Weeds on Forest trails

1. **What is a weed**?
    a. A **Weed** is a "plant that is not valued where it is growing and is usually of vigorous growth, especially one that tends to overgrow or choke out more desirable plants", https://www.merriam-webster.com/
    b. **Noxious Weed** is a legal term to describe "any plant especially injurious to public health, crops, livestock, land, or other property", as determined by the State of Utah. Owners are legally required to deal with noxious weeds on their property, https://utahweed.org/noxious-weeds

Utah Noxious Weed Control Act

        i. Currently 54 weed species are declared Noxious in Utah
    c. **Trail Weeds** are invasive non-native plant found along Forest trails
        i. Often officially designated as "Noxious"
        ii. Non-native plants, almost always from Europe or Asia
        iii. Crowd out native vegetation
        iv. Not grazed by livestock or wildlife and some are poisonous
        v. Can quickly move into disturbed soil after trail building or maintenance
        vi. Often spread by contaminated vehicles, tools, and equipment, by dirty boots and burs on people or their animals, through contaminated hay, and even by livestock droppings
2. **Weed biology**
    a. **Annual plants** germinate, grow, produce seeds and die in single year
    b. **Biennial plants** usually live two years
        i. They grow and store energy in the first year
            1. Usually a low, leafy "rosette"
            2. Energy is stored in the root
        ii. Biennials "bolt" (grow a flowering stalk) in the second year, fruit (produce seeds), and die
        iii. Sometimes biennials may stay as rosettes, accumulating energy for more than a year before bolting
        iv. The best time to control biennial plants is during their rosette stage
    c. **Perennial plants** live several years, producing seeds year after year
        i. **Simple perennials** reproduce by seed
        ii. **Creeping perennials** reproduce vegetatively, often by underground stems (rhizomes), as well as by seed – these plants may be especially difficult to control
    d. **Weed seeds may be viable** in the soil for many years, lying dormant until conditions are favorable
3. **Weed control concepts**
    a. Don't let weeds go to seed
        i. Allowing a weed to produce seeds means many more years of control will be required before the weed is eradicated in that location
    b. Don't make things worse
        i. Immediately remove burs from clothing or fur and place burs in a plastic bag for landfill disposal
        ii. Clean all soil and plant material from tools, vehicles, clothing, and shoes
        iii. Minimize soil disturbance
        iv. Bag and pack out weeds that are going to seed
        v. Always control weeds to keep them from spreading
    c. **Keep up the effort** – it takes years of consistent control to eradicate weeds in any location
    d. **Maintain vigilance** – weeds can move into new areas or move back into areas where there they had been previously controlled

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4. **Weed control methods**
    a. **Manual methods** are suitable for all weeds
        i. **Hand pulling** usually is not feasible but there are exceptions, especially after a soaking rain softens the soil. In all cases, use a tool to finish the job if the plant breaks off above the crown
        ii. **A pick-mattock**, with a pick on one side and an adze on the other, is a good tool for weeding along trails
            1. Long-handled 2.5-pound mattocks or short-handled 1.5-pound mattocks are recommended
            2. Aim a few inches beyond the weed so the mattock severs the root below the "crown" (where the leaves begin)
                a. Use the pick in rocky soil conditions
                    i. A lucky strike can sever the root
                    ii. Continue mattock strikes until rocks are loose
                b. Use the adze when soil has no rocks or when rocks are loose
                c. Continue to dig if the root was not cut off ("severed") below the crown

Pick-Mattock

        iii. **A shovel** can be a good tool to sever weed roots where the soil is softer and not too rocky
        iv. **A weeding tool** carried in your pack can be used to sever roots where occasional weeds may be encountered.

Hand weeding tool

Japanese Hori Hori weeding knife

        v. **Minimize soil disturbance** as much as possible to reduce the opportunity for more weeds to germinate
    b. Chemical control
        i. Herbicides can be effective, efficient and environmentally safe when selected and used properly
        ii. Herbicides shall not be used without landowner approval (it's the law)
            1. Forest Service requirements:
                a. ONLY with a specific Volunteer Agreement
                b. Approved chemicals and detailed recordkeeping and reporting
                c. Forest Service environmental and safety procedures must be followed

5. **Controlling Specific Weeds**
    a. Dyers woad
    b. Houndstongue
    c. Burdock
    d. Scotch thistle
    e. Canada thistle
    f. Musk thistle
    g. Bull thistle
    h. Mullein
    i. Curly dock
    j. Myrtle spurge
    k. White Bryony

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Dyer's Woad

Description: Dyer's woad, *Isatis tinctoria*, a Utah Noxious Weed, is a member of the mustard family (its rosettes have been used to create a blue fabric dye, hence the name). A biennial, 1- to 4-foot-tall, it was accidentally introduced from Europe in the early 1900s. Rosettes have smooth-to-wavy leaf edges, with a creamy-white midrib. Inflorescences of numerous 4-petalled yellow flowers appear from April to July. Each plant can produce hundreds of fruits (seed pods). Pods change from green to black as they mature. Seeds can live more than 10 years in the soil.

Inflorescence, mid-spring/early summer

Rosette, first-year

Mature seed pods, mid- to late summer

Manual Control:

1. **Rosettes:** The rosette stage is the "best" time to control this weed. Learn to recognize dyers woad rosettes and dig them out any time of the year. Look where flowering/fruiting dyers woad plants are or have been found. Use a mattock or other tool to cut the root below the crown.
2. **Bolting/Flowering**: Use a mattock or other tool to cut the root below the crown. Plants often may be pulled after a soaking rain, for example, but be prepared to dig the root if the plant breaks off above the crown.
3. **Fruiting:** Clip, bag, haul, and dispose maturing inflorescences in the landfill. Dig up the plant to keep it from flowering again.

Chemical Control: Spot-treat rosettes with a selective herbicide.

Dyer’s woad, Bridger Look-Off Trail, July

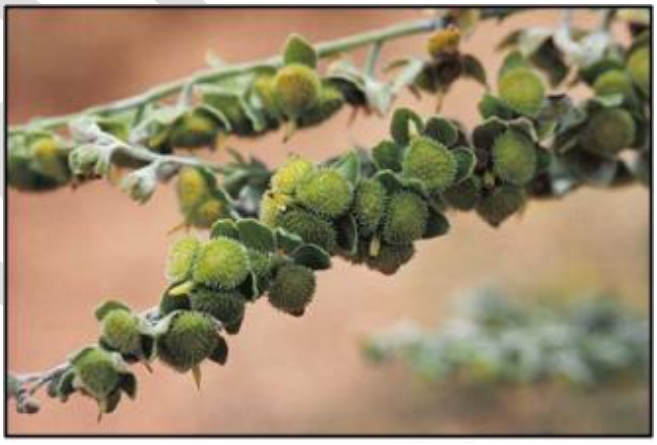
Dyer’s woad going to seed (fruiting) along the Bridger Look-Off trail. It would have been better to weed this plant before it got to this stage of development.

Houndstongue

Description: Houndstongue, *Cynoglossum officinale*, a Utah Noxious Weed, is a member of the borage family (its name refers to the appearance of rosette leaves). Also known as Gypsy weed, this 1-4 foot tall biennial plant was introduced from Europe. Rosettes leaves are soft with smooth edges. Inflorescences of purple flowers appear from late spring to mid-summer. Each flower produces four bur-like seeds. Covered with barbed hooks, the seeds are spread by people and animals. Seeds live about 3 years in the soil. Houndstongue is poisonous to grazing animals.

Flowers, early summer

Rosette, first year



Burs (fruits), mid-summer

Manual Control:

1. **Rosettes:** The rosette stage is the "best" time to control this weed. Learn to recognize houndstonge rosettes and dig them out any time of the year. Look where houndstonge plants are or have been found. Use a mattock or other tool to cut the root below the crown.
2. **Bolting/Flowering**: Use a mattock or other tool to cut the root below the crown. Flowering/fruiting plants may be pulled if soil is soft, but dig the root if the plant breaks off above the crown.
3. **Fruiting:** Clip, bag, haul, and dispose maturing inflorescences in the landfill. Dig up the plant to keep it from flowering again. Immediately remove and bag burs that get on your clothing or pets.

Chemical Control: Houndstongue can be controlled using specialty herbicides before the fruiting stage.

Houndstongue, Bridger Look-Off Trail, July

Houndstonge rosette (first year plant) near the trail

Houndstonge rosette, severed below the crown with a mattock

Fruiting houndstongue, pulled up and ready to bag

Burdock

Description: Burdock, *Arctium minor*, is a member of the aster family. Introduced from Europe, it is a biennial, with rosettes of large heart-shaped leaves. The flowering stalk is 3- to 10-foot tall with purple flowers that mature into seed-containing burs. The burs are covered with hooked spines (this plant was the inspiration for Velcro). Burdock can grow in thick patches that cover the ground and exclude other plants. Seeds are viable in the soil for about 3 years.

Branched stem with many flowers

Rosettes, with large, rhubarb-like leaves

Purple flowers in mid-late summer become burs with Velcro-like hooked spines

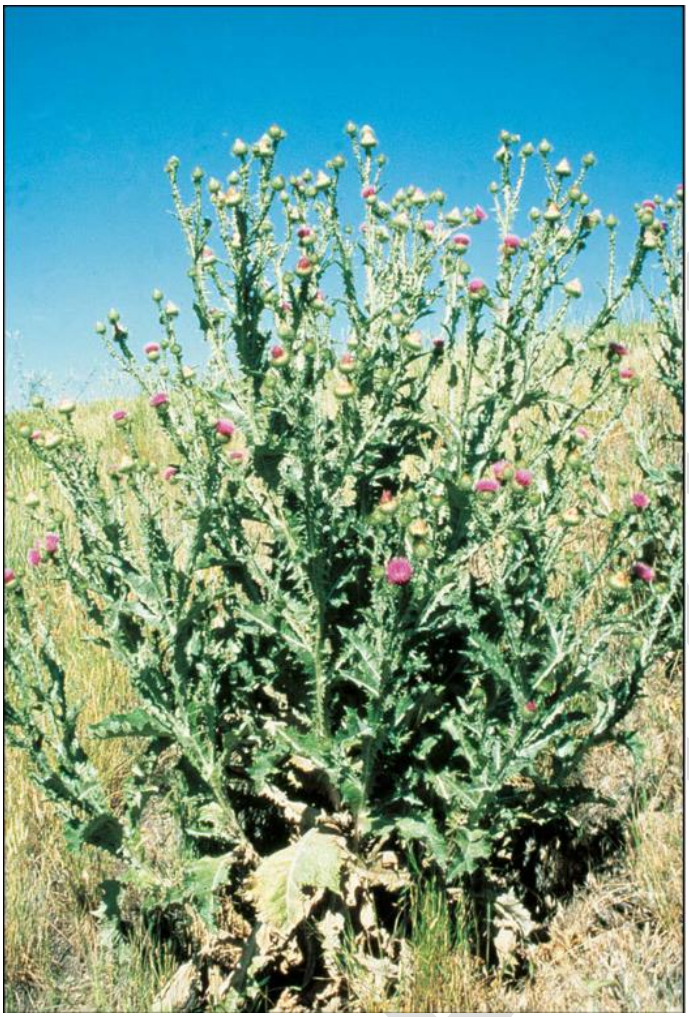
Manual Control:

1. **Rosettes:** The rosette stage is the "best" time to control this weed. Look where burdock plants are or have been found. Use a mattock or other heavy-duty tool to cut the thick taproot below the crown.
2. **Bolting/Flowering**: Use a mattock or other heavy-duty tool to cut the thick, taproot below the crown (the root becomes woody after bolting). They difficult to pull up because if the thick woody taproot.
3. **Fruiting:** Clip, bag, haul, and dispose flower heads in the landfill. Dig up the plant to keep it from flowering again. Immediately remove and bag burs that get on your clothing or pets.

Chemical Control: Selective herbicides can control burdock in the rosette and early bolting stages.

Scotch Thistle

Description: Scotch thistle, *Onopordum acanthium*, a Utah Noxious Weed, is a biennial of the aster family. Introduced from Europe and Asia, the entire plant is covered with spines. Rosette leaves are up to 2-feet long, spiny and covered with hairs, giving them a grayish appearance. It flowers in early summer. Stalks are branched, usually 3-6 feet tall, but may be more than 8 feet tall. Spiny "wings" run up the stems all the way to the pink/lavender flowers. Seed are viable in the soil for 20-40 year or more.



Stems with spiny "wings" all the way to the flower

Violet/red flowers in summer

Hairy rosettes, often more than 2-feet across

Manual Control (wear heavy-duty gloves at a minimum):

1. **Rosettes:** The rosette stage is the best time to control this weed. Look where Scotch thistles grow or have been found. Use a mattock or other heavy-duty tool to cut the thick taproot below the crown.
2. **Bolting/Flowering/Fruiting**: Use a mattock or other heavy-duty tool to cut the thick taproot below the crown. It may help to push the plant down with your feet so you can get close enough to use a weeding tool. Clip and bag thistle flower heads and dispose in the landfill.

Chemical Control: Selective herbicides can control Scotch thistle in the rosette and early bolting stages.

Canada Thistle

Description: Canada thistle, *Cirsium arvense*, a Utah Noxious Weed, is a creeping perennial of the aster family. Introduced into Canada from Eurasia, Canada thistle is found throughout much of the US, often occurring in dense patches. In our mountains, its presence is usually a sign of past livestock activity. Stems are 1-4 feet tall, with lobed, spiny leaves. It blooms in summer with clusters of ½ - ¾ inch purple flowers. Canada thistle is difficult to control, spreading by seed and through an extensive underground root system. Seeds can live up to 20 years in the soil.

Stems are 1-4 feet tall with spiny, lobed leaves

Plants spread by extensive underground root system

Clusters of purple flowers appear in summer

Manual Control: Consistent and repeated weeding for several years is required. Repeated pulling, digging or hoeing can control Canada thistle. After several years of consistent effort (every couple of weeks through the growing season), the root system eventually dies and new plants stop emerging. Clip and bag and dispose of Canada thistle flower heads.

Chemical Control: Canada thistle may be controlled with repeated applications of specialty herbicides.

Canada thistle, Old Juniper Trail, August

Canada thistle going to seed (fruiting) along the Old Juniper Trail in August. These plants should have been weeded well before they got to this stage of growth. Due to the extensive underground root system, repeated weeding efforts are needed before Canada thistle stops sending up new shoots and dies.

Musk Thistle

Description: Musk thistle, *Carduus nutans*, a Utah Noxious Weed, is a biennial of the aster family. Also known as nodding thistle, it was introduced from Eurasia. Stems are up to 6-feet tall, with lobed, spiny leaves. It blooms in summer with a single, often bent over, 1 ½ to 3-inch rose-purple flower per stem. Seeds can live up to 15 years in the soil.

Musk thistle grows up to 6-feet tall, spiny "wings" on stems do not go all the way up to the flowers

Spiny green rosettes year

Large rose-purple flowers, often bent over, with wide spine-tipped bracts in the first

Manual Control:

1. **Rosettes:** The rosette stage is the best time to control this weed. Learn to recognize musk thistle rosettes and dig them out any time of the year. Look where musk thistles grow or have been found. Use a mattock or other heavy-duty tool to cut the taproot below the crown.
2. **Bolting/Flowering/Fruiting**: Use a mattock or other heavy-duty tool to cut the taproot below the crown. Clip and bag maturing thistle heads and dispose in the landfill.

Chemical Control: Selective herbicides can control musk thistle in the rosette stage.

Bull thistle

Description: Bull thistle, *Cirsium vulgare*, is a biennial of the aster family. Introduced from Eurasia, it has rosettes in the first year. The leaves are deeply lobed, wooly underneath and tipped with long spines. Branched flowering stems up to 6 feet tall grow in the second year. Stems have spiny "wings" and clusters of purple flowers at the end. Seed are viable in the soil up to 10 years.

Bull thistle has branched stems, purple flowers and many sharp spines

Bull thistle rosette leaves are deeply lobed, spine tipped, and wooly below

Bull thistle flower

Manual Control:

3. **Rosettes:** The rosette stage is the best time to control this weed. Learn to recognize bull thistle rosettes and dig them out any time of the year. Look where bull thistles grow or have been found. Use a mattock or other heavy-duty tool to cut the taproot below the crown.
4. **Bolting/Flowering/Fruiting**: Use a mattock or other heavy-duty tool to cut the taproot below the crown. Clip and bag thistle heads and dispose in the landfill.

Chemical Control: Selective herbicides can control bull thistle in the rosette stage.

Bull Thistle, Old Juniper Trail, August

Bull thistle (and mullein), fruiting (going to seed) along the Old Juniper Trail in August. These plants should have been weeded long before they got to this late stage of development.

Mullein

Description: Common mullein, *Verbascum thapsis*, is a biennial of the snapdragon family. Introduced from Europe, mullein is difficult to control because of the large number seeds (up to 175,000 per plant) than can live up to 100 years in the soil. It has a thick rosette of wooly leaves the first year. A tall, thick stem with yellow flowers is produced in the second year. Seeds can germinate when soil is bare or becomes disturbed.

Second-year plants have tall flowering stalks

Rosette leaves are covered with fine, soft hair.

Yellow flowers appear in late summer

Manual Control:

1. **Rosettes:** The rosette stage is the best time to control this weed. Use a weeding tool to cut the taproot below the crown. Minimize soil disturbance as much as possible.
2. **Bolting/Flowering/Fruiting**: Flowering mullein often may be pulled up by hand, otherwise, cut the taproot below the crown. Carefully clip and bag maturing flower stalks and dispose in the landfill.

Chemical Control: Specialty herbicides may control mullein in the rosette stage.

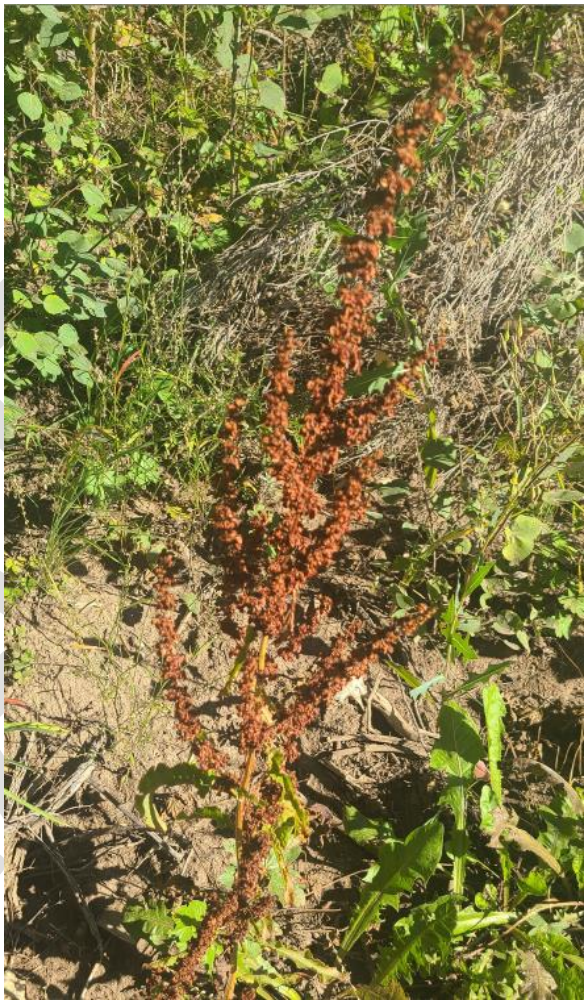
Mullein, Old Juniper Trail, August

Mullein, going to seed (fruiting) along the Old Juniper Trail in August. These plants should have been weeded long before they got to this stage of development

Curly dock

Description: Curly dock, *Rumex crispus,* is a tap-rooted perennial of the buckwheat family. Introduced from Eurasia, curly dock grows 2-5 feet tall. Leaves are mostly at the plant base, up to 12 inches long with wavy margins. Dense clusters of small greenish flowers become reddish-brown as the fruits mature. Seeds remain viable in the soil up to 50 years.

The curly dock flowering stalk is 2-5 feet tall, with leaves mostly near the base with clusters of flowers above



Fruiting curly dock along the Old Juniper trail in August (this plant should have been weeded well before it got to this stage)

Manual Control:

Sever roots several inches below the surface to reduce regrowth. Repeat as needed until the root dies. Carefully clip and bag maturing stalks and dispose in the landfill

Chemical Control: Specific herbicides may be used to control smaller-size curly dock plants

Myrtle spurge

Description: Myrtle spurge, *Euphorbia myrsinites,* a Utah Noxious Weed, is a tap-rooted fleshy perennial of the spurge family. Introduced from Europe as an ornamental, this aggressive plant has invaded hillsides around the west. The plant attacks native vegetation by releasing toxic chemicals into the soil. It has toxic milky juice that can blister the skin and potentially blind the eyes. Fleshy, triangular, blue-green leaves grow in tight clusters around the foot-tall stems. Plants usually bloom during their second year of growth. Yellow flower-like structures appear in late April/early May. Ripe seeds are ejected up to 15 feet. Seeds last up to 10 years in the soil.

Myrtle spurge has fleshy blue-green leaves. Attractive yellow flower-like structures appear in late April/early May (hjnews.com photo)

Manual Control

Carefully dig plants, getting as much as the root as possible. Bag and haul flowering/fruiting plants and dispose in the landfill**. Wear gloves, long clothing and eye protection!**

Chemical Control: Specific herbicides may be used to control myrtle spurge before it goes to seed.

Bagged myrtle spurge from the Highline Trail (May

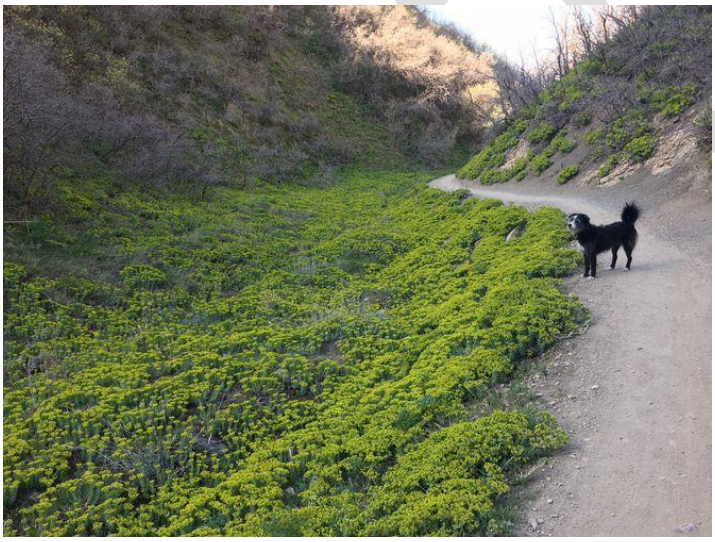
Myrtle spurge along the Crimson Trail (September)

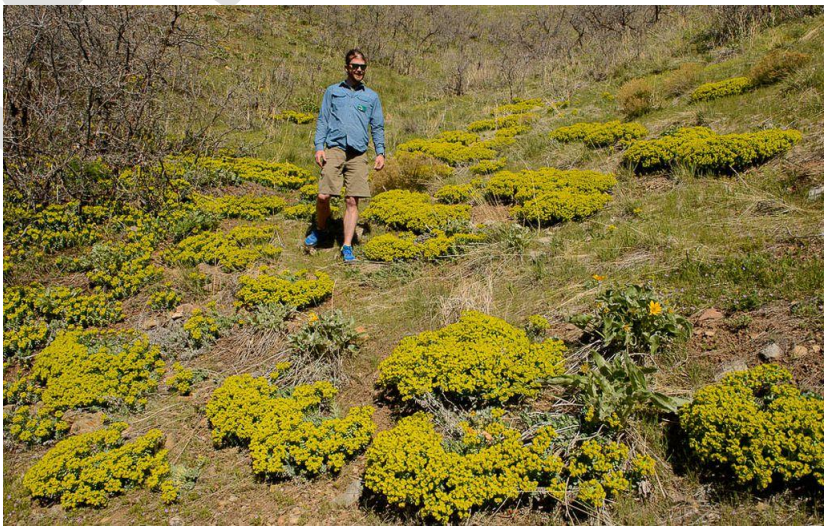
Myrtle spurge along the Highline Trail (May

Myrtle Spurge - let's keep this noxious weed away from our Cache County hills!

Thick, fleshy leaves with toxic, toxic milky juice

Perennial, spring-blooming, 1-1.5 feet tall, toxic, introduced from southern Europe and Asia *("Purge Your Spurge", Salt Lake Country Parks and Public Lands)*

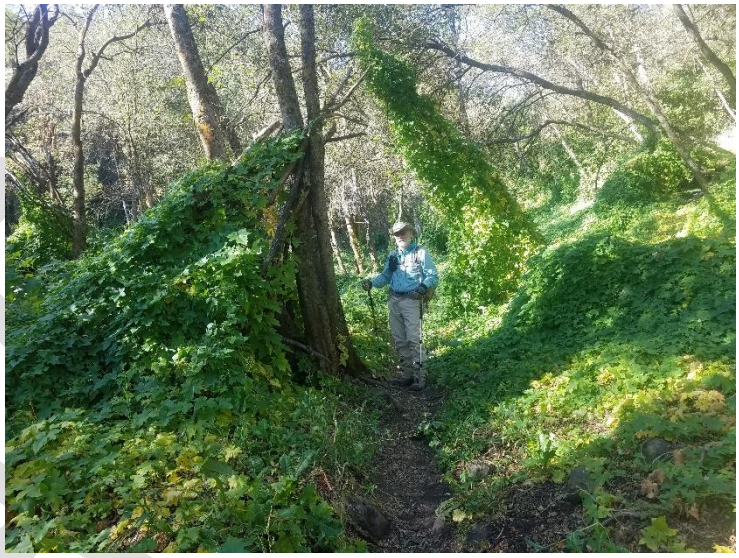




From "How a 'waterwise' ornamental plant has taken over Wasatch foothills" https://www.sltrib.com/news/environment/2018/05/07/how-a-waterwise-ornamental-plant-has-taken-over-wasatch-foothills/

White Bryony

Description: White bryony, *Bryonia alba*, is a perennial vine of the cucumber family. An Idaho Noxious Weed, it is moving into our area, especially in the Wellsville Mountains (Utah has not yet declared it noxious despite its invasive nature). Introduced from Europe, white bryony vines emerge from large underground roots in late spring. Vines spread over the ground and upward, clinging to trees and bushes with curly tendrils. Nearby vegetation can be killed when covered by sunlight-blocking vines. The plant is poisonous, although birds eat the ripe berries and spread the seeds.



White bryony along the Deep Canyon Trail (September)

Manual Control:

Follow white bryony vines back to the ground to find the roots. Dig up the roots using a mattock (or shovel, if soil is not too rocky). Severing roots a couple of inches below the top also is effective. Emerging vines are easier to spot in the spring before vines on the ground are hidden by other vegetation. Be sure to wear gloves to prevent exposure to the toxic juice.

Chemical Control is usually not feasible since herbicide applied to the vines could kill the host plant.

The “best” way to control white bryony is to dig up the roots