Comal Springs riffle beetle Work Group
07/02/2019 Meeting Minutes
Available at eaahcp.org

Members of this committee include: Conrad Lamon, Chad Norris, Butch Weckerly, and Ken Ostrand

1. Call to order.
All members were present except for Ken Ostrand.

2. Public comment.
There were no comments from the public.

3. Review of the Comal Springs riffle beetle (CSRB) Work Group Charge
a.) CSRB Sampling Methodology: currently use cotton lures in spring orifices. The group will consider alternatives to the current sampling methodology and develop potential research projects that may inform and improve the sampling methodology.
b.) Biological Monitoring, Refugia and Applied Research collections: assess and develop recommendations to improve how and why we collect CSRB. Are we oversampling the CSRB?
c.) Long-term Biological Goals: how do we evaluate our long-term biological goals? The National Academies of Sciences was unable to determine, how do we improve this or establish new long-term biological goals?

4. Presentation and discussion of the CSRB literature review and data analysis.
Dr. Tom Arsuffi presented an overview of his CSRB literature review (the presentation is available on the CSRB Work Group website). His research focused on stream ecology related to the hyporheic zone, disturbance and recolonization patterns, sampling methodologies of the CSRB and other riffle beetle species, and life history aspects of the CSRB. A summary on the topics discussed during the presentation are listed below.

Inductive and Deductive Enhancement

1.) ***Stream ecology and the hyporheic zone****: Consider CSRB and Comal Springs at a broader-scale to inform our understanding of the empirical data and theories (Boulton et.al., 2010).*
2.) ***Life-history research on other benthic macroinvertebrates****: Used to inform how life-history information is applied through a species-trait approach (Resh and Rosenberg, 2010)*

*3.) **Patch Dynamics:** How spatial patterns are created and are linked to the ecology of a species (Winemiller et. al., 2010). Why do we see different CSRB densities between spring orifices? Example: Is there a link between the riparian vegetation and CSRB densities (tree roots=food?).*

a.) Landscape ecology perspective: how spatial patterns are created and effect ecological processes over different spatial and temporal scales.

b.) Metacommunity: The influence of periodic disturbances, refugia, and dispersal in maintaining nonequilibrium communities in patch mosaics. (Findlay, 2010)

*4.) **Disturbance**: The role of disturbance and recolonization in stream ecology (Resh et. al., 1988; Stanley et. al., 2010). How do we define disturbance and apply it to the CSRB? Are we looking at CSRB disturbance at the right spatial and temporal scales?*

**direct and indirect disturbances: flood, drought, habitat characteristics, and resource availability.*

**additional disturbances may include aquatic recreation, ducks and vultures, and even sampling. Sediment deposition from flooding and overland runoff could impact their respiration rates.*

**Dr. Lamon asked: Do we know if there is a lower count after a disturbance? Need to consider population estimates and identify trends within the data we currently have*

**Need to account for all disturbances (even time between sampling by all/different entities) when assessing the number of CSRB on lures.*

Currently, sampling can be triggered by extreme drought and flood conditions to assess their numbers; however, sampling may exacerbate the disturbance from drought or flood. Members discussed postponing the sampling after an event to let the species recover; but, for how long? We need to document and consider the disturbances when sampling and improve our understanding of their resilience and recovery rates (life history studies).

*5.) **Resistance, resilience, and recolonization***

**recolonization patterns: could establish in new areas (logs, adjacent springs, etc.). Need to combine data from other entities to assess spatial variation.*

**pathways: aerial, hyporheic, upstream migration, and downstream drift*

**what is the recovery time, how do we analyze that? Consider their fecundity and duration of life stages.*

Members discussed adding more variables to the data collected during sampling events to help ascertain habitat conditions that influence the population and potentially develop population models to analyze and predict densities. CSRB population estimates would be ideal for analyzing observed trends, but the subterranean hyporheic zone is complex. Members then discussed what we do know about the CSRB.

CSRB life history

The CSRB live in the hyporheic zone, the conduits, spring orifices, and on logs and woody debris near springs. More info on slide 17 and 18. CSRB are K-strategist, which means they have slow

growth rates and low fecundity ("elephant" inverts), most of their biomass (females) is dedicated to egg production. As a K-strategist, they recover slowly from disturbances.

CSRB and other riffle beetle sampling methodologies

**Bore hole samples help assess the hyporheic zone, but they disturb the habitat significantly more than the cotton lure.*

**Drift nets have been used in the past, but the cotton lures have proved more effective at capturing CSRB*

**Cotton strip is used in other systems. Some argued that the lack of folds (cotton lure is folded square) causes the strip to turn anoxic. Members discussed changing the duration from 30 days to 3 days to avoid the strip turning anoxic and reducing the travel time to assess those that are close to the strip.*

**Currently sample the same three reaches (i.e., Spring Run 3, Westernshore at Landa Lake, and Spring Island) each sampling event (typically Spring and Fall). Members suggested collecting more information during sampling events and potentially adding new sampling areas.*

**How far do they travel to the lure? Anecdotal evidence suggests that CSRB can travel 1-3 meters within 30 days and can be found up to 1 meter from a spring.*

**What attracts them to the cotton lure? Does the conditioned lure, "lure" them or are they just stopping by, or are they just lost? US Fish and Wildlife refugia staff are working on a food preference study and Dr. Nowlin's lab (Texas State University) has analyzed the gut content of the CSRB. Dr. Kosnicki (BIO-WEST) has found certain logs have a higher density of CSRB, these may offer some insight about their food preferences: shredder vs. scrapper.*

Dr. Weckerly emphasized the need for a hierarchical framework to tease-out the abundance predictions vs. estimates which Dr. Nowlin's research findings may provide.

We must be careful about making assumptions about the CSRB population based on the lure counts. Statistics would be difficult because we don't have dependent variables.

The group collectively agreed that the current methodology works and consistency is important, but there are still many unknown factors.

Questions:

**What portion of the population within the sampled spring orifice/area is attracted to the lure? Is it 90% or just a small portion of the population?*

**Why are the CSRB attracted to the lure? Is the microbial content on the conditioned lure and how does it compare to other food sources?*

**What does the number of CSRB captured on the lure represent?*

**How long does it take the CSRB to recover after a sampling event?*

**Should we sample in other spring orifices?*

Recommendations (pilot studies):

1.) Test cotton strip sampling method used by other riffle beetle researchers.
2.) Determine microbial content of the conditioned cotton lures
3.) Reduce sampling time from 30 days to 2-4 days
4.) Evaluate the effectiveness of the lure in a controlled environment

5. Questions from the public.

The public offered comments and questions during the discussion which were incorporated above.

6. Adjourn.

Meeting adjourned around noon.