

Potential risks of releasing native lady beetles

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There are a number of ecological risks and other potential risks to purchasing and releasing convergent lady beetles (*Hippodamia convergens*), including: removing large numbers of beetles from their native environment; transmitting disease to local beetle species in the area where they are released; competing with local beetles and other insects for food; and breeding with local beetles, which may introduce unhelpful genes into the local population. In addition, there is ample evidence that releasing convergent ladybird beetles into a farm or garden area does not work – this species tends to leave the release area before it starts to lay eggs or feed.

Collection from the Sierra Nevada: In California, many lady beetle species overwinter in large aggregations in the Sierra Nevada. In the spring, adults fly down from the mountains to valley and coastal areas, where they play an important role in controlling crop pests. Large quantities of lady beetles (in the genus *Hippodamia*) are collected each year at overwintering sites in the Sierra Nevada and sold commercially. We don't know the scale of the harvest, but it is potentially quite large – likely many millions each year. An estimate from 1999 suggests that lady beetles were sold for approximately \$20/gallon, and there are ~75,000 beetles in a single gallon (Signer 1999). Another estimate suggested that an experienced lady beetle harvester can make \$1,000/day during the collection season (Hubbell 1993). If you use these two estimates you can calculate that one person would need 50 gallons to make \$1,000 -- they would be removing 3,750,000 lady beetles from the Sierra Nevada! We do not have firm numbers of how many beetles are removed, but likely many millions of beetles are collected from the Sierra Nevada each year.

When lady beetles are removed from the Sierra Nevada in the winter, those individuals will not be available to return to the foothills and Central Valley the following Spring. Mass-removal of ladybugs from the Sierra Nevada in the Winter could potentially lead to pest problems for farmers in the Central Valley the following Spring and Summer, which could lead to an increase in pesticide use (Hagen 1954).

Disease: The issue of disease transmission from commercially collected lady beetles to wild, local lady beetles has not been well studied. Scientists have not identified all of the various pathogens harbored by lady beetles that are sold commercially, nor have they determined whether each of those pathogens are transmitted to local, wild species of beetles. There is one recent study (Saito & Bjørnson 2006) of commercially purchased convergent lady beetles transmitting an unidentified fungus (a microsporidium) to a number of other local, wild species of lady beetles. Another article (Cranshaw 2006) notes that many field-collected lady beetles have parasitic wasps – those parasites could be transmitted to local, wild beetles in higher numbers than they would normally encounter. Even if the convergent lady beetle occurs in the wild in the release area, the local beetles may have adapted to different pathogens, and

they may not be resistant to particular strains of pathogens carried and transmitted by the commercial convergent lady beetles.

There are many examples of disease transferring from other commercial species to their wild counterparts, with catastrophic results for the wild, local species. The possible extinction of one of California's native pollinators – Franklin's bumble bee – is hypothesized to have been caused by diseases transferred from commercial bumble bees. While this hypothesis is currently being investigated, there are numerous examples from other countries of commercial bumble bees transmitting pathogens to wild bumble bees. Some other notable examples include disease transfer from commercial Atlantic salmon to wild Pacific salmon and from domestic sheep to wild bighorn sheep.

Competition with other organisms: Ecosystems have a suite of native insects that play a variety of different roles – such as predators, parasites, pollinators, or decomposers. Lady beetles are generalist predators that can consume large quantities of food. A mass-release of lady beetles could be harmful to many of the native insects that occur in the release area by competing with insect predators for food, or directly consuming insects.

The nine spotted lady beetle was once a common species in the US but now is extremely rare and likely extirpated from whole sections of the US. The loss of the nine spotted lady beetle is hypothesized to be from the introduction and release of non-native lady beetles from Europe and Asia, which may have out-competed the nine spotted lady beetle for food. Although the convergent lady beetle is not an exotic species, it is being released into areas in higher quantities than one would find naturally, and may have a similar effect on local, wild species.

Breeding with local beetles: Commercial convergent lady beetles may breed with wild, local beetles and could introduce unhelpful genes into the population. This could negatively influence the survivorship of local convergent lady beetles. Obrycki et al (2001) indicates that augmentatively released California *H. convergens* could successfully mate with local *H. convergens* populations. Obrycki et al (2001) goes on to state that “the practice of augmentative releases of field collected *H. convergens* needs to be carefully examined for non-target effects.”

When released, do these organisms work?: Releasing convergent lady beetles that have been collected from their overwintering grounds is not an effective way to control local insect populations. They need to migrate before they will start feeding or laying eggs, so they simply fly away when released (see Cranshaw 2006) and do not control insects on site.

Conservation Biological Control: There are many ways to attract lady beetles and other native beneficial insects (we are developing a book on this approach). Conservation Biological Control and calls for providing the habitat that these organisms need so that they will move into your area on their own.

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