

## Tamarisk Leaf Beetle Monitoring Protocol 2009

In general the goal of the biocontrol monitoring protocol is to define **when**, **where**, and **how many** *Diorhabda elongata* are in existence across the region. Within that we then want to have a good idea of where defoliating sized populations exist, where newly aggregated populations are rising, and where beetles have yet to spread to. This protocol is designed to be fast and efficient and answer only basic questions about *D. elongata* distribution and abundance. It can be utilized on and off the river and should be a basic protocol for establishing the degree of beetle presence in an area. In general the amount of sweep samples taken within an area can be variable, of course the more sweeps across a region the greater the resolution of our data. It should be best followed that for every 5 sweep sets a GPS point should be taken and data recorded for that location, the more sweep sets the better, but utilize 5 sets as a minimum.

### General Sweep Surveys:

Using standard 15" aerial sweep nets and doing ~1 m sweeps; 5 sweep sets will be done per sampling location/GPS point. Per sweep set, 5 sweeps will be done within the tamarisk foliage. After each set of 5 sweeps, the contents of the net will be recorded using defined parameters (Table A). This should be repeated 5 times roughly 5 m away from each previous sweep set. Such that 5 sets of 5 sweeps, each roughly 5 meters apart will be done per sampling location.

Per sampling location, a GPS point should be recorded along with the attributed data for each sweep set (see Table A).

If marginal tamarisk is present for sampling, sweep sets should still be done on whatever tamarisk is present.

### River Surveys:

During river surveys, sampling locations should be stopped at every 1.5 km. When on land the 5 sets of 5 sweeps protocol (The General Protocol listed above) should be done within roughly 50 m of the landing point (variably 25 m up and downstream). When possible tamarisk off the waterline should be swept, but with efficiency in mind when searching for a tree.

When no tamarisk is present or inaccessible at the 1.5 km point, float to the next available tamarisk and sweep there. Following, only proceed to the next point that was 1.5 km from the original intended stopping point that was missed.

In areas when getting off the boat is impossible (overhanging tamarisk/vegetation on both sides), "floating surveys" should incorporate 25 sweeps spread over roughly 50 m of vegetation. Sweeps should be done again in sets of 5 with roughly 5 m between sets, the difference being that the net will only be counted at the end of all 5 sets (i.e. 25 sweeps) rather than counting the contents 5 separate times.

### Counting:

When counting net contents take care in not letting beetles escape or fly away when possible. Shaking the net vigorously or tapping the sides can sometimes knock beetles into the bottom of the net aiding in the count. All adult beetles should be counted.

We have decided to avoid counting sexes though this year, except in certain situations where we believe the data to be worth the time spent.

Larvae will be counted as either “Early” (1<sup>st</sup> and 2<sup>nd</sup> Instars: small & black with no yellow stripe) or “Late” (2<sup>nd</sup> & 3<sup>rd</sup> Instars: larger body, with noticeable yellow stripe). Do not worry about fine details dictating Early and Late as it is mostly anecdotal information.

A quick glance before and during each sweep set for eggs is all that is necessary for answering if eggs are present or absent. Look on the branches for the creamy pink/white egg clusters. This is also very anecdotal information and should not take much time.

Defoliation will be categorized for each sampling location as the average level of defoliation within the sample location and recorded as “Hi/Med/Lo.” We will avoid using percentages, due to observer differences. For the untrained eye, “Lo” will entail mostly green trees, described as frosted, having a slight haze of brown, or very minute patches of defoliation, easily overlooked as un-defoliated. “Hi” will descend from the 100% defoliated trees that look dry, brown and completely dead, to the trees that are roughly 80% brown and nearing a lack of any green foliage. “Med” is the large swath in-between that represent trees bearing a stable amount of green foliage, but also showing distinguishable signs of defoliation. Mind that the bright yellow tinge that tamarisk get mostly late in the fall is Leaf Hopper damage and should not be confused as *D. elongata* defoliation.

In concurrence with defoliation, refoliation should also be recorded. Following similar levels: “Hi/Med/Lo.” Refoliation is best noticed by the “fireworks puffs” or “poodle puffs” that are the signature of tamarisk re-sprouting. Leaves will re-sprout out of the sides of branches and trunks. “Lo” will be the presence of these puffs with only a slight recovery over the plant. “Med” will again be more broad, entailing roughly 30-70% of the tree holding newly sprouted vegetation. “Hi” will be roughly 80% or more of the tree greenly foliated. Note that partially defoliated trees may be confused as refoliated, but typically refoliation will not occur until after at least the hatching of the 1<sup>st</sup> Summer generation of beetles in Mid June- Mid July and should be comparable to non defoliated material as looking greener and healthier. Again observer judgment will have to be involved and extra notes may be needed.

### **Data Recording:**

When sweeping an area 1 GPS point should be taken for every 5 sets of sweeps (or equivalent 25 sweeps) and multiple GPS points can be taken at a site if more intensive sweeping is utilized. Upon taking data at each GPS point, the date and kilometer number (if on a river survey) should be recorded followed by the sweep data and when possible photos of the sweep area should be taken and recorded by their respective ID number. When at all possible, written comments about geographical location, note worthy net samples, or other significant information should also be recorded. Anything is better than nothing.

**Table A: Recordable data per GPS point**

Date	Kilometer	Defoliation	Refoliation	Picture	Adult	Early Larvae	Late Larvae	Eggs	Comments
mm/dd/yy	123.4	Hi/Med/Lo	Hi/Med/Lo	ID Number	Total 1	Total 1	Total 1	P/A	" "
					Total 2	Total 2	Total 2	P/A	" "
					Total 3	Total 3	Total 3	P/A	" "
					Total 4	Total 4	Total 4	P/A	" "
					Total 5	Total 5	Total 5	P/A	" "