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to
Jordan River Native Mussel Surveys 2021
Technical Report

Lower Little Cottonwood Creek

To
Wasatch Front Water Quality Council

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Introduction

Richards et al. (2020, 2021) recently completed an extensive/intensive native mussel survey in the Jordan River. No live or recently dead native mussels were found. Using Smith (2006) equations, Richards et al. (2021) conservatively estimated probability of detection densities were << 0.01 m^2. Based on those surveys and other surveys and literature reviews (Richards 2015, 2016, 2017, 2018, 2020; Richards and Miller 2019; Richards et al., 2020 a, 2020b, and 2020c), we concluded that native mussels were extinct (absent) in the Jordan River primarily due to human economic activity and inadequate management and protection. A final survey of native mussels by the OreoHelix Ecological and Wasatch Front Water Quality Council mollusk survey program was conducted in lower Little Cottonwood Creek, Salt Lake City on April 16, 2021 by Dr Richards and Dr. Miller and is the subject of this addendum.

Methods

Survey Location

We excavated 10.0 m^2 of the lower Little Cottonwood Creek using shovel/net method approved by EPA. The survey site was entirely in Murry City Park between 40.657739°, -111.879421° and 40.660712°, -111.887967°. This section of lower Little Cottonwood Creek appeared to be in the best physical condition (i.e., multiple meanders, riffles, runs, pools, variety of substrates comprised of cobbles, gravels, sand, OM, etc.) of all sections of the creek and if an extant native mussel population could survive it was expected to occur in this section.

Survey Methods

We used the shovel/kick net method that was employed by Richards (2018, 2021, etc.). This method is considered to be an intrusive excavation survey as suggested by UDWQ and USEPA (2013b) with a search efficiency (SE) = 1.0. The survey was conducted on April 16, 2021. We used a flat- bottom shovel with 10 cm depth line marked across the blade (Figure 1). In effect, a shovel is a large trowel. It is thus, one of the primary excavation methods recommended by USEPA (2013b, page 24). One surveyor demarcated a 0.5 m^2 area of substrate using the known width of the shovel blade and then sank the shovel up to a penetrable depth up to 10 cm and scooped sediment in the 0.5 m^2 area into a 4 mm mesh net (Figure 1) held by the second surveyor standing directly downstream of the first. This was repeated approximately every 50 meters downstream.

Figure 1. Shovel/net method tools. Flat-bottomed shovel with 10 cm demarcation used for scooping sediments into 4 mm mesh net.

Contents of net samples were vigorously rinsed on site in the river to remove sediments < 4 mm. Remaining contents were then spread onto bare substrate along the shoreline and examined or if sparse sediments were present, examined in the net for live native mussels, recently dead, and weathered shells and shell fragments. If any were present, they were recorded, as was substrate type.

Results

No live, recently dead, of shell fragments of *Margaritifera falcata* or *Anodonta californiensis/nutalliana* were encountered. Substrates were comprised of large cobbles in riffles, small cobbles in runs, and gravel/sand/OM in slower sections. All substrates were heavily embedded with sand leaving very little room for native mussels to become established if any were present. The only fish species captured was Longnose Dace *(Rhinichthys cataractae*), which has not been reported as a secondary host for any Utah native mussels (Xerces Society 2021a and b). Only a few other live pollution tolerant macroinvertebrate taxa were encountered, Hirudinea and Isopoda. Although not specifically surveyed for, no Ephemeroptera, Trichoptera, or even Chironomidae were found on cobbles examined, indicating water quality in the lower Little Cottonwood Creek was severely impaired. Also, no live or empty shelled gastropods and only one half- shell of a small Corbicula was collected further indicating unsuitable degraded conditions.

Discussion

The section of lower Little Cottonwood Creek surveyed superficially contained the most suitable habitat for *Anodonta* sp. (or *Margaritifera falcata*) in the lower creek but was highly embedded and ecologically water quality impaired. Lower Little Cottonwood Creek downstream of the survey location is increasingly degraded, heavily channelized, embedded, passes under long sections of pavement, and runs through heavily industrialized areas, thus poorer habitat for native mussels. As Little Cottonwood Creek leaves the canyon upstream of the valley and the survey area, sections of the creek are chronically diverted and often dry during summer months acting as a barrier to movement and unsuitable for native mussel survival. *Margaritifera falcata* and their secondary fish hosts require colder water than lower Little Cottonwood Creek provides during summer months (Xerces Society 2021a) and water temperatures and habitat and conditions are unsuitable for *Anodonta* sp. upstream of the canyon (Xerces Society 2021b). Water quality of Little Cottonwood Creek is considered impaired for cadmium, E. coli., macroinvertebrates, temperature, TDS, copper, and pH by UDWQ (2016) and consequently there is very low likelihood that any native mussels can survive in the creek (see Xerces Society 2021a and b).

Conclusion

Native mussels in lower Little Cottonwood Creek are likely extinct (absent). Although, due to severe water quality impairment, they are likely extinct in the upper sections of the creek as well. Their extinction in lower Little Cottonwood Creek is entirely due to anthropogenic causes including poor management and inadequate protection. This loss, as well as the loss of native mussels in the Jordan River and throughout the drainage is an unfortunate Utah natural heritage travesty.

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