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TRIBUTARY

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Western Pearlshell Mussel (WEPE) Reproduction and Life History Study in Five Watersheds of Montana:
Aquatic SWG Implementation

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The western pearlshell mussel (WEPE), Margaritifera falcata in Montana has experienced significant state-wide range reductions in the last 100 years and is now known from ~80 populations, of which, only ~20 are expected to be viable 100 years from now (A and B-viability) (Stagliano 2010 and 2015). In Montana, non-viable WEPE populations (C and D) have exhibit-ed no signs of recruitment over the past 20–30 years (i.e. no juvenile mussels <30 mm sampled) (Stagliano 2015). Determining which life-history phase (reproduction, host-fish densities, juvenile survival) is most limiting to WEPE survival and recruitment (Figure 1) will allow us to establish guidelines for suitable future management actions towards recover-ing the state's numerous non-viable WEPE popula-tions

Observations and Results 2019-2020

1) Reproduction and Gravidity Status. In both 2019 and 2020, we successfully determined the reproduc-tive status and glochidia release timing of 25 WEPE populations across 5 watersheds with varying eleva-tion, stream temperature regimes and pop. viability.

Overall, in 2019, warmer stream water temperatures and lower snowpack run-off in the Kootenai & Yaak River watersheds in May and June triggered earlier pearlshell gravidity in those populations (by June 5th most WEPE populations were partial-fully gravid), while in the Big Hole, June 10th was the date which most populations were highly gravid; in high eleva-tion populations within the Rock-Flint watersheds we observed 50% gravidity into early July.

In 2020, cooler stream water temperatures, June rains and later snowpack run-off in almost all watersheds (See Kootenai/Big Hole Watershed exception) led to an approximately 7-day later pearlshell gravidity on-set in those populations (avg. June 10th most popula-tions were partially gravid), cooler temps at high ele-vations and in the Yaak River lead to WEPE exhibiting some

gravidity into mid-July and even early-August. Glochidia release was not synchronous and occurred over ~3 week time frame in most WEPE populations.
2) Host Fish Glochidia Infections.
We documented WEPE glochidia on all salmonid spe-cies captured, including non-native brook, rainbow, brown trout and mountain whitefish (1st time ever field documented). Typically, browns, brook trout and mountain whitefish had low infection rates (<10 glo-chidia per gill side) compared to Oncorhynchus spp. captured in the same reach.
In streams with native westslope cutthroat trout (WCT) present (Upper Willow, Moose Meadows, El-liston and W.F. Rock Creek) or Columbia Redband trout (Yaak River Basin), WEPE glochidia infection loads were higher on these species' gills compared to non-native trout species captured in the same reach (Figure 3).
Synthesis and Conclusions

1) Comparisons among the 25 WEPE populations indi-cated that while host fish densities and salmonid infec-tion rates were significantly higher at viable, recruiting WEPE streams, benthic sedimentation may ultimately be responsible for recruitment failure in at least 50% of these non-viable populations. The presence of juvenile mussels less than 30 mm (a determining factor in the viability of stream populations) was negatively related to fine sediments. In streams with high-quality benthic habitat (low % fine sediments) (Marshall Creek and Yaak River,), even lower salmonid densities and corre-sponding infection rates are producing recent WEPE juveniles, so it likely doesn't take many infected fish to produce viable WEPE juveniles, if the benthic habitat is suitable for post-parasitic survival (Figure 1).

Figure 3. Westslope Cutthroat trout with a high glochidia load.

Figure 1. *WEPE life-history diagram with possible limiting factors at various host-fish interaction/juvenile stages (non-viable).*