Larvae of the Rare Butterfly, Taylor's Checkerspot, Released at Glacial Heritage

The sun is shining when Eric Delvin and I arrive at Glacial Heritage the morning of March 14th. The early Lomatium is in flower, but there's a cold breeze, which makes it clear that Spring has not yet arrived. Clouds are on the horizon.

This morning marks the first ever attempt to re-establish the rare Taylor's checkerspot butterfly on a historic site in south Puget Sound. Mary Linders of the Washington Department of Fish and Wildlife is the chief researcher for the project. Her assistant, Mike Walker, has experience monitoring the checkerspot in the Bald Hills and will be tracking the larvae released today. A number of conservationists and butterfly enthusiasts from a variety of organizations, myself included, have trickled onto the site to watch this highly anticipated event.

The Taylor's checkerspot butterfly is a subspecies of Edith's Checkerspot and is in imminent danger of extinction. Checkerspots belong to the family Nymphalidae, or Brush-footed butterflies. The upper wing surfaces of the checkerspot have a distinctive red-orange / black and cream-colored checkerboard pattern.

Historically, Taylor's checkerspot was documented at approximately seventy sites from south Vancouver Island, western Washington, and south to the Willamette Valley in Oregon. Delineating checkerspot populations is difficult because of the likely metapopulation structure and because the populations vary tremendously in size from year to year. At one site, counts went from 7 to 14 to 125 over three years while another population went from thousands to extinction in two years. Currently there are 3 occupied sites in Clallam County, Washington, one site each in Thurston and Pierce Counties in Washington, 2 sites in Benton County, Oregon and one newly discovered population (with only 12 animals!) in British Columbia, where checkerspots were thought to be extirpated. All but two of the current populations are extremely small with fewer than 50 individuals most years.

Mary and Mike bring in the test subjects.

Tell me about the experiment – what are we doing here? What are we looking for?

"Well, we've been working on captive rearing the Taylor's checkerspot for about 3 years now. Dan Grosboll started those efforts in 2003. The larvae we'll be releasing today are post-diapause larvae from the Oregon Zoo, which were captive-reared from eggs. We have 30 larvae and we'll be putting them out in two groups on one site, maintaining the two diapause treatments used at the Zoo. The larvae will be placed on the largest plants of *Plantago lanceolata*, the larval host, found at the site and we'll be tracking their survival through the larval stage and beyond."

So – why Plantago?

Castilleja hispida

"Plantago has iridoid glycosoids, chemical compounds which are found in a number of plants. Taylor's checkerspot larvae concentrate these compounds, which make them toxic to potential predators. Plantago, although it's actually an exotic species, is a lot more plentiful than natives with the same chemical compound. For example, Plantago has a similar chemical signature to *Castilleja Hispida*, or Harsh Paintbrush, a native host plant which is now very rare."

You were saying that you're looking at larval survival...

Two Checkerspot larvae await release

"Yeah. We're basically hoping that even one survives – which would be a tremendous success. In the wild, there can be less than a 1% chance of survival. This is the first time that a release of captive larvae has been attempted – in large part because we've not been able to get the animals through diapause. Dan was able to get 12 adults to emerge in 2003, but we're really still learning."

So – what kills them? Why is the survival rate so low?

"It's a good question and we really don't know the answer.
There may be issues with insect predators and parasites and we know that rodents or birds can potentially eat them. It's highly unlikely that vertebrate predators are a major issue for the larvae, however, because the larvae are hairy for one thing and for another they're somewhat toxic. Birds have been known to spit them out and they can also cause an emetic affect. Weather is probably the most vital component. Releasing them requires at least a day in advance of sun to let the soil warm up. The sun is extremely important for this species as they're thermal regulators. At this time of year, you'll see them crawl out on the Plantago blades where they can angle themselves to the sun – to get maximum exposure. This helps them raise their body temperature, which aids in their digestion and metabolism. Basically it helps them grow – they can't digest their food without the sun to help them."

How was the site and time of release chosen?

"We picked this spot for the availability of Plantago. We looked at both the dispersion of the plants and their uniformity in size. There are two release areas within this site, which helps us cut down on the variability of other factors. We're just looking at survival rate at this point, so it's important to give them the best chance that we can – and as equal a chance as we can, while still maintaining the Zoo's treatment groups. We've been waiting for enough sun to be able to do the release, and we've had one good day at this point. We really needed to get them out here – some of them are beginning to show signs of stress."

They are so small. How will you monitor them?

Blue 6 breaks for breakfast

"The short answer is that it won't be easy. We've marked each individual in one of 6 segrants of the body with a dot of model paint. So for example – this is Blue 6," she says, making a note on her clipboard and placing the caterpillar down gently on a flagged Plantago. "We'll be monitoring them 3 times a week and tracking where they are and how far they're moving relative their release point. We'll try to get information about how far they move, what direction they move in, in relation to slope and aspect and whether

they stay on the host plant where they were placed, move to another Plantago, or even another species entirely. We've also placed a temperature sensor in each area so we can determine whether there is any difference between the release areas. There's only one site for both groups, so we did a coin toss to determine which group is placed uphill; the other goes downhill on the same site."

Do they move much?

"Actually that's one of the major challenges we'll be facing. The larvae of this species can disperse up to 10 meters a day. The larvae are only about 1-2 cm in length so we just have to do the best that we can here. After their last instar (molt), when they're done eating, they begin to wander and according to Dan Grosboll, they can travel up to 3m an hour! We don't know why they do that. One possibility that Barry Bidwell suggested - that hasn't been considered for this species- is the possibility that parasites hone in on the host plant at this particular stage, so it may be an escape behavior."

If things do go well for them, how long before they become butterflies?

"If they continue to eat and develop, they remain larvae for about 2-3 weeks – depending on how much sun they get. They can only gain weight on sunny days. The soil here is dark and retains a lot of heat, so after one day of good sun, we've been able to show a 7-degree F temperature difference between the air 3 feet above the ground and the air at plant level. We think they're sensitive to contours of about 10 cm. Their hair may help them retain heat too, but that's a theory that hasn't been tested. There are still a lot of questions."

Taylor's Checkerspot – coming soon to a prairie near you?

The Taylor's Checkerspot

-- Interview by Gabrielle Byrne (The Nature Conservancy)