

## Low Density Release Strategies for Sasi Predator Beetles

### Planning a Release Design

A release design is critical for larger properties (over 5 acres), but it will be very helpful for smaller properties as well. The first step in any release plan is to prepare a map of the distribution of hemlocks over your property. This need not indicate individual trees, but it should designate the size, density and relative health of hemlocks as well as adelgid densities in each of your hemlock areas. In preparing your release design, you will survey your property with this map in hand to decide the locations of **beetle colonies** and individual **release sites**.

Hemlock health is an important consideration for planning, because the number of adelgids declines as the infested hemlock becomes more defoliated. This means that early-infestation trees, with many visible adelgid ovisacs, are an excellent choice for release sites. However, this does **not** mean that trees experiencing defoliation or “dieback” cannot be used as release sites! Even “sick” trees which still have some crown growth should contain enough adelgids to feed all the larvae from a moderate beetle release, and the immediate benefits of such releases for trees with “dieback” can be substantial!!

### Beetle Colonies

Once you have your map in hand, you can begin designing the placement of beetle colonies on your property. A **colony** is a set of 2-3 release sites, located within 100' of one another. The purpose of these colonies is to create local population centers for the Sasi beetles and to facilitate reproduction going forward. Each colony can be placed 100 yards or more from the neighboring colony (and sometimes much farther). Colonies should be placed in locations near your highest priority treatment areas. Remember that the beetles can move in all directions to find HWA-infested hemlocks, so place your colonies accordingly. (All distances are approximate, to be adjusted in light of local conditions, such as tree densities and health.)

### Release Sites

Within each colony area, you should select and mark release sites that will maximize the capability for the beetles to spread within that area. The primary criterion for a **release site** is proximity to a tall tree, but the presence of numerous adelgid ovisacs is a definite plus. It is not necessary to climb up into tall trees for the release, adjacent smaller trees will serve just as well. On release the adult beetles will begin “flying up the ladder” of hemlock foliage (both release trees and taller adjoining trees), laying eggs as they go. After laying eggs at the top of the tallest adjacent tree, they will then fly to the tops of other large trees to continue egg-laying. Meanwhile the larvae and eggs from the release and subsequent egg-laying will remain and develop at their respective sites. (All the above is based on observations at my release sites.)

In general, 30 to 50 beetles should be enough for each release site with about 100 per colony area. Spacing of colonies can be adapted to local conditions such as tree size, health and adelgid densities. The key for site design is to ensure an adequate food supply for all beetle larvae resulting from the immediate post-release egg-laying and to maximize possibilities for movement of beetles.

Once you have worked out your design for beetle release, you can calculate the number of beetles required to carry out this design. And if that number exceeds your budgetary constraints, then it will also be easy to adjust your plan. Probably the best adjustment strategy is to increase distances between your colonies. By maintaining the colony structure, using fewer beetles will only increase the time required to connect-the-dots providing coverage of your property. (The research literature does not yet provide definitive information about how far and fast the St beetles can move. But Conway (2005) reports beetle movement of 400 ‘ over a 6 month period and I have seen ‘ movements over 2000’ in a season.)

## Releasing Beetles

The weather during Feb/March/April can be rough, but the beetles will likely be tougher than you are! Still it would best (for all concerned) to avoid releasing St beetles in high winds or in below-freezing temperatures. Despite the above discussion of beetle counts, you will not need to stand out in the cold, counting individual beetles.

The beetles from **Forever Green** will come in cloth sacks containing beetles and a lot of hemlock twigs and branches. My strategy is to divide the foliage into equal parts and use each to create a colony (as described above).

For large trees with no accessible lower branches, I recommend fastening a #4 (triangular) paper coffee filter to the trunk (about head high) and placing your beetle twigs within. By a day later, most of the beetles will have moved into the canopy in search of food. And if you'd like you can remove the filter and place the twigs in an adelgid-rich area (in case eggs or larvae are present).

## Assessing Your Release

You will not have to wait long to see the “fruits of your (and the beetles’) labors”. A release in Spring will have Sasi beetles and their larvae up in the trees and reducing the adelgid densities prior to the Spring hemlock growth cycle. If your trees are more seriously defoliated, you will be able to “see” the beetles work by midsummer - in the form of clusters of new foliage (with a distinctive yellow-green color) bursting out on your trees. Sometimes, you can follow the path of the beetles (branch by branch) up the tree. But this new growth will usually be most obvious at the crown (top) of the tree.

For trees that are healthier to begin with, these “beetle effects” will not be so obvious. Instead you may just see more of the normal branch tip growth (than you would have otherwise). But your trees will still be getting healthier, as well as growing more beetles. And here the new foliage effects will be more obvious in year 2.

New foliage is critical for the survival of a severely HWA-infested hemlock. Research has shown that once adelgids occupy 45% or more of a hemlock's stems (Evans 2004), that tree stops producing new growth. This is why even a small number of Sassi beetles can have an important benefit for a sick hemlock. Because without producing new foliage, a tree will lose the capacity to produce food for itself. And no tree can survive without food..

## Following the Beetles

If you have released in areas of seriously defoliated trees, you will get another “reward” by midsummer -- you will be able to begin following the path(s) of your beetles across your property. Most beetles leaving the tallest tree at the release site seem to move to the tops of the tallest adjoining trees. And the presence of these beetles and their larvae is again indicated by bursts of new growth at the tops of these trees. Sometimes you will have to wait until the deciduous trees shed their leaves to see clearly what's happening in the crowns of your hemlocks. Smaller trees in the vicinity will also be affected and this will be indicated by “growth fans” on one or more branches, usually toward the tops of the trees. These growth clusters are very distinctive, especially on trees that are too sick to exhibit “normal” new growth during this period.

What a great reward this will be for both you and your trees! So look forward to getting out in the woods in early Summer and Fall, to **look at your trees**. There's nothing more gratifying than seeing a tree

come back from the brink, and knowing that you have helped with the rescue. Of course, a severely HWA-weakened tree can die from other challenges, such as defoliation, drought, hemlock scale or borers or growing conditions. So there is no guarantee that all your weakened trees can be saved by biological control strategies, but at least you can give them a chance!

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**Saving Hemlocks**