# Rush skeletonweed
*Chondrilla juncea* L.

# History and Ecology in North America

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## SYNONYMS
Skeleton weed, hogbite, nakedweed, gum succory, devil's grass

## 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** | *Chondrilla* | |
| **Species** | *Chondrilla juncea* L. | Rush skeletonweed |

## HISTORY AND DISTRIBUTION
Rush skeletonweed is native to Europe, western Asia, and northern Africa. It was inadvertently introduced to northeastern North America in the 1870s, where it remains sparsely distributed in fields and roadsides and is not considered an agricultural problem. Western USA infestations are much more severe and are believed to have begun via contaminated orchard and vineyard rootstocks in 1938. To date, rush skeletonweed has been recorded in 18 U.S. states and two Canadian provinces (**Fig. 1**).

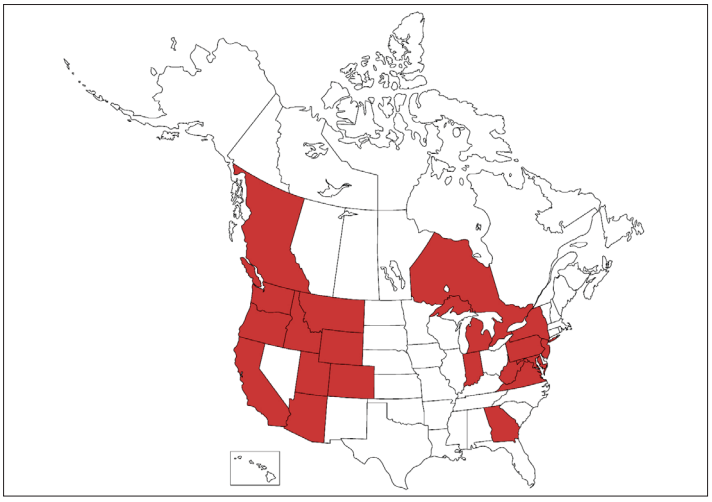

**Figure 1.** Rush skeletonweed reported distribution in North America (Credit: EDDMapS, www.eddmaps.org; USDA PLANTS Database, plants.usda.gov; both accessed 9 July 2021)

## IMPACT
Rush skeletonweed is one of the most problematic exotic plant species in the Intermountain West of the USA. Because of its propensity to compete aggressively for light, water, and nutrients, rush skeletonweed dramatically reduces yields in agricultural crops (especially wheat), and it displaces native species in natural areas. Although young rosettes are nutritious and are often eaten by livestock and wildlife, cattle still prefer grasses to young rush skeletonweed, and older flowering stems of rush skeletonweed are not palatable to most domestic cattle and sheep. Consequently, grazing of infested pastures or rangeland often increases the amount of rush skeletonweed and decreases livestock production.

## IDENTIFICATION
### At a Glance
Rush skeletonweed (**Fig. 2**) is an herbaceous perennial typically growing 1–4 ft (0.3–1.2 m) tall from a deep and sometimes rhizomatous root system. Rosettes have deeply lobed, hairless leaves up to 5 in (13 cm) long. Stems are wiry, and their bottom portions are covered with stiff, golden-reddish and downward-pointing hairs. Stem leaves are alternate, small, narrow, and up to 4 in (10 cm) long. As flowering stems mature, stem leaves often wither; the remaining bare stems give the plant an overall skeleton appearance. Flower heads are ½ in (1¼ cm) across and consist of 9–12 yellow ray florets that produce seeds without fertilization. Seeds are small, brown, and topped by tufts of pappus. All parts of the plant exude a milky latex when damaged.

**Figure 2.** Rush skeletonweed plant (Travis McMahon, MIA Consulting)

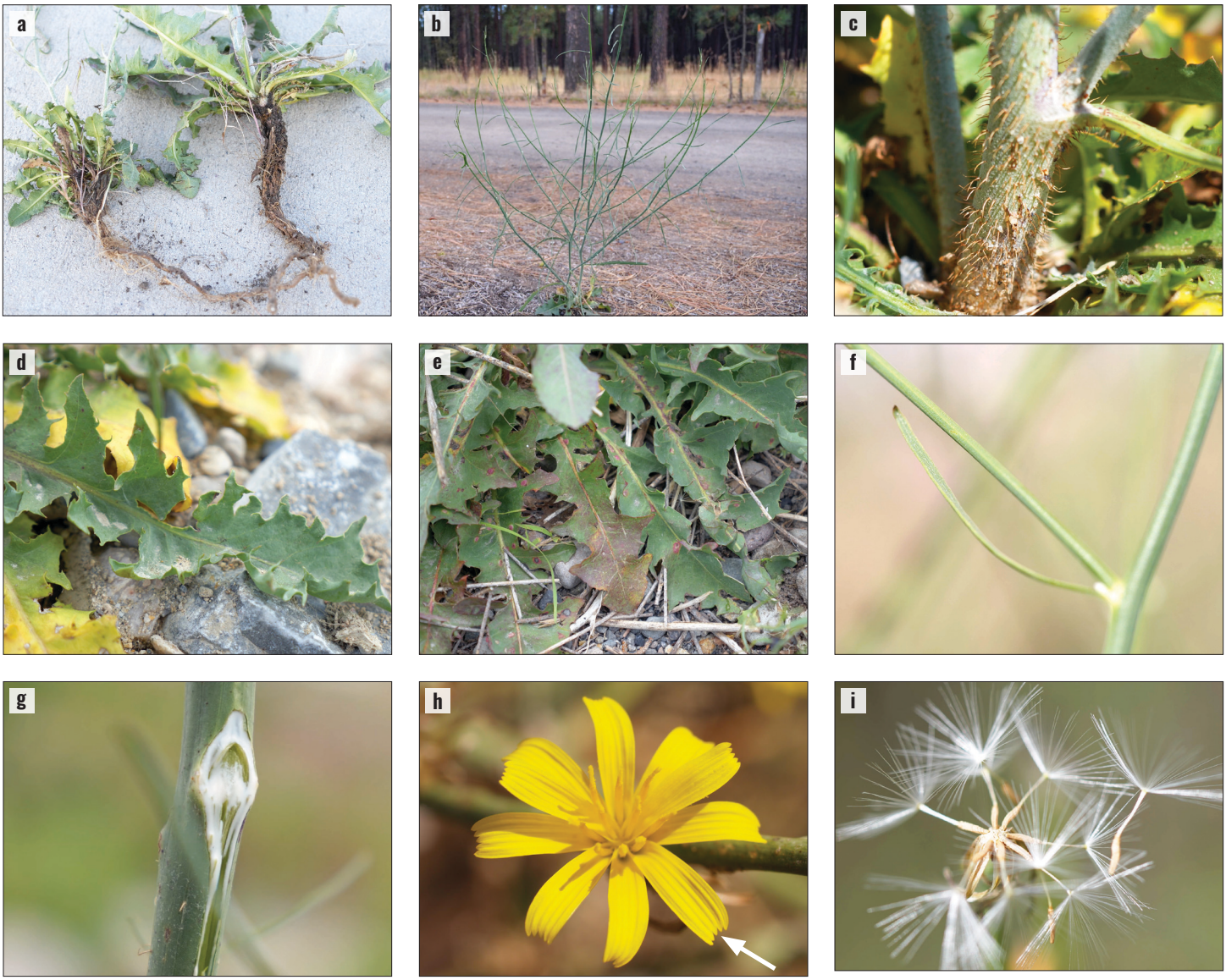


**Figure 3.** Rush skeletonweed (a) roots are deep and sometimes rhizomatous. Plants appear wiry (b) after stem leaves wither. Stem bases have (c) have stiff, golden-reddish and downward-pointing hairs. Older rosette leaves (d) have lobes often pointing backward; (e) some rosette leaves may be tinged in purple. Stem leaves (f) are narrow and grow smaller up the stem. All parts of the plant (g) ooze latex when damaged. Flower heads have (h) 9–12 yellow ray florets, each consisting of 5 fused petals (arrow). Seeds (i) are oblong and topped by a tuft of fine hairs. (a–i: Travis McMahon, MIA Consulting)

## Roots

Rush skeletonweed develops taproots that are slender, brittle, often forked, and deep, growing up to 6½ ft (2 m) long. Roots have short lateral branches which are typically short-lived and less than 3 in (8 cm) long, but some lateral roots near the surface can become rhizomatous, often in very sandy, gravelly, or waterlogged soils (**Fig. 3a**). Rhizomes can produce new rosettes that, over time, form their own roots and eventually become independent plants. Root pieces as small as 1 in (2½ cm) long and ½ in (1¼ cm) in diameter can develop into new plants.

## Stems and Leaves

Plants typically grow 1–4 ft (0.3–1.2 m) tall and have one or more flowering stems with multiple spreading and ascending branches (**Fig. 2**). Stems are wiry, rigid, and may lack leaves. When present, stem leaves often wither back with maturity; remaining stems give the plant an overall skeleton appearance (**Fig. 3b**). Upper stems are not hairy, but the bases of flowering stems have many stiff, golden-reddish, and downward-pointing hairs (trichomes; **Fig. 3c**). Rosette leaves are hairless and 2–5 in (5–13 cm) long. Older rosette leaves have deep lobes that often appear to be pointing backwards towards the leaf base (**Fig. 3d**). Some leaves are tinged with purple or reddish-brown, especially along margins and near leaf tips (**Fig. 3e**). When present, stem leaves are alternate, narrow, and grow smaller further up the stem (**Fig. 3f**). As flowering stems bolt and mature, basal and stem leaves often wither (**Fig. 3b**); upper leaves are at times no more than scale-like bracts. All parts of the plant exude a milky sap when damaged (**Fig. 3g**).

### Flowers

Flower heads are produced along and at tips of branches, either solitary or in clumps of 2–5 (**Fig. 2**). Each flower head is ½ in (1¼ cm) across with 9–12 bright yellow ray florets (**Fig. 3h**). Each floret resembles a single petal but consists of 5 fused petals whose tips separate at the ends of flowers (**Fig. 3h white arrow**). Flower heads are either attached directly to plant branches or via short stems. Bracts at the base of the flower head are gray-green and may appear waxy.

### Fruits and Seeds

Each floret can produce a single seed without fertilization. Seeds are oblong, tapered at both ends, and pale to dark brown (**Fig. 3i**). Each seed has many ribs running lengthwise and is topped by a tuft of fine white bristles (pappus; **Fig. 3i**). First-year plants typically produce 50–150 flower heads annually, equating to 500–1,500 seeds per plant. Longer-lived individuals are capable of producing 20,000 seeds annually.

## ECOLOGY

Rush skeletonweed spreads by seeds as well as rhizomes and root fragments. The plant reproduces mostly through apomixis which means its seeds are typically produced without fertilization. So although pollinators visit rush skeletonweed flowers, pollen doesn't play a role in the production of viable seeds.

Autumn rains stimulate seedling germination, and seedlings or rosettes overwinter. Seedlings are sensitive to shading from other plants and survive better in areas with little competition for light. Plants bolt and branch in spring. As flowering stems mature, stem leaves often wither back, and photosynthesis takes place in the green stems. Flowering typically occurs in late summer. Plants less than one year old are capable of producing seeds, and seeds can remain viable in the soil for several years, though the majority germinate within one. Seeds are readily carried by wind, water, humans, and other animals and are dispersed fall through winter. Above-ground plant parts die back after setting seed, and plants re-sprout each spring from their roots.

## HABITAT

Rush skeletonweed grows best in semiarid conditions with cool, moist winters and warm summers. It capitalizes on disturbance and is often found along railroads, roadsides, riverbanks, fallow fields, abandoned lots, and overgrazed rangeland (**Fig. 4a,b**).

## SIMILAR SPECIES

There are several other plants in the sunflower family (Asteraceae) that resemble rush skeletonweed with their similar flowers or their lobed leaves. The weedy chicory (*Cichorium intybus*) has similar lobed leaves, wiry stems, and milky latex, but its florets are blue and it does not have stiff, downward-pointing hairs at the base of the main stem. Rosettes of the weedy dandelion (*Taraxacum officinale*) have similar lobed leaves and milky latex. But dandelion stems are unbranched, hollow, and leafless, and its flower heads are much larger. The weedy prickly lettuce (*Lactuca serriola*) has similar lobed leaves, wiry stems, small yellow flower heads and milky latex, but prickly lettuce leaves are more jagged along their margins, and it has stiff hairs present all along the stem and on leaf undersides. The weedy yellow starthistle (*Centaurea solstitialis*) and native rush skeletonplant (*Lygodesmia juncea*) also have a few similar features, but both are readily differentiated by their long flower head spines or lavender florets, respectively. **Table 1** lists key characteristics useful for differentiating these species from rush skeletonweed and from each other.


**Figure 4.** Dense rush skeletonweed infestations (a) in an abandoned field and (b) blanketing an overgrazed hillside (a,b: Travis McMahon, MIA Consulting)

## NOTES

Different genotypes of rush skeletonweed are currently recognized in North America, and these genotypes respond differently to environmental conditions and control methods. Although some sources claim there are distinct morphological (visual) differences between the most common genotypes, the majority of land managers have observed a wide variety of morphological traits between and among the these common genotypes, depending on habitat and climatic conditions. Genetic analyses are often necessary to determine genotype.

**Table 1.** Key traits for differentiating rush skeletonweed from similar related species established in North America.

| SPECIES | SIMILARITIES | DIFFERENCES | PLANT | ROSETTE LEAF | FLOWER HEAD |
|---|---|---|---|---|---|
| **Chicory**<br><br>*Cichorium intybus*<br>Asteraceae<br><br>Exotic perennial | Plants skeleton-like later in season; rosette leaves lobed, lobes often point out or backwards; coarse hairs on some stems; seeds with pappus; all parts of the plant exude a milky latex when torn | Grows from stout taproot, not rhizomatous; rosette leaf lobes sometimes point forward; hairs on stems (when present) white rather than reddish, don't always point downard; florets blue; seeds without pappus |  |  |  |
| **Dandelion**<br><br>*Taraxacum officinale*<br>Asteraceae<br><br>Exotic biennial or perennial | Rosette leaves hairless and lobed, lobes point backwards; florets yellow; seeds with pappus; all parts of the plant exude a milky latex when torn | Grows from stout taproot, not rhizomatous; all leaves basal; flower heads produced singly on hollow, unbranched, leafless, fleshy stems; no stiff hairs at stem base; flower heads much larger |  |  |  |
| **Prickly lettuce**<br><br>*Lactuca serriola*<br>Asteraceae<br><br>Exotic annual or biennial | Rosette leaves lobed; stem bases have stiff hairs; flower heads similar size, yellow florets; seeds with pappus; all parts of the plant exude a milky latex when torn | Grows from stout taproot, not rhizomatous; rosette leaf lobes jagged along margins; stiff hairs not restricted to stem base—extend all along stem and leaf undersides; flowering stems branched in upper half |  |  |  |
| **Rush skeletonplant**<br><br>*Lygodesmia juncea*<br>Asteraceae<br><br>Native perennial | Roots deep, rhizomes branched; plants skeleton-like; stem leaves narrow, alternate; seeds with pappus; all parts of the plant exude a milky latex when torn | Plants only 4–16 in (10–40 cm) tall; lacks overwintering rosette; no stiff hairs at stem base; florets pink |  |  |  |
| **Yellow starthistle**<br><br>*Centaurea solstitialis*<br>Asteraceae<br><br>Exotic annual | Some plants may appear skeleton-like; rosette leaves lobed; florets yellow; seeds with pappus | Grows from stout taproot, not rhizomatous; plants gray-green, covered in fine hair; rosette leaf lobes point outward; no stiff hairs at stem base; stems winged; bracts spiny, up to 1 in (2½ cm) long |  |  |  |

**Photos:** chicory plant (Travis McMahon, MIA Consulting), rosette leaves (Ohio State University Weed Lab, Bugwood.org CC BY-3.0 US), flower head (Gerald Holmes, Strawberry Center, Cal Poly San Luis Obispo, Bugwood.org CC BY-3.0 US); dandelion plant (Philipp Weigell, Wikipedia.org CC BY-3.0), rosette leaves (Travis McMahon, MIA Consulting), flower head (Ara Lobato Ortigoza, iNaturalist.org CC BY-NC 4.0); prickly lettuce plant (Travis McMahon, MIA Consulting), leaf (Дарья Друщенко, iNaturalist.org CC BY 4.0), flower head (Eric Koberle, iNaturalist.org CC BY-NC 4.0); rush skeletonplant plant (Karrin, iNaturalist.org, CC BY-NC 4.0), leaves (Bio3660calder, iNaturalist.org, CC BY-NC 4.0), flower head (botanicalwanderer, iNaturalist.org, CC BY-NC 4.0); yellow starthistle plants, rosette leaf, flower head (Travis McMahon, MIA Consulting)

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## SUGGESTED CITATION

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