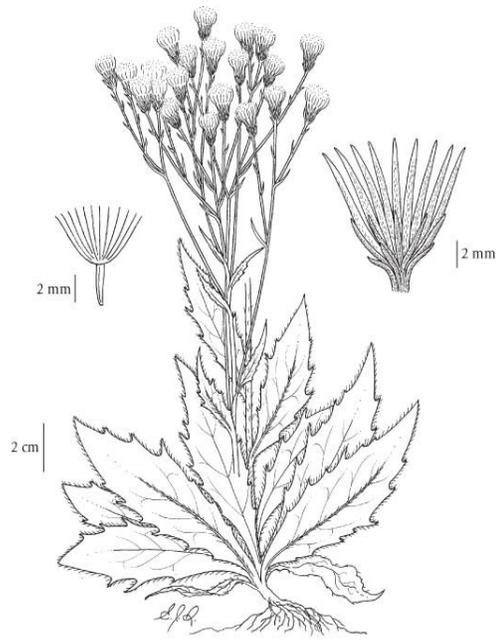


Illustration Source: The *Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20sabaudum>

Western hawkweed (*H. scouleri*) Complex (native)



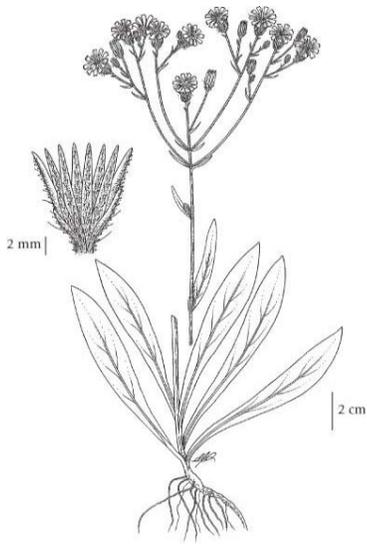
Above left: Houndstongue hawkweed (*H. scouleri* var. *cynoglossoides*)

Above right: Scouler's hawkweed (*H. scouleri* var. *scouleri*)

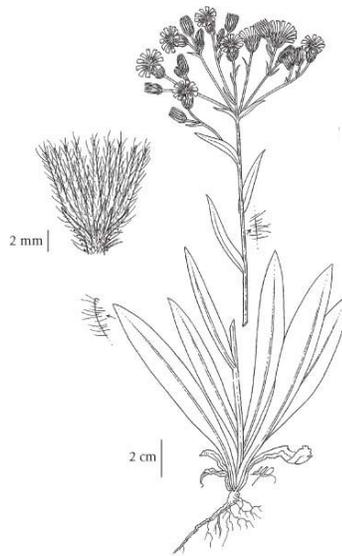


Above left: Houndstongue hawkweed (*H. scouleri* var. *cynoglossoides*)

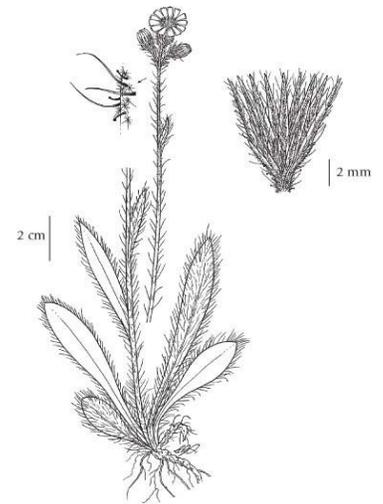
Above right: Western hawkweed (*H. scouleri* var. *albertinum*)



Scouler's hawkweed (*H. scouleri* var. *scouleri*)



Western hawkweed (*H. scouleri* var. *albertinum*)



Houndtongue hawkweed (*H. scouleri* var. *cynoglossoides*)

Illustration Source: The *Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20scouleri&redblue=Both&lifeform=7>

White hawkweed (*H. albiflorum*) (native)

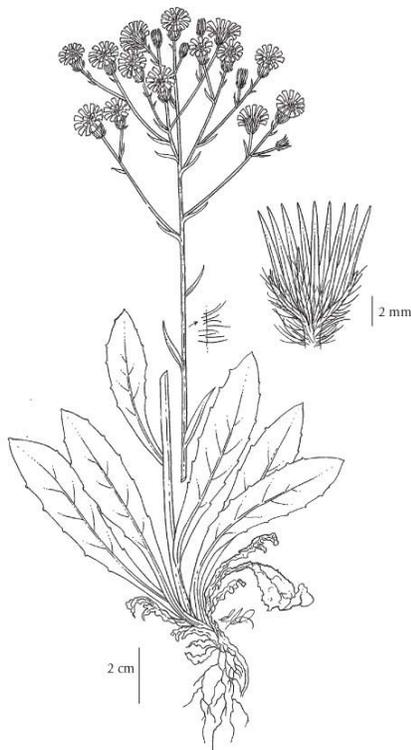


Illustration Source: The *Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20albiflorum>

Common hawkweed (*H. lachenalii*)

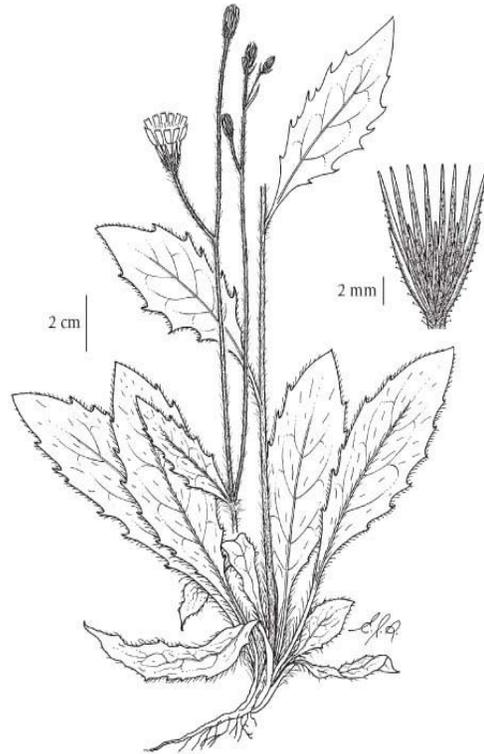


Illustration Source: *The Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20lachenalii>

Spotted hawkweed (*H. maculatum*)



Photo Source: Ministry of Forests

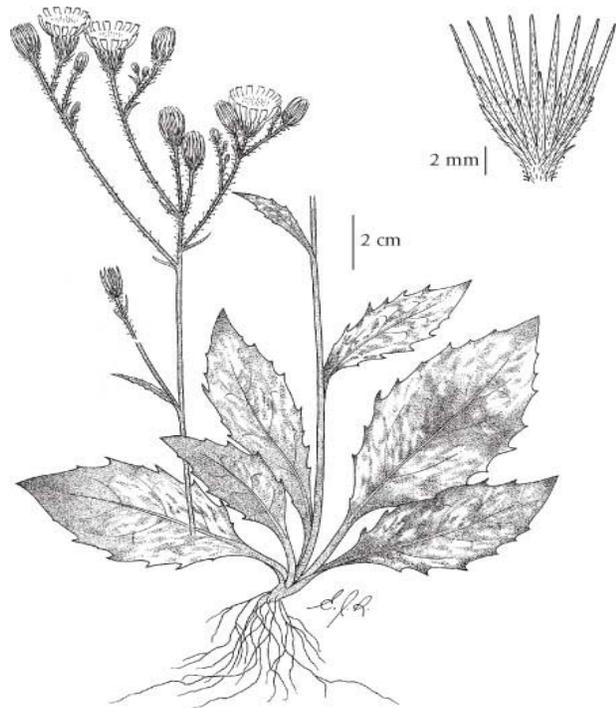


Illustration Source: The *Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20maculatum>

Smooth hawkweed (*H. laevigatum*)



Wall hawkweed (*H. murorum*)

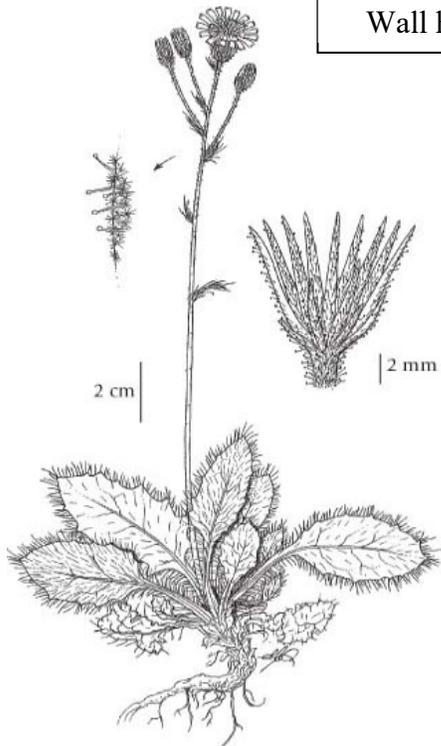


Illustration Source: The *Illustrated Flora of BC*
<http://linnet.geog.ubc.ca/Atlas/Atlas.aspx?sciname=Hieracium%20murorum>

GLOSSARY

Botanical terms used in key defined from *Plant Identification Terminology: An Illustrated Glossary* (Harris & Harris, 2001).

Achene: A small, dry, indehiscent fruit with a single locule and a single seed (ovule), and with the seed attached to the ovary wall at a single point, as in the sunflower.

Bract: A reduced leaf or leaf-like structure at the base of a flower or inflorescence.

Calyx: The outer perianth whorl; collective term for all the sepals of a flower.

Cordate: Heart-shaped, with the notch at the base.

Corolla: The collective name for all of the petals of a flower; the inner perianth whorl.

Cyme: A flat-topped or round-topped determinate inflorescence, paniculate, in which the terminal flower blooms first.

Dentate: Toothed along the margin, the teeth directed outwards rather than forward.

Elliptic: In the shape of an ellipse, or narrow oval; broadest at the middle and narrower at the two equal ends.

Glabrous: Smooth; hairless.

Hirsute: Pubescent with coarse, stiff hairs.

Indehiscent: Not opening at maturity along definite lines or by pores.

Involucre: A whorl of bracts subtending a flower or flower cluster.

Lanceolate: Lance-shaped; much longer than wide, with the widest point below the middle.

Locule: The chamber or cavity (“cell”) of an organ, as in the cell of an ovary containing the seed or the pollen bearing compartment of an anther.

Ovate: Egg-shaped in outline and attached at the broad end.

Panicle: A branched, racemose inflorescence with flowers maturing from the bottom upwards.

Pappus: The modified calyx of the Compositae (Asteraceae), consisting of awns, scales, or bristles at the apex of the achene.

Pedice: The stalk of a single flower in an inflorescence, or of a grass spikelet.

Perianth: The calyx and corolla of a flower, collectively, especially when they are similar in appearance.

Phyllary: An involucral bract of the Compositae (Asteraceae).

Pubescent: Hairiness; short, soft hairs.

Raceme: An unbranched, elongated inflorescence with pedicellate flowers maturing from the bottom upwards.

Revolute: With the margins rolled backwards toward the underside.

Rhizome: A horizontal underground stem; rootstock.

Sessile: Attached directly, without a supporting stalk, as a leaf without a petiole.

Spatulate: Like a spatula in shape, with a rounded blade above gradually tapering to the base.

Stellate: Star-shaped, as in hairs with several to many branches radiating from the base.

Stolon: An elongate, horizontal stem creeping along the ground and rooting at the nodes or at the tip and giving rise to a new plant.

Truncate: With the apex or base squared at the end as if cut off.

Umbel: A flat-topped or convex inflorescence with the pedicels arising more or less from a common point, like the struts of an umbrella.

Villous: Bearing long, soft, shaggy, but unmatted, hairs.