**Integrated Weed Management (continued)**

- **Apply** 3 oz. of Milestone or 1 gallon of 2,4-D, plus 3 quarts of a good surfactant like Dyna-Amic, for each acre.
- For **each acre**, apply Escort, Telar, Curtail or Redem in at 1/2 to 1 oz.; Tordon at 1 quart; or Weedmaster at 1 quart. They are all very effective, but do not use them along creeks.
- For **larger areas**, consider having an aerial spray of Milestone in the fall. First, put colored ribbons on some Rush Skeletonweed plants to help the pilot spot the infestations.
- **Spray** Milestone in the vicinity of mature Rush Skeletonweed plants in the late fall when they are readily visible. Milestone’s residual will knock down new seedlings the following spring.
- **Overall**, follow the herbicide’s label instructions.
- **Survey** your property in mid-summer to determine if there are any bio-controls present. Look for evidence of their presence such as purple blemishes and spots, or mite galls. You will not be able to see the insects themselves, only some evidence of their presence.
- If you have never released bio-controls yourself, some bio-controls can travel great distances from neighboring properties.
- **Determine** if additional bio-controls will be helpful in controlling this noxious weed. Staff from the weed board can offer assistance in making this evaluation by inspecting the property with a landowner.
- **Consider the purchase of more bio-controls** for your property. Contact the weed board for more information on available sources of the bio-controls.
- Dr. Gary Piper of Washington State University provides many local landowners with biocontrols for Rush Skeletonweed. Landowners should contact the weed board to arrange for the purchase of the bio-controls. The weed board will contact Dr. Piper for delivery arrangements, and a bill for the bio-controls will be sent to the landowner from Dr. Piper sometime in the fall.
- The **bio-controls are sent to the weed board about the third week of July, in large 25-pound plastic trash sacks full of infected plant materials.** Weed board staff will assist landowners with the release of the bio-controls. About one-to-two hours is required in releasing each bag of bio-controls, as individual pieces of infected plant material are placed on the landowner’s healthy Rush Skeletonweed plants.
- If a landowner has sufficient bio-controls, it is wise to redistribute bio-controls to areas not yet infected by the bio-controls. First make an evaluation on where the bio-controls should be released. The galls with the mites can be cut off dried-up plants and then released on top of healthy plants in the center of an unaffected patch. For the Midge and Rust, a trowel will work, but make sure the flowers and seed heads are cut off or absent. Once there are sufficient bio-controls on the noxious weeds, leave the weeds alone. Do **not** mow or plow the infected plants under, since this may result in the death and destruction of the bio-control insects. Be patient. The bio-controls need a few seasons.
- Make sure that the Rush Skeletonweed does not go to seed.

**Options for Control**

- **Apply** 3 oz. of Milestone or 1 gallon of 2,4-D, plus 3 quarts of a good surfactant like Dyna-Amic, for each acre.
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- Make sure that the Rush Skeletonweed does not go to seed.

**Rush Skeletonweed: Options for Control**

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- Make sure that the Rush Skeletonweed does not go to seed.
Habitat and Plant Communities

- **Seeds**: One plant can produce up to 20,000 seeds and 90 percent are capable of germinating. The seeds have a parachute of fine hairs which allow them to travel along wind currents up to 20 miles, much like dandelions. Seeds are also carried in the fur and hair of animals, on the clothing of people, or by vehicles traveling through infested areas. The weed produces seeds without the need for fertilization, and thus such seedling is an identical clone to its parent.

- **Germination and Emergence**: Rush Skeletonweed seeds display virtually no dormancy. Seeds germinate within 24 hours under optimal conditions (59-86 degrees F). Buried seeds germinate within a year or two even if less than 0.3 inches of rain fall at one time. Seeds may remain viable for up to four years.

- **Over-Winter**: Rush Skeletonweed will overwinter as a rosette. The best time to apply herbicides is right after the first frost when the plant is moving nutrients down to its roots to survive winter.

- **Growth Pattern**: The plant initiates growth very early in the spring, by mid-April. The time to apply herbicides is very early in the spring, when the plant is still a rosette or when it is about to bolt, or later in the fall when it overwinters as a rosette.

- **Vegetative Growth**: Rush Skeletonweed can vegetatively produce shoots from rhizomes and by regeneration following rootstock fragmentation. The vegetative spread is also at shoot buds located along the lateral roots and at the top of the main taproot.

- **Tilling or cultivation will stimulate new plants and more weed growth. Root fragments will spread the plant.**

- **Later in the Season**: At first, Rush Skeletonweed resembles the dandelion, but the rosette dies back as the flower stalk develops. The stems of the mature plant are sparsely leaved and wiry in appearance.

- **Without control measures, this weed will produce a monoculture of inter-connected plants. A single plant can become an entire colony.**

### Integrated Weed Management

- **Successful control of Rush Skeletonweed requires sustained effort, constant evaluation and a variety of improved strategies.**

- **Survey your property several times a season to determine the extent of any weed infestations.**

- **Prevent the spread of the noxious weed into new areas. Refrain from driving vehicles and machinery through Rush Skeletonweed infestations during the seeding period.**

- **Livestock should not graze weed-infested areas during seed formation.**

- **To prevent seed spread, limit access to the property by campers, hikers, off-road vehicles and horseback riders. Clean plant materials off the bottoms and wheels of vehicles.**

- **For very small infestations, diligent hand pulling or grubbing two or three times a year, for six to 12 years, can be helpful. New plants will emerge from severed roots and buried seeds. Pull out the young weed when the soil is wet.**

- **Due to its deep roots, mowing is not effective control since it will have a minimal effect on the weed’s nutrient reserves. It will allow the plant to continue to move reserves down to its roots for more vegetative growth.**

- **Do not till or cultivate. Cultivation spreads root fragments and may actually increase the infestation.**

- **Plant competitive legumes, such as alfalfa, which will compete for soil moisture and may shade Rush Skeletonweed plants.**

- **Continuous grazing by sheep can reduce or prevent production of Rush Skeletonweed rosettes and seed. Moderate grazing is as effective as heavy grazing in controlling Rush Skeletonweed since heavy grazing decreases the competitive ability of desired species.**

- **Rush Skeletonweed is difficult to control with herbicides since most people spray too late in the season, and then without an effective surfactant like DyneAmic, an MSO-silicone blend.**

- **Effectively applying herbicides depends on spraying at the right time with an aggressive reapplication program.**

- **Due to its rubbery plant surface, always use a good surfactant like DyneAmic, when spraying Rush Skeletonweed.**

- **In the spring, spray when the plant is still a rosette, or at least no later than when it is about to bolt.**

- **Spray the new rosette later in the fall, after the first frost.**

- **Spraying rosettes twice a season, early in the spring and later in the fall, should eradicate the weed after three years.**

- **Milestone and 2,4-D have been very effective in Lincoln County. These products can be used to the edge of a creek. A state applicator’s license is not needed for their use. Unlike 2,4-D, Milestone provides some residual coverage for 1-2 years.**

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**Spray now before the plant bolts.**

**Avoid out-of-control noxious weeds.**

**The taproot goes down 8 to 10 feet. If you plow, you will break up the roots, causing more growth and new plants.**

**Rush Skeletonweed grows in either very dry or very wet environments. It thrives in habitats with 9 to 59 inches of annual precipitation. With its deep, 8-to-10-foot taproot, it can out-compete most plants. It is very drought-tolerant. Ranchers in dry Australia use the rosette of the weed for grazing sheep.**

**Spray the new rosette later in the fall, after the first frost.**

**Milestone has been very effective in Lincoln County. These products can be used to the edge of a creek. A state applicator’s license is not needed for their use. Unlike 2,4-D, Milestone provides some residual coverage for 1-2 years.**

**Close-up of the down-turned hairs on the lower stem.**

**The tiny yellow flower at the end of a stem.**

**Spray now before the plant bolts.**

**The new growth looks like dandelion leaves below last year’s woody stems.**

**Rush Skeletonweed blooms and seeds about to fly away.**

**Options for Control**

**Lincoln County Noxious Weed Control Board**

405 Rose Street, P.O. Box 241, Davenport, Wash. 99112 509-729-3646
**Gall Midge (Cystiphora schmidti)**

- All Rush Skeletonweed biotypes are attacked by the Midge, but the lateflowering biotypes are the most heavily damaged.
- Midge adults are light brown in color and are about 1/8 inch long. They resemble tiny mosquitoes and are not readily seen.
- Males live 1 to 2 days, and females live 3 to 4 days.
- Females of the first generation lay eggs in rosette leaves. Eggs are inserted through the lower epidermis of a leaf, with individual eggs separated by 1/8 inch or more.
- Succeeding generations, up to 4, develop on the flower stems until fall senescence.
- A female produces about 100 eggs during her lifetime. Eggs incubate about 9 days.
- Upon hatching, the pink-orange larvae feed on the tissues beneath the surface of the leaf or stem where they hatch. Feeding stimulates the plant to form galls which are characterized by swelling and yellowish to reddish-purple discoloration of the affected tissues. Galls become noticeable 10 to 12 days after eggs have been deposited.
- Larvae develop in 4 to 7 days. Mature larvae cease to feed, but spin silken cocoons about themselves within the gall prior to pupating.
- The pupal period lasts 4 to 6 days. The pupae rupture the gall epidermis and form holes through which the adults escape.
- The life cycle of a Midge can be completed in 24 to 44 days. The Midge is active from late-April to October, with a peak from August to October.
- The Midge injures Rush Skeletonweed both in the rosette and flowering/stem stages. When galls are abundant, photosynthesis is reduced. The plant’s epidermis is injured causing the leaves to dry, turn yellow, and die prematurely. Both spring and fall rosettes, especially swelling rosettes, may die.
- Midges are most damaging to fall rosettes, destroying over 50 percent of the leaves formed.
- Infested plants have fewer branches and may produce 60 percent fewer flower heads than uninfested plants.
- While the Rust Fungus has caused significant damage in California, its presence has not often been seen in Lincoln County, perhaps due to lack of dew and humidity.
- The Rust Fungus remains active throughout the year, and it may infect all above-ground plant parts.
- From spring to fall, cinnamon-brown-colored, round or “bull’s-eye,” erupative pustules (blister) called “uredia” develop on rosette leaves, stems and flower buds.
- The uredia produce red-brown spores that propagate the fungus during the growing season, but do not overwinter. Elongate teliospores or telia are produced at the base of flowering stems. Telia produce dark-brown teliospores which remain dormant and overwinter until the following spring.
- Rust development is slowed or stopped during the winter but resumes rapid growth in the spring. In March, the teliospores produce basidiospores, the pathogen’s sexual stage. These germinate on the rosette leaves and form clusters of yellowish spermogonia which eventually yield spermatia. These produce acia and aeciospores in April. Aeciospores germinate to produce uredia and uredospores, and this completes the life cycle.
- Rust spores are readily disseminated by wind, water and animals.
- A new generation of uredospores can be produced every 2 weeks during the summer on the floral shoots.
- Rust infections often kill plants prior to bolting. Rust causes desiccation, reduced photosynthetic surface area, increased plant susceptibility to other pathogens, and suppressed plant growth. Heavily-infested plants are stunted and deformed, with few branches.

**Rust Fungus (Puccinia chondrillina)**

- Do not till or cultivate. Cultivation spreads root fragments and may actually reduce the infestation.
- Plant competitive legumes, such as alfalfa, which will compete for soil moisture and nutrients and may shade Rush Skeletonweed plants.
- Continuous grazing by sheep and goats can reduce or prevent production of Rush Skeletonweed rosettes and seed. Moderate grazing is as effective as heavy grazing in controlling Rush Skeletonweed since heavy grazing decreases the competitive ability of desired species.

**Preventing Invasion & Containing Infestations**

- **Integrated Weed Management**
  - Successful management of Rush Skeletonweed requires combining strategies to prevent the movement of weeds, containing existing infestations, and reducing weed infestations to tolerable levels.
- **Prevent Invasions**
  - Detect and eradicate new plants early. Retain from driving vehicles and machinery through infested areas during seeding. Wash the undercarriage of vehicles and machinery before leaving infested areas. Do not use hay, livestock feed or manure contaminated with Rush Skeletonweed seeds. Livestock should not graze weed-infested areas during flowering and seed set. Avoid Rush Skeletonweed patches during cultivation. Go around small weed infestations during harvest. Screen irrigation water before it enters a clean field. Limit access to property to campers, hunters and off-road vehicles.
- **Proper Grazing Plan**
  - Alter the season used for grazing to allow favorable weed infestations to tolerate emergence. Use a mechanical and cultural control plan to allow favorable weed infestations to tolerate emergence. Use a mechanical and cultural control plan to allow favorable weed infestations to tolerate emergence.

**Mechanical and Cultural Control**

- For very small infestations, diligent hand pulling or grubbing two or three times a year, for six to 10 years, can be helpful. New plants will emerge from severed roots and buried seeds. Pull out the young weed when the soil is wet.
- Due to its deep roots, mowing is not effective control since it will have a minimal effect on the weed’s nutrient reserves. It will allow the plant to continue to move reserves down to its roots for more vegetative growth. There will be a thicker infestation in later seasons. Mowing is not the answer.
- Do not till or cultivate. Cultivation spreads root fragments and may actually reduce the infestation.
- Plant competitive legumes, such as alfalfa, which will compete for soil moisture and nutrients and may shade Rush Skeletonweed plants.
- Continuous grazing by sheep and goats can reduce or prevent production of Rush Skeletonweed rosettes and seed. Moderate grazing is as effective as heavy grazing in controlling Rush Skeletonweed since heavy grazing decreases the competitive ability of desired species.
Biological Control of Rush Skeletonweed

• Four biological control agents have been released for control of Rush Skeletonweed in North America: a mite, a midge, a rust, and a rootfeeding moth (Brachymeria girvedella), soon to be released in the state of Montana.

• Grasshoppers and blister beetles are common native insects that often feed on Rush Skeletonweed, but are not suitable as biological control agents because they also feed on many desirable crops and plants.

• Introducing biological control agents does not guarantee short-term weed control. Several years are required for them to multiply to population levels that effectively suppress the weed.

Chemical Control of Rush Skeletonweed

• Rush Skeletonweed is difficult to control with herbicides since it is a deep-rooted, rhizomatous perennial. Some people think the weed is tolerant to herbicides.

• However, most people spray too late in the season for the herbicide to be effective.

• In the spring, spray when the plant is still a rosette, or at least no later than when it is about to bolt.

• Spray again later in the fall, after the first frost.

• Spraying rosettes twice a season, early in the spring and later in the fall, should eradicate the weed after three years.

• Effectively applying herbicides depends on spraying at the right time with an aggressive reapplication program.

• Always use an effective surfactant like Dyna-Amic, an MSO-silicone blend.

• The weed has a rubbery plant surface, with few leaves to absorb the herbicide. The use of an MSO surfactant like Dyna-Amic is essential. Other good surfactants include Hasten and SYL-TAC.

• Milestone and 2,4-D have been very effective in Lincoln County. These products can be used to the edge of a creek. A state applicator’s license is not needed for their use.

• Unlike 2,4-D, Milestone provides some residual coverage for 1-2 years.

• Apply 1.5, 2, or 3 gallons of Milestone or 2,4-D, plus 1 quart of a good surfactant like Dyna-Amic, for each acre.

• For each acre, apply Escort, Tela, Curtall or Redmean at 0.5 to 1.0 oz; Tordon at 1 quart; or Weedmaster at 1 quart. They are all very effective, but do not use them along creeks.

• Sheep and goats will graze the rosette and the early-flowering plant. Ranchers in Australia have used Rush Skeletonweed rosettes to feed sheep herds.

• Livestock should not graze weed-infested areas during flowering and seed set. Otherwise, seeds will pass through their digestive systems and spread infestations throughout an entire pasture.

• Rush Skeletonweed will invade wheat.

• It may be time to spray herbicides.

• An elaborate spray unit

• A plant heavily galled by mites

• Collected and uncollected flower stems

• Rush Skeletonweed will continue to multiply and disperse until the weed’s growth is stopped by lack of moisture or fall frost. One plant may be covered by as many as 4,000 galls during a summer season.

• Unfertilized female mites will produce male mites, Fertilization of females is by spermatozoa, a stalked sperm sac attached to the inside of the gall and later collected by the female. When the gall dries and there is a mass mite exodus, the males deposit numerous spermatozoa on the outside of the gall.

• To redistribute mite galls, place them on top of healthy Rush Skeletonweed plants in the center of the biggest patch. Release on damp days, in the evening or covering the plant with a plastic bag to help maintain higher humidity. If windy, lightly tie the gall to a healthy plant.

• Mites can reduce flower and seed production by 96 percent on weeds that they infest. They can reduce rosette regenerations following flowering by 76 percent.

• Bioagents will not eradicate Rush Skeletonweed, but they will reduce seed production and stunt the weed, impairing its competitive ability and allow native plants and grasses to grow.

• Releasing bio-agents should be part of a total integrated vegetation management effort that includes the use of herbicides, fertilizers, competitive plants and grazing management techniques.

• Herbicides are most effective when applied to plants that are infected with biological control agents. Continuing to spray herbicides if few midge galls are seen, but efforts should be made to preserve and redistribute mite galls.

• Buds on the same plant, be carried by the wind, or carried to other plants. Mites will die within 2 to 3 days if the ambient humidity is below 50 percent at about 80 degrees F and they don’t make it into another Rush Skeletonweed plant.

• Mites and galls continue to multiply and disperse until the weed’s growth is stopped by lack of moisture or fall frost.

• Options for Control

• Options for Control

Cattle Grazing on Rush Skeletonweed

• Cattle grazing on Rush Skeletonweed is not effective for short-term weed control.

• Rush Skeletonweed contains a white, milky sap that is typically not palatable to cattle. As the plant matures, it gets wiry and some what woody, making digestion difficult.

• Cattle avoid Rush Skeletonweed, but when forced to graze on it, they may nibble on rosettes and flowering stems early in the season, before lignified stems grow.

• Rush Skeletonweed is likely to invade crops.

• It is easy to spot with a good surfactant like Dyna-Amic, an MSO-silicone blend.

• The weed has a rubbery plant surface, with few leaves to absorb the herbicide. The use of an MSO surfactant like Dyna-Amic is essential. Other good surfactants include Hasten and SYL-TAC.

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