

Standardized Impact Monitoring Protocol (SIMP) for *Bradyrrhoa gilveolella* and Rush Skeletonweed:



Overview:

A critical part of successful weed biological control programs is a monitoring process to measure populations of biological control agents and the impact that they are having on the target weed. Monitoring should be conducted on an annual basis for a number of years. The Idaho State Department of Agriculture, in conjunction with the University of Idaho, Nez Perce Biocontrol Center, and federal land management agencies, has developed the monitoring protocol below to enable land managers to take a more active role in monitoring the progress and weed control ability of the rush skeletonweed root moth, *Bradyrrhoa gilveolella* (BRGI) in efforts to control rush skeletonweed,

Chondrilla juncea. This monitoring protocol was designed to be implemented by land managers in a timely manner while providing data which will enable researchers to better quantify the impact of BRGI on rush skeletonweed throughout the state.

Rush Skeletonweed:

Rush skeletonweed is a long-lived perennial capable of reproducing by seed or vegetative regrowth. Flowers are self-fertile and contain 10 to 12 bright yellow florets. An individual plant is capable of producing up to 20,000 seeds that can remain viable in the soil for up to a year. Plants are typically 1.5 to 3 feet tall with multiple spreading, nearly leafless, light-green stems characterized by stiff, downward pointing hairs located on the lowermost 2 to 3 inches of the plant. Rush skeletonweed has a taproot that can reach depths of 7.5 ft into the soil, enabling it to thrive under a variety of climatic conditions. This weed is commonly found on sandy soils in areas of drought that have been disturbed by grazing, recreation, or fire.

Rush Skeletonweed Root-boring Moth (BRGI):

BRGI is a recently approved biological control agent for rush skeletonweed. The moths overwinter as late instar larva or pupa and emerge from their shelter tubes, made of silk, latex, and frass, in May and June for winter generation adults or August to September for summer generation adults. Adults are 0.5 inches long, have a 1 inch wing span, are creamy buff in color, and have three distinct horizontal bands on their front wings. Females produce nearly 300 eggs and lay them on plant rosettes or in the soil. Six to 10 days later, the larvae hatch, penetrate the soil, and begin feeding externally on the roots while spinning their tubes. The larvae destroy the cortical and vascular tissues of the roots, depleting carbohydrate reserves, adversely impacting plant vigor and overwintering ability, and exposing the plants to soilborne



plant pathogens. Larvae complete development in 45-60 days and the pupal period lasts seven to 10 days.



Monitoring:

The Statewide Biological Control monitoring protocol is based upon a permanent 20 meter vegetation sampling transect randomly placed in a suitable (at least 1 acre) infestation of rush skeletonweed and sweep net samples of BRGI. Annual vegetation sampling will allow researchers to characterize the plant community and the abundance and vigor of rush skeletonweed. Sweep net samples of BRGI

adults will provide researchers with an estimate of BRGI population levels.

Permanent Site Set-up:

To set up the vegetation monitoring transect, you will need: 1) a 25 x 50 cm Daubenmire frame made from PVC (preferred) or rebar, 2) a 20 m tape measure for the transect and plant height, 3) 10 permanent markers (road whiskers and 16 penny nails – see picture below), 4) a post (stake or piece of rebar) to monument the site (see pictures for examples of field equipment), and 5) 30-45 minutes at the site during the **3rd week of June**. To set up the transect, place the 20 m tape randomly within the infestation. Mark the beginning of the transect with a post. Place permanent markers every 2 m (for a total of 10 markers) beginning at the 2 m mark and ending with the 20 m mark on the tape measure. Place the Daubenmire frame parallel to the tape on the 50 cm side with the permanent marker in the upper left corner starting at 2 m (see pictures). **Refer to the “sweep” data sheet for how to conduct monitoring.** Repeat the frame placement at 2 m intervals for a total of 10 measurements (one at each permanent marker).

