

Southern Idaho Student “Bug Crews”

Weeds, youth, and biocontrol in the rangelands of Idaho

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Biological control of noxious weeds is an effective and widespread method often used by rangeland managers in the western United States. However, once biological control agents, usually insects, are released onto public and private lands there are few, if any, programs to follow up and monitor the effectiveness of these agents. A technique being used by some land managers is the use of student crews to implement monitoring programs. The Southern Idaho Bio-Control (SIBC) program is one program that has successfully used student crews during the past 10 years for this purpose.

To understand how the SIBC program began, a brief background of the approval process required for the introduction of biological control agents is needed. Prior to releasing insects onto rangelands, researchers travel to the target weed's place of origin to find insects damaging the weed in its native environment. After insects are identified, only those causing the most damage to the target plant are selected to undergo extensive testing. The testing process is conducted to determine the host-specificity of insects to be introduced, ensuring that damage to desired native and domestic plants will not occur. Once approved, the insects are released to establish colonies throughout the weed's range.^{1,2} This process is successful at finding new biocontrol agents. Presently there are over 100 approved insects available for release that target 25 noxious weed species in the United States.³⁻⁵

The use of summer crews consisting of local junior high and high school students is a solution being employed to implement, monitor, and expand biocontrol efforts. Student crews are able to 1) make new biocontrol insect releases, 2) monitor establishment of initial releases in the target area, 3) determine when insect populations are ready for collection and further distribution, 4) collect and distribute insects into other target areas, and 5) conduct long-term monitoring of the plant community to see that insects used for biocontrol have successfully reduced populations of the target plant.

The SIBC program has successfully used insect biocontrol agents by employing student crews, better known as “Bug Crews.” Besides implementing biocontrol, the program provides students with a unique opportunity to work, learn, and experience first-hand the effects of invasive plants and use of biocontrol agents, specifically insects, that can reclaim local rangelands dominated by invasive plants. In turn, the students are helping land managers and researchers collect data, monitor plots, and collect insects for further distribution. The SIBC program continues to be successful and can be used as a model for control of invasive plants in other areas.

History of the SIBC Program

The first SIBC student crew started in Camas County, Idaho, in 1998 as a cooperative program created by a University of Idaho Extension agent, a Camas County biology teacher, and the US Forest Service. The Camas Soil Conservation District was a driving force behind the project along with the US Department of Agriculture (USDA) Forest Service, Forest Health Protection, Boise Field Office, which provided technical expertise and part of the funding, and supplied insects used for control of diffuse knapweed (*Centaurea diffusa*), the most common and widespread weed in Camas County. The initial idea was set in motion in 1996, but it was not until funding was secured and the program presented to the Camas Soil Conservation District in 1997 that the program got off the ground. The Camas Soil Conservation District agreed to provide adult supervision and supplied a program coordinator, thus allowing the program to start field work in 1998. In 2005, the Wood River Resource Conservation and Development Council, a nonprofit organization interested in biological control of noxious weeds, came on board, enabling the project to receive funding from grants, a significant factor in expanding the program to multiple counties.

Camas County efforts were subsequently joined by additional student crews in the surrounding counties of Blaine,



Gooding crew takes measurements, 2008. Photo courtesy of Becky Frieberg.

Gooding, and Lincoln. These counties are located in south-central Idaho on the northern edge of the Snake River Plateau. These sparsely populated counties are approximately 5,000 feet above sea level and include the foothills between the Snake River and the Sawtooth Mountains. In Camas County alone there are approximately 125,000 acres of prairie used for crops and pasture, 99,000 acres of rangeland used for grazing, and 11,000 acres of private forest. National forest and rangelands encompass 444,000 acres across the county. In 1996, 20,000 acres of rangeland and forest were infested with rapidly spreading diffuse knapweed.

Six students were selected for the inaugural summer project and were originally called "Kid-Nappers" after the target species, but soon a new name was adopted by the students, who began informally to refer to themselves as a "Bug Crew." The name stuck. The program is a summer employment opportunity for area junior and high school students and has employed more than 60 students since the inaugural season in 1998.

The original program had two objectives that are still ongoing in 2009: 1) to demonstrate and implement the use of biological weed control on the rangelands of south-central Idaho and 2) to provide specialized educational opportunities for students. Program organizers also hoped that students participating in the program would be encouraged to perform well in school, and, as an added bonus, continue their education in a related academic field after graduating from high school. The program has been so successful that diffuse knapweed has almost disappeared in many areas. Currently, crews are working with spotted knapweed (*Centaurea maculosa*), leafy spurge (*Euphorbia esula* L.), and Dalmatian toadflax (*Linaria dalmatica*).

What Makes the SIBC Program Successful?

The longevity and success of the SIBC program is related to the involvement of students in every aspect of biocontrol.

Students spend most of their time in the field at the different weed infestations throughout their respective counties. They do on-the-ground work, collecting and releasing insects, mapping sites, collecting data, and monitoring release sites and insectaries. The program also allows students to be exposed to different noxious weeds and the insects used to control them. They also work closely with local ranchers, researchers, and teachers. Typically, students contact local ranchers and farmers where it is felt biocontrol can be an effective tool to control the selected target species. This approach has proved to be tremendously effective, because the students already know the families and are able to explain the benefits of biocontrol within the context of their own community. Local landowners are also supportive of and cooperative with the program, allowing the SIBC to release and monitor insects on their farms and ranches. The program is summer-long with students typically working on a Bug Crew every summer for 3–5 years. The long-term aspect of the program provides students with continuity and an opportunity to see results. Additionally, the program provides paid summer employment, an important part of the program because it gives students the opportunity for a summer job when jobs for high school and junior high students may be difficult to find in many rural communities.

Students often comment about the life-changing experiences they have gained by participating in a Bug Crew. These experiences help students learn to care about the environment, develop friendships, build a strong work ethic, and understand how their work is making a difference in their respective communities. Bri Qualls, a current Bug Crew member, applied to the program because it was a way that she could "help restore our land, and become noxious weed free. I saw it as an opportunity to help the environment. It's also a lot of fun." Several other students have used the program as a springboard into a college. One student wrote an essay and made a video of his experiences to help him apply for college scholarships. He was successful and is



Examining spotted knapweed (*Centaurea maculosa*) for effects of biocontrol agents. Photo courtesy of George Markin.



Joe Milan explaining how to calculate plant densities within a transect. Photo courtesy of Becky Frieberg.

currently attending college. A 2007 Bug Crew member also commented that going to college has always been her plan and that she would enjoy a career “along the lines of what I’m doing now.” As the program continues to grow it is hoped that students will continue to have life-changing experiences, learn to appreciate the role insects play in an ecosystem, understand the long-term consequences of actions by their direct and indirect participation in a long-term research project, and finally, better appreciate the role science can play in helping to insure a sustainable future.

How to Set Up and Organize a Student “Bug Crew” Program

There are several important components to setting up and organizing an effective student “Bug Crew” program. Based on 10 years of experiences and the lessons learned in south-central Idaho, we are providing the following basic guidelines to help land managers interested in starting a similar program. It is important to understand that any particular biocontrol program may follow and utilize all or just some of these guidelines depending upon the particular situation at hand. We list them here in the order that seemed most appropriate when beginning a similar program; however, many factors may influence whether all or just some of these guidelines are utilized and the order in which they are implemented.

Identify a Target Species

It is important to understand that if proven biocontrol agents are not available to control the selected target weed, the program is not appropriate. A US Forest Service representative selected diffuse knapweed as the target weed species in 1996 because it was the most widely spread and rapidly growing weed in the county. A good resource that can be used to identify approved USDA biocontrol agents for the target weed of concern, published in 2004, is

Biological Control of Invasive Plants in the United States, edited by Coombs et al.⁶ Local Extension weed specialists or biological control coordinators from federal agency field offices are also good resources.

Identify Technical Advisors

Technical experts are needed to help identify target weeds, locate and obtain insects needed for the biocontrol work, help design methods of rearing large numbers of insects, and show students how to collect and handle insects. They also help select release sites and design simple monitoring procedures. Most importantly, the technical advisors answer technical questions that students may have. They don’t conduct the work; they just provide scientifically proven advice.

Identify a Steering Committee

A steering committee needs to be organized to oversee the program and should include local, committed individuals and/or groups who are supportive, actively involved, and can help organize the program. Committee members can be from federal, state, and local agencies; weed management areas; county weed boards; soil conservation districts; and local school districts. The SIBC steering committee provides oversight to all four counties and the Bug Crews participating in the project. An umbrella agency, such as a local resource and conservation development agency that has the ability to receive and disperse state and federal grant money, also needs to be part of the program.

Identify a Program Manager and Crew Supervisors

This is a critical component to a successful program. The program manager is the main liaison between the crew supervisors, the students that work for them, and the program steering committee. The manager and supervisors effectively implement and accomplish many of the administrative, planning, and financial management functions within any program regardless of how it is set up and organized. They are also responsible for the day-to-day operation and safety of the crews in the field. In turn, the program manager and supervisors are accountable to the steering committee and various partnering entities involved in the program.

Develop a Work Plan and Annual Budget

Each year a plan of work also needs to be developed and submitted to the steering committee. The plan should include the target species, locations of study sites, and how the sites are monitored. An important factor that must be included with the work plan is an annual budget, showing projected costs, sources of funding, and how funding will be spent. The budget is based on the availability of funding each year. The most significant expense in the Bug Crew budget is labor, followed by supplies (including insect purchases) and the cost of transportation. The SIBC has found



Bug Crew parade float. Photo courtesy of Becky Frieberg.

that it is often easier to find equipment funding, such as cameras and insect tents, but difficult to find money to pay for labor cost. The program also needs a “home base” to house the program. The SIBC has been able to operate out of local soil conservation district offices. A well-prepared budget also provides information needed to apply for funding through state and federal agencies.

Identify Funding Sources

Securing funding is a significant factor to consider when developing a Bug Crew program and needs to be addressed during the early stages of the program; without funding, a program will not be sustainable. Bug Crews provide a highly visible local activity that is beneficial to both private and public landowners. Thus, finding the necessary funds is generally not that difficult. Possible funding sources include local and county weed boards, cooperative weed management areas, soil conservation districts, state agricultural departments, private organizations, foundations, and federal agencies such as the Natural Resources Conservation Service, US Forest Service, and Bureau of Land Management.



Bug Crew 2008. Photo courtesy of Becky Frieberg.

Develop a Public Relations (PR) Plan

This plan is submitted to the steering committee and is used to disseminate information about the project to the local community and specific program sponsors. The PR plan complements the work plan and budget. It also provides an opportunity to inform local communities that biocontrol can be a viable option in their area. Bug Crew public relations activities have included county fairs, parade floats, presentations at state weed meetings and soil conservation district meetings, Web pages, pamphlets, brochures, presentations to school science classes, and meetings with various federal, state, and local leaders. Numerous local newspaper articles with photos have been written about the Bug Crew due to the local appeal in southern Idaho. The PR plan has been an important factor in the SIBC program’s success and has contributed to the support by local farmers, ranchers, and other members of the community.

Recruit Students

Once the logistics of the program are in place, it is important to find and recruit interested students from local schools. The SIBC has found that a typical student applying for the program has an interest in science and local environment. Students are selected based on an annual application process that usually gives preferences to returning Bug Crew members. For new students it is important that they submit a good application to be selected for the program. Many students have other commitments during the summer, such as sport activities, church camps, and family vacations, so being flexible in their work schedule is necessary. The number of students hired to work in a Bug Crew may also be restricted by budget constraints, transportation issues, minimum age requirements, and the amount of work that needs to be completed.

Other Student Crews in the Western United States

The SIBC program is an example of similar programs across the western United States using students to implement and monitor biocontrol of noxious weeds. A variety of biocontrol programs employing youth exist in Wyoming, Montana, and other areas within Idaho. In Montana, the Whitehall Project, based out of Whitehall High School in Whitehall, has been successful and was one of the first programs in Montana. The project is similar to the SIBC project in that it teaches students how to build insectaries; raise, collect, and monitor insects; and provide them to agencies, such as the Montana Department of Transportation. The Whitehall project focuses on rearing two insects that target spotted knapweed, the root boring weevil (*Cyphocleonus achates*) and the root boring moth (*Agapeta zoegana*). In addition, the project collects biocontrol agents from established field sites and redistributes them around the county and to local landowners. The project also holds workshops to teach others how to set up and raise insects in their schools. In Montana,

over 20 schools have followed the Whitehall project model. During the past several years, the SIBC program regularly cooperates and exchanges ideas with the Whitehall project, with the exchange benefiting everyone involved.

Have You Hugged a Bug Crew Today?

The SIBC Bug Crews have played an important role in implementing and monitoring biocontrol of weedy plant species affecting rangelands in south-central Idaho. The success of the program in Idaho provides other communities a model for establishing student “bug crews” in their area. Nan Reedy, a former Bug Crew coordinator for the Camas and Gooding Soil Conservation Districts, suggests that before developing a similar program it is important to realize that biocontrol programs require a long-term commitment, because effective biocontrol of target plant species can take years to accomplish. Finally, she says, “It must be fun!”

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