

NON-NATIVE INVASIVE PLANT TRAINING MANUAL

FOR LANDSCAPE CONTRACTORS, LANDSCAPE
MAINTENANCE PERSONNEL AND NURSERIES

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(Second edition copy)



Prepared by:



In Cooperation with:

U.S. Forest Service: Tahoe National Forest

Truckee River Watershed Council and Weed Warriors

Role of Truckee River Watershed Council (TRWC)

Mission Statement: We bring the community "Together for the Truckee" to protect, enhance and restore the Truckee River watershed.

Weed Warriors is a program of the TRWC.

Weed Warriors Mission Statement: The Weed Warriors coordinate activities necessary for the prevention and control of non-native invasive plants in the Truckee River watershed. The emphases of these activities are focused upon the exclusion, detection, containment and eradication of non-native invasive plants of local significance as they are identified. These efforts will not include any plant species that are native to California.

Goals:

- Participate in on-the-ground efforts to eradicate non-native invasive plants.
- Educate the public about non-native invasive plants: their identification, and how to prevent infestations and the spread of invasive plants.
- Report to, and communicate, with partners about sites requiring removal of non-native invasive plants.
- Appoint and manage a Steering Committee composed of knowledgeable members to oversee, direct, and collaborate with staff and volunteers to implement these goals.

To accomplish our mission statement, we train members of the community in NNIP identification, sponsor weed pulls in selected areas, and provide for a system of weed reporting using our website and smart phones which coordinates with the appropriate weed management authorities. The appropriate county will control those non-native invasive plants which are "Class A and Class B noxious weeds". All of these plants are relatively rare throughout the state, and are reportable on our website, <http://www.truckeeriverwc.org/weed-warriors/identification>.

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INTRODUCTION

The purpose of this Training Manual is to familiarize professionals and maintenance personnel who design, install, and maintain landscapes in the Truckee River watershed, with non-native invasive plants. The term “**non-native invasive plants**” (**NNIP**) is used in this manual and encompasses the following terms – “noxious weeds” and to some degree “weeds” and “invasive plants”. This manual will be focusing on those species that are “non-native”, meaning not occurring naturally in the geographic location under discussion, in this case the California.

What is the difference between a weed and a non-native invasive plant?

Weed - A weed is simply a plant growing in a place where it’s not wanted. It might be a problem locally, but it generally doesn’t spread to become a large-scale problem in natural areas.

Invasive Plant - An invasive plant is a non-native plant with very high reproductive potential and the ability to establish across long distances (for example, it might produce seeds that can spread by wind or by animals). An invasive plant can become established in natural areas, and disrupt natural communities by outcompeting native plants.

Noxious Weed - A noxious weed is an invasive plant that has been defined as a pest by law or regulation. The California Department of Food and Agriculture (CDFA) maintains a list of "noxious weeds" that are subject to regulation or quarantine by county agricultural departments. Noxious weeds are rated “A”, “B”, “C”, and “Q”. See Appendix F – Glossary for a definition of each.

There has been a tremendous expansion of non-native invasive plants across the United States, including within California. New problem NNIPs arrive in the Truckee River Watershed every year, usually associated with highly disturbed areas and are located primarily along roads, or in localized areas; for example musk thistle primarily infests the area in and around Boca Hill to the Truckee River.

Increasingly, non-native invasive plants pose a threat to the integrity of local resources due to their ability to displace native species, alter nutrient and fire cycles, decrease the availability of forage for wildlife, and degrade soil structure (Bossard et al. 2000). NNIP have the potential to affect native plant species through direct competition for nutrients, light, and water (Bossard et al. 2000), as well as, indirectly through mycorrhizal interactions, soil biochemical alterations (Bossard et al. 2000), or allelopathy (Bais et al. 2003). NNIP infestations can also greatly reduce the recreational and aesthetic values.

The problems associated with NNIP introduction are expected to continue. In California, current inventories indicate that NNIP are spreading at an increasing rate. It is expected that California will be subject to even higher rates of NNIP introductions as human population and trade globalization continue to increase (California Noxious and Invasive Weed Action Plan 2005). It is recognized that any attempt to reduce the negative impacts of NNIP must be well coordinated and strategically targeted with actions designed to promote and enhance on-the-ground prevention and control.

This Training Manual is provided to help reduce the risk of non-native invasive plants being introduced and being established.

Role of Landscapers in controlling NNIPs

Thousands of species of non-native landscape ornamentals are used in California. Most are not considered invasive. Only a small percentage of them threaten our wild lands. However, these non-native ornamentals constitute over half of the worst invasive plants in California.

1. Know which ornamentals can be highly invasive, and find suitable substitutes. The following have been planted in gardens in our area, and are NNIP:
Dalmatian toadflax, Yellow Toadflax, Oxeye daisy, Klamathweed, Scotch broom, Purple Loosestrife,
2. Report NNIPs to TRWC so they can be properly managed with a goal of eradicating them.
3. Control NNIPs that are not reportable to contain them and prevent their spread.

Even though, some NNIPs are more widespread throughout the state than Class A and Class B noxious weeds, they might be quite rare in our area, and it is important to report them. An example of this is Scotch broom (*Cytisus scoparius*). Others are quite common in our area, but should be controlled because of their highly invasive nature. An example of this is List C species bull thistle (*Cirsium vulgare*).

Reportable Invasive Plants in the Truckee River Watershed Area

Common Name	Scientific Name	Noxious Weed Rating (CA)
Light Pink to Purple Flowers		
Canada Thistle	<i>Cirsium arvense</i>	B-Rated
Musk Thistle	<i>Carduus nutans</i>	A-Rated
Scotch Thistle	<i>Onopordum acanthium</i>	A-Rated
Diffuse Knapweed	<i>Centaurea diffusa</i>	A-Rated
Russian Knapweed	<i>Acroptilon repens</i>	B-Rated
Spotted Knapweed	<i>Centaurea stoebe</i>	A-Rated
Purple Loosestrife	<i>Lythrum salicaria</i>	B-Rated
Purple Starthistle	<i>Centaurea calcitrapa</i>	B-Rated
White Flowers		
Diffuse Knapweed	<i>Centaurea diffusa</i>	A-Rated
Hoary Cress	<i>Lepidium draba</i>	B-Rated
Perennial Pepperweed (Tall Mountain Whitetop)	<i>Lepidium latifolium</i>	B-Rated
Yellow Flowers		
Yellow Starthistle	<i>Centaurea solstitialis</i>	C-Rated
Dalmatian Toadflax	<i>Linaria dalmatica</i>	A-Rated
Yellow Toadflax	<i>Linaria vulgaris</i>	Not Rated
Dyer's Woad	<i>Isatis tinctoria</i>	B-Rated
Scotch Broom	<i>Cytisus scoparius</i>	C-Rated
Rush Skeletonweed	<i>Chondrilla juncea</i>	A-Rated
Trees		
Tree-of-heaven	<i>Ailanthus altissima</i>	C-Rated

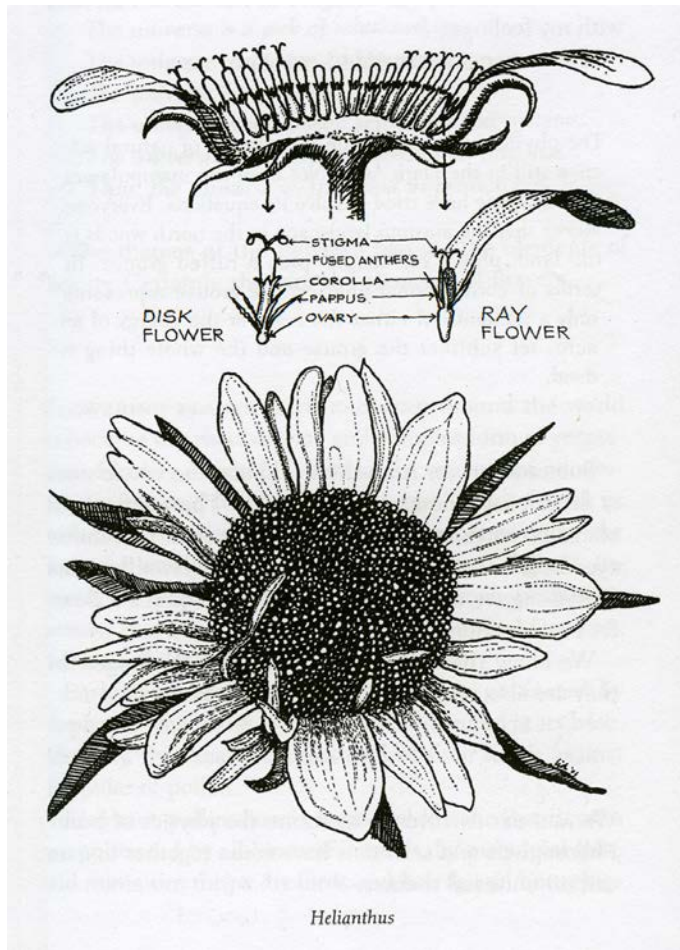
WEED IDENTIFICATION AND ERADICATION/CONTROL

The following plants have been selected for this Training Manual. A more extensive list of NNIPs is available on the Truckee River Watershed Council's website:

<http://www.truckeeriverwc.org/weed-warriors/identification>.

Asteraceae (Sunflower Family)

Many of our NNIPs are members of the sunflower family. Sunflowers are examples of composite flowers. The composite 'flower' often has *two kinds* of flowers. The two composite-flower types are usually known as **disk flowers** and **ray flowers**. The "flower's" broad central area is composed of hundreds of **disk flowers**, and the yellow "petals" are the **ray flowers**.



They can be difficult to distinguish from one another. The chart in Appendix A, "Composite (Asteraceae) Differentiation" from the Forest Service, Pacific Northwest Research Station, General Technical Report PNW-GTR-817, May, 2011, is useful. (See Appendix A)

Thistles: Identifying thistles is challenging. Some thistles are native and should not be removed. See the following table for a guide to the four species found in our region. Thistles have spiny leaves. Flowers do not have ray flowerlets. The following table compares a few thistles that occur in our area. Many are biennial NNIPs that reproduce by seed. That means the first year of their life they produce a basal rosette of leaves and the second year they produce flowers and flowering stalks. It is important to control these thistles before they produce seed.

Weed	Characteristics	Flower Color
Bull thistle C-Rated; not reportable.	Leaves are deeply lobed, dark green and coarsely hairy on the upper side of the leaf with softer whitish hairs below. There are long yellow spines on the tips of each leaf lobe. The leaves wrap around the stem and look “winged”. Biennial.	Reddish-purple
Canada thistle B-Rated Report It!	Clump or patch-forming perennial to 3 feet tall, with extensive creeping roots. Small flower heads lack prickles. Leaves are prickly and appear hairless.	Light purple to white
Musk thistle A-Rated Report It!	Leaves are coarsely toothed, spiny and rarely covered with dense, short hairs, with a prominent light-green midrib. There are no hairs on the underside of the leaves. The outer margins’ edges of the leaves have a white, frosted look. Biennial	Purple/lavender
Scotch thistle A-Rated Report it!	Conspicuous stem wings. Biennial. Leaves are hairy.	Purple

Biennial Thistle Rosettes (formed first year of growth)/Basal Leaves



Musk Thistle rosette has hairless leaves radiating from a central taproot



Bull Thistle rosette leaves are covered with bristles on both sides and feel “sandpapery” to the touch



Musk Thistle leaf blade is smooth on both sides, but has spines on the margin



Bull Thistle leaves are bristly on both sides, with spines on the margin



Scotch Thistle rosette has broad leaves covered with hairs making the leaves appear “frosted”



Scotch thistle has conspicuous winged stems



Second year **Musk Thistle** plants can grow to be 5 to 6 feet tall



Bull thistle has branched stems with terminal flowers



The **Scotch thistle** plant is large with winged stems and broad basal leaves

Perennial Thistle – Canada thistle



Canada Thistle rosettes are often connected under the soil by creeping rhizomes



Canada Thistle stems are green with sparse hairs and sessile leaves



Canada Thistle plants are erect and have prickly leaves

Thistle Flowers:



Bull Thistle flower



Musk Thistle
flower head is disk shaped and bright magenta pink and is borne on long, "naked" stems



The pink to purple **Scotch Thistle** flower has a wide-short hour glass shape



Canada Thistle flowers are smaller than most other thistle flowers

Thistle Eradication/control of Biennial species: Report Musk and Scotch thistles. If only the rosette is present, dig out rosettes of biennial species so that at least 2 inches of the tap root is out of the ground and leave in place to dry out. If reportable thistles are flowering, it is important for the appropriate county agency to collect the flowering portions to ensure that they do not spread further. If Bull Thistle has a flowering stalk(s), double-bag the flowering stem and flowers, secure with a tie and leave in the sun to decompose. After the material is no longer viable (a slimy mess), put in waste bins. Thistles that have been cut off and placed on the ground can continue to produce seed. References for non-mechanical control are in Appendix D.

Thistle Eradication/control of Perennial species. Report Canada thistle, which is a perennial and must be controlled by the use of the appropriate herbicide to avoid spreading the plant from root fragments left in the ground.

Knapweeds do not have spiny leaves and have white, purple, or pink flowers that do **not** have any ray flowerlets.

Identification: Knapweeds can also be difficult to identify, but most perennial species are non-native and capable of invading wild lands and should be reported. Spotted knapweed is the most common knapweed in the Truckee area. It is important to control these knapweeds before they produce seed.

Weed	Characteristics	Flower Color
Diffuse knapweed A-Rated Report It!	Leaves are deeply divided into lobes. The flowerhead bracts are pale green with tan margins and short spines.	White, pink or lavender
Spotted knapweed A-Rated Report It!	Leaves are deeply divided into lobes. The flowerhead bracts have a black margin on the tips and there are no spines.	Pinkish-purple, rarely white



Spotted Knapweed basal Rosette with deeply lobed leaves forms



Spotted knapweed spineless leaves are deeply divided



Spotted Knapweed flowers are usually pink to lavender; bracts are black-tipped



Spotted Knapweed plants flower in the second year

Starthistles do not have spiny leaves and have flowers that do not have ray flowerets.

Weed	Characteristics	Flower Color
Yellow starthistle C-Rated Report It!	Leaves are variable, often deeply lobed, and sometimes smooth margined. Flowerhead bracts are 1-2 inches long and straw-colored.	Yellow



Central spine on **Yellow starthistle** flower bract is up to 1 inch long



Yellow starthistle plant is annual with spiny yellow



Yellow starthistle leaves are lobed

Yellow starthistle eradication/control: Yellow starthistle is thought to have spread to over 15 million acres in California and can be found in 56 of the 58 counties in California. We are part of the “Leading Edge” project to prevent massive infestation in the Truckee area, although it has been found here. Report this plant.

Early detection is essential. **If no flowers or seed are present**, dig out rosettes so that most- if not all-of the tap root is out of the ground. If it is flowering, bag the weed and correctly dispose of them. Always wear heavy gloves to avoid injury from the spines.

Daisies: Daisies have the classic sunflower flowerhead with the small disk flowers in the center and the large-petaled ray flowers around the edge.

Weed	Characteristics	Flower Color
Oxeye Daisy	Clumping perennial plant to 3 feet tall and extensive creeping roots. Root fragments can regenerate new roots.	White petals around a central yellow disk

Oxeye daisy is very invasive in favorable spots such as meadows and is becoming an increasing problem in the West. It spreads from gardens to meadows and other open, sunny areas and is often found in wildflower seed mixes. It can be very difficult to distinguish from Shasta Daisy which is a desirable garden plant. To help distinguish between Oxeye daisy and Shasta Daisy, see Appendix B.



Flower color white with a yellow center



Single flower heads grow at the end of stems



Rosette leaves are spatulate; margins are crenulate



Lower leaves clasp the stems

Brassicaceae (Mustard Family)

Flowers in this family have 4 petals arranged in the shape of a cross. This is one of the easiest ways to identify the family.

Weed	Characteristics	Flower Color
Tall Whitetop B-Rated Report It!	This rhizomatous perennial has a waxy coating on its leaves. The sessile leaves occur all along the stems. Flowers are located near the top of each stem. It has a deep, spreading root system. Roots of this weed have been found to extend up to 10 feet deep.	White
Hoary Cress B-Rated Report It!	Also known as short whitetop, and also a rhizomatous perennial; the upper leaves clasp the stem.	White
Dyer's Woad B-Rated Report It!	An erect biennial, or short-lived perennial, it can grow 3 feet high. Plants exist as a rosette before flower stems develop at maturity. Distinctive feature are the large distinctive dark hanging fruits.	Bright yellow

Tall Whitetop Identification: Tall whitetop (also called perennial pepperweed) has many stems. It reproduces from rhizomes (root-like under-ground stems) and from seed. In Truckee, this species is common in many of the round-abouts, as well as, low, wet areas.



Tall Whitetop showing root connection



Tall Whitetop in flower



Tall Whitetop infestation

Tall Whitetop eradication/control: Very early detection and removal of the seedlings is the best way to avoid establishment. Manual/mechanical treatment methods do not work well because small pieces of root (even pieces less than 1 inch long) can resprout and produce new plants. Especially check riparian areas.

Hoary Cress



Numerous fragrant flowers have four petals typical of the mustard family



Stems on mature plant are generally erect



Alternate leaves clasp the stem

Dyer's Woad is highly invasive and very rare in our area. It is unmistakable because its fruits are unique.



Bright yellow four-petaled flowers bloom in clumps



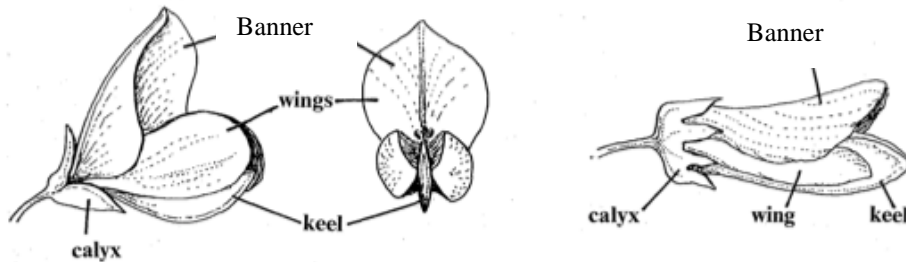
Herbaceous biennial or short-lived perennial grows 3-4 feet high



Fruits are hanging, flattened, and purplish-black to black

Fabaceae (Pea Family)

These non-native invasive plants in our area have the following “pea” flower structure:



Scotch Broom, French Broom, and Spanish Broom identification: All three of these brooms are shrubs that have yellow pea flowers. They spread by seed. All three brooms will re-sprout from the stem.

Weed	Characteristics	Flower Color
Scotch Broom C-Listed Report It!	Flowers appear before the leaves. Flowers are arranged densely along the stem. Seedpods are hairy at the edges only. Stems have 5 ridges.	Yellow
Spanish Broom C-Rated Report It!	Flowers are at the end of the stems. Seedpods are hairy all over. Stems are round.	Yellow
French Broom C-Rated Report It!	French broom inflorescences are dense clusters occurring in racemes on axillary short-shoots. Stems are leafy, erect, dense, and green and densely covered with silky, silvery hairs.	Yellow
White Sweetclover Not rated; not reportable	White sweetclover has long slender flower heads of small, white fragrant flowers and compound leaves that consist of 3 leaflets.	White
Yellow Sweetclover Not rated; not reportable	Resembles white sweetclover, except for flower color.	Yellow



Scotch Broom



Scotch Broom seedpod



Scotch Broom densely arranged flowers



French Broom leaves and seed pods



Spanish Broom with flowers at the end of the stems

Broom control and eradication: The best way to avoid an infestation of brooms is to pull them up when they are seedlings. Once brooms are established, they can be manually pulled using a weed wrench, but annual return visits to pull seedlings will be needed until the seed in the soil is exhausted. Brooms are easier to pull when soils are moist. Brooms can also be cut if the stem is cut at ground level during an extended dry period. Refer to the following photos for an example of successful broom treatment. Always wear gloves and check for ticks frequently.

Yellow and White Sweetclover have been used in roadside revegetation efforts, but have been reported to invade some meadows. You may wish to remove them.



White Sweetclover flower



Usually biennial, these plants can grow 6 feet tall



Leaves consist of 3 leaflets



Yellow Sweetclover flowers

Sweetclover control and eradication: Cutting plants prior to seed production can control this plant.

Miscellaneous

Weed	Characteristics	Flower Color
Cheatgrass (<i>Bromus tectorum</i>) Not reportable	Early-emerging annual grass to 3 feet tall becomes purplish at maturity and fading to dingy tan upon death.	Mature inflorescence droops to one side.
Field Bindweed (<i>Convolvulus arvensis</i>)	Herbaceous perennial, with vine-like stems and an extensive system of deep, creeping roots	White or pinkish
Klamathweed C-Rated; not reportable	Erect perennial 3 – 4 feet tall, with rhizomes that are just below the soil surface	Bright yellow
Poison Hemlock Not rated; not reportable	Erect biennial up to 9 feet tall with fern-like foliage; all plant parts are highly poisonous.	White
Teasel Not rated; not reportable	Erect, tap-rooted biennial or short-lived perennial commonly 3 feet tall.	Lavender to white
Dalmatian Toadflax Report It!	Erect herbaceous perennial to 3 feet tall. Extensive system of vertical and creeping roots.	Yellow
Yellow Toadflax Report It!	1 – 2 feet high with extensive creeping root system.	Yellow with orange, bearded throat.

Cheatgrass



Cheatgrass flowerhead droops and changes color from green to red to brown



Cheatgrass is highly flammable when dry, this plant readily colonizes disturbed and burned areas



Cheatgrass maturing to red, hairy sheaths enclose the stem

Cheatgrass control and eradication: Because it has shallow roots, this plant is easily pulled. Follow the bag and bake method (Appendix D) before disposal.

Field Bindweed



Funnel-shaped flowers are white to pink and open for one day



Arrowhead leaves are alternately placed along the stem



Stems twine around and over other plants or trail along the ground

Field Bindweed control and eradication: Root system is extensive and can reach 10 feet deep, making it difficult to manually control.

Klamathweed



Flowers are showy, with five separate petals and many stamens in the center



Bushy, herbaceous perennial can grow to 4 feet tall and has numerous branches off of the main stem



When leaves are held to light, transparent dots are obvious

Klamathweed control and eradication: Established infestations are difficult to control manually because new plants can arise from roots and rhizomes that are not removed from the soil.

Poison Hemlock



Many small white flowers comprise the flower head



Plant is commonly biennial, can reach 8+ feet, and has erect stems and branches



The first year, the plant forms a rosette of fern-like foliage



The plant forms the flowering stem, which often has purple spots or streaks, the second year of growth

Poison Hemlock control and eradication: All parts of this plant are extremely toxic. Gloves should be worn when handling. Seeds are short-lived in the soil – about 3 years), so removal of the plant before seed-set every year will deplete the seedbank.

Teasel



Flower heads have large spine-like bracts. Flowers are lavender to pink, rarely white



Growth is mainly erect



Plants exist as rosettes until flowering stems develop



Stems have stiff prickles; leaves are opposite

Teasel control and eradication: Manual removal of plants to a few inches below the crown can control small populations.

Dalmatian Toadflax



Showy, yellow, snapdragon-like flowers have a long spur



Erect plant can be almost 4 feet tall



Leaves and stems are waxy

Yellow Toadflax



Flowers are yellow with an orange-bearded throat and a long spur



Several erect stems 18" – 24" tall arise from the base; leaves are linear

Toadflax control and eradication. Report Dalmatian Toadflax which is a perennial and must be controlled by the use of the appropriate herbicide to avoid spreading the plant from root fragments left in the ground. Do not pull Dalmatian Toadflax. For Yellow Toadflax, also a perennial, pull or dig for several years, removing as much root as possible; do not mow; chemical control is available.

References

Bais et al. 2003 Allelopathy and Exotic Plant Invasion: From Molecules and Genes to Species Interactions. *Science: Vol. 301 no. 5638 pp. 1377-1380 DOI: 10.1126/science.1083245*

Bossard et al. 2000 Invasive Plants: What We Know and What We Want To Know. *American Journal of Botany* 92(6): 901–902.

CDFA. 2005. California Noxious and Invasive Weed Action Plan. California Department of Food and Agriculture, Sacramento. 45 pp

APPENDIX A

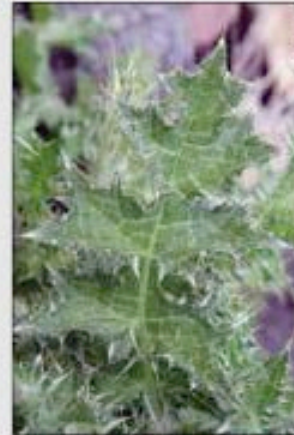
SUNFLOWER FAMILY DIFFERENTIATION

This Key to Differentiating Invasive Members of the Daisy Family is copied from “Nonnative Invasive Plants of Pacific Coast Forests”. Forest Service, Pacific Northwest Research Station. General Technical Report PNW-GTR-817. May, 2011.

Composite (Asteraceae) Differentiation

The following identification tips only apply to species groups covered in this guide. Aster flowers are found in “heads,” with many tiny flowerlets grouped in a cylinder above green or brown bracts (phyllaries). The color, shape, and spininess of the bracts is often key to distinguishing species. Two types of flowerlets can be found: **disk**, which are tubular and generally in the center of the flower; and **ray**, which are generally on the outer edge of the flower with sunflower-like flat petals.

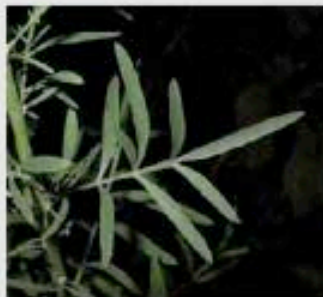
- **Knapweeds** do not have spiny leaves and have white, purple, or pink flowers that do **not** have ray flowerlets.
- **Starthistles** do not have spiny leaves and have yellow flowers that do **not** have ray flowerlets.
- **Thistles** have spiny leaves. Flowers do **not** have ray flowerlets.
- **Skeletonweed** has smooth leaves and yellow flowers that **do** have ray flowerlets, but **no** disk flowerlets.
- **Hawkweeds** have hairy leaves and yellow or orange flowers that **do** have ray flowerlets, but **no** disk flowerlets. (A native species has white flowers.)
- **Daisies** have the classic sunflower flowerhead with the small disk flowers in the center and the large-petaled ray flowers around the edge.



Italian thistle (CAPY2).



Rush skeletonweed (CHJU).



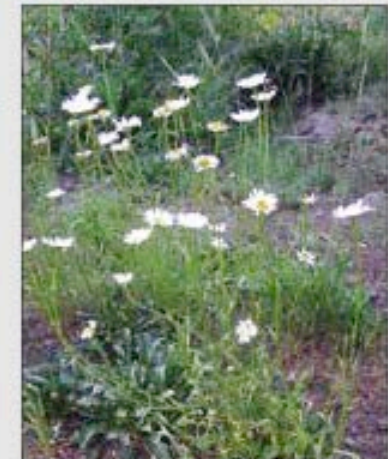
Spotted knapweed (CESTM).



Maltese starthistle (CEME2).



Orange hawkweed (HIAU).

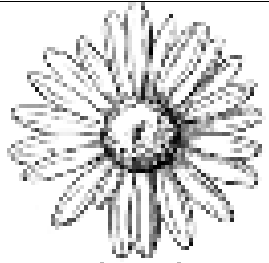
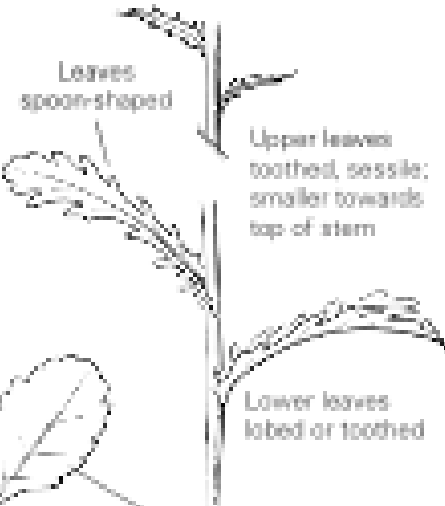
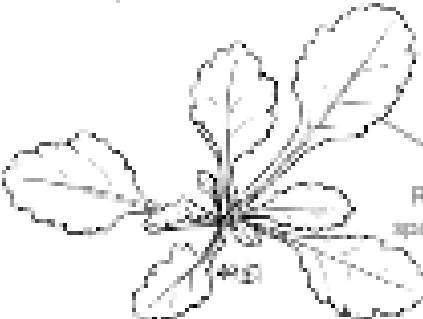


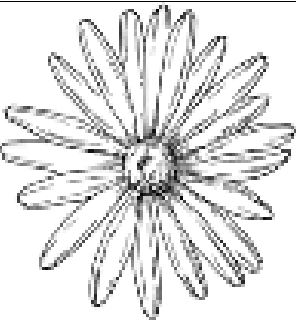
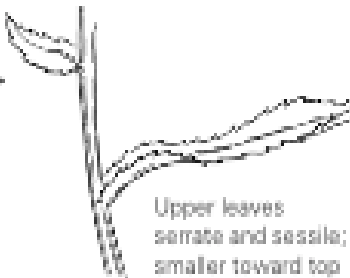
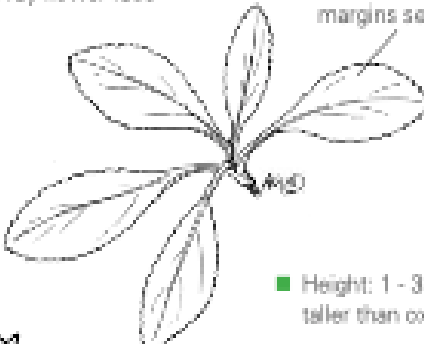
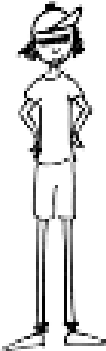
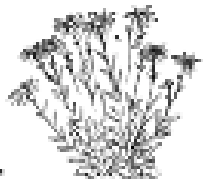


Oxeye daisy (LEVU).

APPENDIX B

COMPARISON BETWEEN OXEYE AND SHASTA DAISY

Graphics, by Annaliese Miller, from "Invasive Weeds of the Lake Tahoe Basin".

<p style="text-align: center;">OXEYE DAISY IS AN INVASIVE NON-NATIVE</p>	<p style="text-align: center;">SHASTA DAISY IS A DESIRABLE GARDEN PERENNIAL</p>
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Approximate disk flower to ray flower ratio</p> </div> <div style="text-align: center;">  <p>Leaves spoon-shaped</p> <p>Upper leaves toothed, sessile; smaller towards top of stem</p> <p>Lower leaves lobed or toothed</p> </div> </div> <div style="text-align: center; margin-top: 20px;">  <p>Rosette leaves spatulate; margins crenulate</p> </div> <div style="display: flex; align-items: center; margin-top: 20px;">  <div style="margin-left: 10px;"> <ul style="list-style-type: none"> ■ Height: 0.8 - 2 ft ■ Stems: smooth to slightly hairy ■ Leaves: upper, toothed and sessile; lower, pinnately lobed or toothed ■ Flowers: single flower heads grow at ends of branches; bracts are lined in black ■ Flower color: white with yellow center </div>  </div>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>Approximate disk flower to ray flower ratio</p> </div> <div style="text-align: center;">  <p>Upper leaves serrate and sessile; smaller toward top of stem</p> </div> </div> <div style="text-align: center; margin-top: 20px;">  <p>Rosette leaves oval; margins serrate</p> </div> <div style="display: flex; align-items: center; margin-top: 20px;">  <div style="margin-left: 10px;"> <ul style="list-style-type: none"> ■ Height: 1 - 3 ft, taller than oxeye daisy ■ Stems: stiff, more-or-less smooth ■ Leaves: upper, serrate and sessile; lower, petiolate ■ Flowers: single flower heads grow at ends of branches; heads larger than oxeye daisy ■ Flower color: white with yellow center </div>  </div>

APPENDIX C

NON-NATIVE INVASIVE PLANT LOCATION/TREATMENT FORM

Non-Native Invasive Plant Location/Treatment Form

Scientific and/or Common Name: _____

Location: Quad.: _____ Section: _____ Township & Range: _____

GPS Coordinates: _____

Directions to the location:

Type land use (i.e. plantation, mine site, roadside, etc.): _____

Percent bare ground: _____

Estimate occurrence size: _____

Number of plants: _____

Land Owner: _____

Phenology: _____% vegetative _____% flowering _____% fruiting/seed set

Any signs of introduction method (roadside, equipment, livestock, erosion control efforts): _____

Eradication methods and Date of Eradication:

Reporter(s): _____ Date: _____

Attach before and after photos

Attach map with NNIP occurrence clearly identified

APPENDIX D

BAG AND BAKE DISPOSAL

Bag & Bake Class “C” and Non-Rated Weeds

- Dig plants with flowers or seeds, removing as much root as is practical. (See “Control and Eradication” section specific to each weed listed.)
- Double bag seeds and flower parts using strong plastic yard waste bags.
- Spray plants with dish soap/water solution.
- Tie bag and leave out in sun to decompose (up to two months).
- Dispose of in trash. Do not use “green bags” that are to be used for composting and redistribution.
- Observe site for regrowth of invasive weeds from remaining rootstock and seedlings.

APPENDIX E

NATIVE OR BENEFICIAL NON-NATIVE LOOK-ALIKES

Non-Native Invasive Plant	Beneficial Look-alike
Invasive Non-native Thistles	Anderson's Thistle, Snowy Thistle, Elk Thistle
Invasive Knapweeds	Asters
Klamathweed	Native (Scouler's) St. Johnswort
Toadflaxes	Snapdragons
Field Bindweed	Dwarf Chamaesaracha

Anderson's Thistle (*Cirsium andersonii*)



This native thistle has cylinder-shaped flower heads that are a rose red to reddish purple



Rosette leaves, formed the first year of growth, have small flat hairs with wavy and spiny margins

Snowy Thistle (*Cirsium occidentale* var. *candidissimum*) (Native)



Plant can reach heights of 6+ feet, and is densely covered with white wooly hairs



Flowers are pink to red

Elk Thistle (*Cirsium scariosum*) (Native)



Rosette leaves have long golden hairs; flowers are stemless. Grows in wet places.

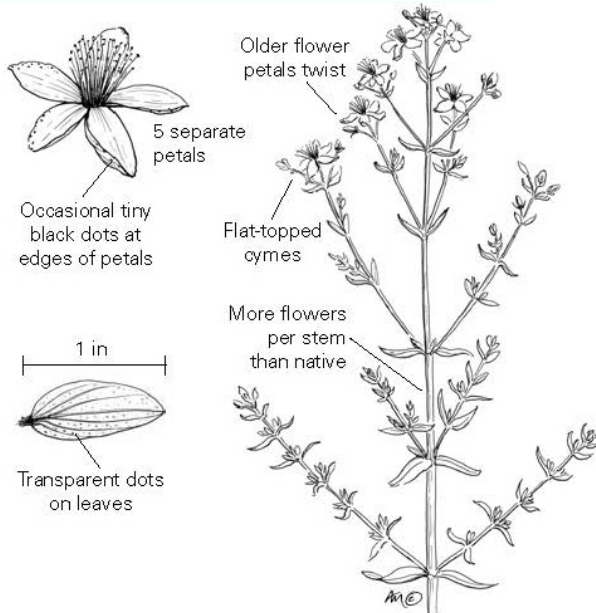
Asters



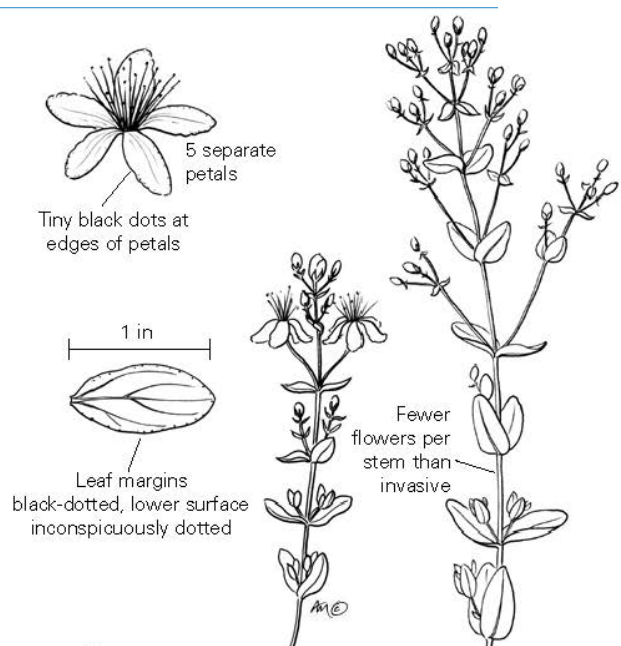
There are many native asters. All have both disk (central yellow disk) and ray flowers. Knapweeds have only disk flowers, which can be very showy.

Scouler's St. Johnswort (Native)

This native is difficult to distinguish from Klamthweed.



Klamthweed has numerous longer stems which can be much longer than 2 inches arising from the main stem



The stems which extend from the main stem of the native, **Scouler's St. Johnswort**, are rarely longer than 2 inches long

Dwarf Chamaesaracha (*Chamaesaracha nana*) (Native)



The flowers of **Dwarf Chamaesaracha** (in the tomato family) resemble those of field bindweed, but the petals are not completely fused to form a funnel shape. Also, the plant does not have long viny stems with arrow-shaped leaves along the stem.

Appendix F – Glossary

Allelopathy - The inhibition of growth in one species of plants by chemicals produced by another species.

Biennial – A plant that completes its normal term of life in two years, flowering and fruiting the second year.

California Department of Food and Agriculture (CDFA) noxious weed ratings - CDFA noxious weed ratings are based primarily on the overall distribution of the weed and can be modified based on the severity of threat.

- **A rated:** A rated weeds are normally limited in distribution throughout the state. Eradication, containment, rejection or other holding action at the state-county level. Quarantine interceptions to be rejected or treated at any point in the state.
- **B rated:** B rated weeds are more wide spread. Eradication, containment, control or other holding action at the discretion of the commissioner. State endorsed holding action and eradication only when found in a nursery.
- **C rated:** C rated weeds are generally widespread throughout the state. Action to retard spread outside of nurseries at the discretion of the commissioner. Reject only when found in a crop seed for planting, or at the discretion of the commissioner.
- **Q rated:** Q rated species are treated as temporary A rated weeds. Denoting action outside nurseries at the state-county level pending determination of a permanent rating.

Control – With respect to invasive species, control is defined as any activity or action taken to reduce the population, contain, limit the spread, or reduce the effects of an invasive species.

Early Detection – The process of finding, identifying, and quantifying new, small, or previously unknown infestations prior to (or in the initial stages of) its establishment as free-living expanding population. Early detection of an invasive species is typically coupled with integrated activities to rapidly assess and respond with quick and immediate actions to eradicate, control, or contain it.

Eradication – With respect to invasive species, eradication is defined as the removal or elimination of the last remaining individual invasive species in the target infestation on a given site. It is determined to be complete when the target species is absent from the site for a continuous time period (that is, several years after the last individual was observed).

Integrated Pest Management (IPM) – A pest control strategy based on the determination of an economic, human health, or environmental threshold that indicates when a pest populations is approaching the level at which control measures are necessary to prevent a decline in the desired conditions (economic or environmental factors). In principle, IPM is an

ecologically-based holistic strategy that relies on natural mortality factors, such as natural enemies, weather, and environmental management, and seeks control tactics that disrupt these factors as little as possible. Integrate pest management techniques are defined within four broad categories: 1) Biological, 2) Cultural, 3) mechanical/Physical, and 4) Chemical techniques.

Invasive Species – Executive Order 13112 of the National Forest Service defines an invasive species as “as alien species whose introduction does or is likely to cause economic or environmental harm or harm to human health.” The Forest Service relies on Executive Order 13112 to provide the basis for labeling certain organisms as invasive. Based on this definition, the labeling of a species as “invasive” requires closely examining both the origin and effects of the species. The key is that the species must cause, or be likely to cause, harm and be exotic to the ecosystem it has infested before we can consider labeling it as “invasive”. Thus, native pests are not considered “invasive”, even though they may cause harm. Invasive species infest both aquatic and terrestrial areas and can be identified within any of the following four taxonomic categories: Plants, Vertebrates, Invertebrates, and Pathogens.

Invasive Species Management – Activities to prevent, control, contain, eradicate, survey, detect, identify, inventory, and monitor invasive species; includes rehabilitation and restoration of affected sites and educational activities related to invasive species. Management actions are based upon species-specific or site-specific plans (including forest plans, IPM plans, watershed restoration plans, and so forth), and support the accomplishment of plan goals and objectives and achieve successful restoration or protection of priority areas identified in the respective plan(s).

Inventory – Invasive species inventories are generally defined as the observance and collection of information related to the occurrence, population or infestation of the detected species across the landscape or with respect to a more narrowly-defined areas or site. Inventory attributes and purposes will vary, but are typically designed to meet specific management objectives which need information about the extent of an invasive species infestation. Inventories are typically conducted to quantify the extent of, and other attributes related to, infections identified during survey activities.

Mychorrhizal – a symbiotic association between a fungus and the roots of a vascular plant, where the fungus colonizes the host plant's roots, helping with the uptake of nutrients.

Native Species - Any species of flora or fauna that naturally occurs in the United States and that was not introduced by man.

Naturalized Species - Any non-indigenous species of flora or fauna that is close genetically or resembles an indigenous species and that has become established in the ecosystem as if it were an indigenous species.

Noxious Weed – The term “Noxious Weed” is defined for the Federal Government in the Plant Protection Act of 2000 and in some individual State statutes. For purposes of this plan, the term has the same meaning as found in the Plant Protection Act of 2000 as follows: The term “noxious weed” means any plant or plant product that can directly or indirectly injure or cause damage to crops (including nursery stock or plant products), livestock, poultry, or other interests of agriculture, irrigation, navigation, the natural resources of the United States, the public health, or the environment. The term typically describes species of plants that have been determined to be undesirable or injurious in some capacity. Federal noxious weeds are regulated by USDA-Animal and Plant Health Inspection Service under the Plant Protection Act of 2000, which superseded the Federal Noxious Weed Act of 1974. State statutes for noxious weeds vary widely, with some States lacking any laws defining or regulating noxious weeds. Depending on the individual State law, some plants listed by a State statute as “noxious” may be native plants which that State has determined to be undesirable. When the species are native, they are not considered invasive species by the Federal Government. However, in most cases, State noxious weed list include only exotic (non-native) species. Refer to California’s definition of noxious weeds in the glossary:

California Department of Food and Agriculture (CDFA) noxious weed ratings .

Perennial –A plant that lives more than two years.

Prevention – Prevention measures for invasive species management programs include a wide range of actions and activities to reduce or eliminate the chance of an invasive species entering or becoming established in a particular area. Preventative activities can include projects for education and awareness as well as more traditional prevention activities such as vehicle/equipment cleaning, boat inspection, or native plant restoration plantings. Restoration activities typically prevent invasive species infestations by improving site resilience, and reducing or eliminating the conditions on a site that may facilitate or promote invasive species establishment.

Rapid Response – With respect to invasive species, rapid response is defined as the quick and immediate actions taken to eradicate, control, or contain infestations that must be completed within a relatively short time to maximize the biological and economic effectiveness against the targeted invasive species.

Restored – With respect to performance specifically, the invasive species program is driven by an outcome-based performance measure centered on ‘restoration’. An area treated (see treatment definition) against invasive species has been ‘restored’ when the targeted invasive species defined in the project plan was controlled or eradicated directly as a result of the treatment activity. In some instances, actions taken across particular area to prevent the establishment and spread of specific invasive species are also included in this treatment definition. ‘Restored’ acres are a subset of ‘treated’ acres, which are tracked annually to determine the effectiveness of treatments. Preventing, controlling, or eradication invasive species assists in the recovery of the area’s resilience and the capacity of a system to adapt to change if the environment where the system exists has been degraded, damaged, or

destroyed (in this case by invasive species); and helps to reestablish ecosystem functions by modifying or managing composition and processes necessary to make terrestrial and aquatic ecosystems sustainable, and resilient, under current and future conditions (as described in FSM 2020). In most cases, this is a performance measure defined in the project plan, and project managers have the flexibility to set the parameters for determining when the treated areas have been restored. Absence of an individual invasive species organism, whether through eradication or prevention efforts, is most often the criteria used to determine when acres have been restored. Monitoring treatment efficacy is critical to reporting invasive species management performance.

Appendix G – Illustration and Photo Credits

Musk Thistle rosette: courtesy of Kathy VanZuuk/TNF

Bull Thistle rosette: courtesy of Kathy VanZuuk/TNF

Musk Thistle leaves: courtesy of Kathy VanZuuk/TNF

Bull Thistle leaves: courtesy of Kathy VanZuuk/TNF

Scotch Thistle rosette: courtesy of Kathy VanZuuk/TNF

Scotch Thistle stem: courtesy of Kathy VanZuuk/TNF

Musk Thistle plant: courtesy of Kathy VanZuuk/TNF

Bull Thistle plant: courtesy of Kathy VanZuuk/TNF

Scotch Thistle plant: courtesy of Kathy VanZuuk/TNF

Canada Thistle rosette: © 2005 Luigi Rignanese

Canada Thistle stem: © 2008 Keir Morse

Canada Thistle plant: Sue Donaldson

Bull Thistle flower: Christopher Christie

Musk Thistle flower: Sue Donaldson

Scotch Thistle flower: Sue Donaldson

Canada Thistle flower: Sue Donaldson

Spotted Knapweed rosette: Kathy Welch

Spotted Knapweed leaves: Kathy Welch

Spotted Knapweed flowers: Sue Donaldson

Spotted Knapweed plant: Robin Breckenridge

Yellow Starthistle flower head: Sue Donaldson

Yellow Starthistle plant: Sue Donaldson

Yellow Starthistle leaves: Cindy Roche, Bugwood.org

Oxeye Daisy flower: Sue Donaldson

Oxeye Daisy flower heads: Sue Donaldson

Oxeye Daisy rosette: Montana Statewide Noxious Weed Awareness and Education Program Archive, Montana State University, Bugwood.org

Oxeye Daisy leaves: © Keir Morse

Tall Whitetop root connection: Need Credit

Tall Whitetop flower: courtesy of Kathy VanZuuk/TNF

Tall Whitetop infestation: courtesy of Kathy VanZuuk/TNF

Hoary Cress flowers: Sue Donaldson

Hoary Cress stem: Sue Donaldson

Hoary Cress leaves: Joseph M. DiTomaso, University of California, Davis, Bugwood.org

Dyer's Woad flower: Kathy Welch

Dyer's Woad plant: Steve Dewey, Utah State University, Bugwood.org

Dyer's Woad fruits: Kathy Welch

Pea Family *Fabacae* illustration: courtesy of Kathy VanZuuk/TNF

Scotch Broom plant: courtesy of Kathy VanZuuk/TNF

Scotch Broom seed pod: courtesy of Kathy VanZuuk/TNF
Scotch Broom flowers: courtesy of Kathy VanZuuk/TNF
French Broom leaves and seed pods: courtesy of Kathy VanZuuk/TNF
Spanish Broom plant: courtesy of Kathy VanZuuk/TNF
White Sweetclover flower: Beth Brenneman
White Sweetclover plant: Beth Brenneman
White Sweetclover leaves: © 2005 Luigi Rignanese
Yellow Sweetclover flower: Steve Dewey, Utah State University, Bugwood.org
Cheatgrass flowers: Tom Heutte, USDA Forest Service, Bugwood.org
Cheatgrass branches: Sue Donaldson
Cheatgrass stem: Tom Heutte, USDA Forest Service, Bugwood.org
Field Bindweed flowers: Kathy Welch
Field Bindweed leaves: Mary Ellen (Mel) Harte, Bugwood.org
Field Bindweed stems: Mary Ellen (Mel) Harte, Bugwood.org
Klamathweed flowers: Beth Brenneman
Klamathweed plant: Beth Brenneman
Klamathweed leaf: Richard Old, XID Services, Inc. Bugwood.org
Poison Hemlock flower head: Susi Urie
Poison Hemlock plant: Susi Urie
Poison Hemlock rosette: © Barry Rice
Poison Hemlock stem: Eric Coombs, Oregon Department of Agriculture, Bugwood.org
Teasel flower head: Joe DiTomaso
Teasel plant: © Barry Rice
Teasel rosette: Steve Dewey, Utah State University, Bugwood.org
Teasel stem: © Keir Morse
Dalmation Toadflax flower: Sue Donaldson
Dalmation Toadflax plant: Sue Donaldson
Dalmation Toadflax leaves: Susi Urie
Yellow Toadflax leaves: Charles Webber
Yellow Toadflax leaves: Kathy Welch
Anderson's Thistle plant: Kathy Welch
Anderson's Thistle rosette: Annaliese Miller
Snowy Thistle plant: courtesy of Kathy VanZuuk/TNF
Snowy Thistle flowers: courtesy of Kathy VanZuuk/TNF
Elk Thistle rosette: courtesy of Kathy VanZuuk/TNF
Asters flowers: courtesy of Kathy VanZuuk/TNF
Klamathweed illustration: Annaliese Miller
Scouler's St. Johnswort illustration: Annaliese Miller
Dwarf Chamaesaracha plant: courtesy of Kathy VanZuuk/TNF