



TECHNICAL MEMORANDUM

DATE: 9 June 2021
TO: Patrick Kaspari, McKinleyville Community Services District
FROM: Sam Rizza, Stillwater Sciences
SUBJECT: Freshwater Mussel Survey in the Lower Mad River

1 INTRODUCTION

McKinleyville Community Services District (MCSD), owns and operates a wastewater treatment facility that discharges directly to the Mad River in Humboldt County between 1 October–14 May when the river is flowing at 200 cubic feet per second (cfs) or higher. When the flow in the river is less than 200 cfs, and from 15 May–30 September, treated effluent is discharged to the percolation ponds, used to maintain wetlands and adjacent forested area, or irrigates agricultural lands adjacent to the Mad River. The MCSD is required under its National Pollutant Discharge Elimination System (NPDES) Permit (No. CA0024490) to monitor ammonia levels in its discharge and assess its potential impact on receiving waters. As part of the monitoring program, the MCSD is required to determine the presence or absence of freshwater mussels (Western pearlshell [*Margaritifera falcata*] and California floater [*Anodonta californiensis*]) in the receiving waters of the Mad River.

The MCSD contracted with Stillwater Sciences to conduct a presence/absence survey for freshwater mussels in the lower Mad River following the work plan developed by Moonstone Associates, Inc. This survey was conducted in accordance with the *Technical Support Document for Conducting and Reviewing Freshwater Mussel Occurrence Surveys for the Development of Site-Specific Water Quality Criteria for Ammonia* (USEPA 2013).

2 METHODS

2.1 Work Plan

Prior to conducting the presence/absence survey, the MCSD was required to develop and submit a work plan for approval to the North Coast Regional Water Quality Control Board (NCRWQCB). The work plan was developed by Moonstone Associates, Inc. (2020) and submitted to the NCRWQCB on 28 September 2020. The MCSD received approval to proceed from the NCRWQCB on 8 December 2020.

2.2 Study Area

The study area is located approximately 1.9 miles downstream of the Highway 101 Bridge and within the Mad River's intertidal zone. The study area consists of a single reach of the Mad River extending approximately 552 meters (m) (1,810 feet [ft]) downstream and 9 m (30 ft) upstream stream of the wastewater discharge point (Figure 1). The study area encompasses a long run and riffle habitat, totaling approximately 561 m (1,819 ft).

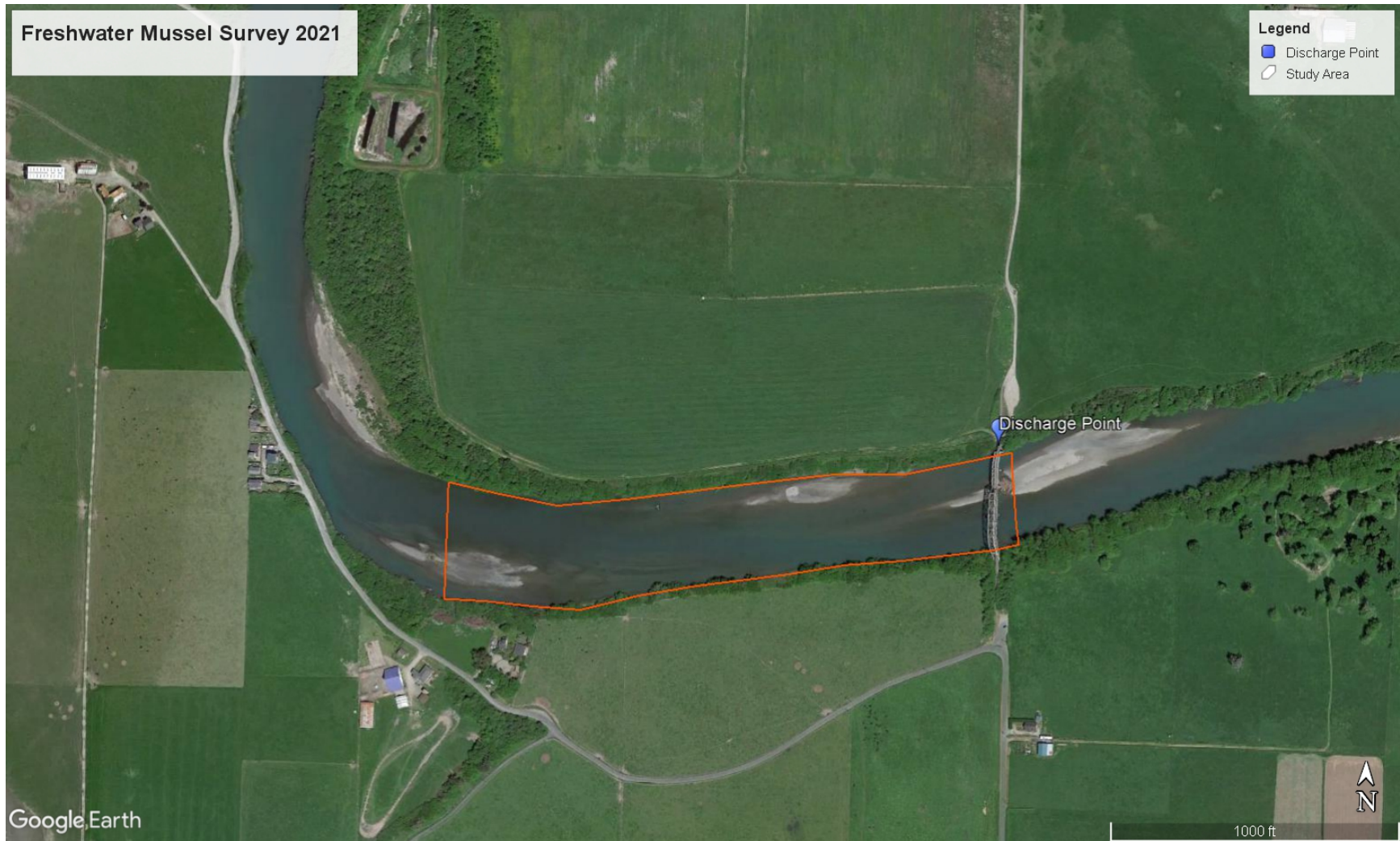


Figure 1. Map of Study Area on the Lower Mad River encompassed by the orange polygon. The discharge point is distinguished by a blue marker.

2.3 Information Review

A thorough review of appropriate databases and documents was conducted to determine if mussels have been previously recorded as present in the vicinity of the study area. These included the California Department of Fish and Wildlife's (CDFW) California Natural Diversity Database (CNDDDB; CDFW 2021), California Freshwater Species Database (Aquarius; Klausmeyer et al. 2015), CDFW stream inventories, and published papers of freshwater mussel distribution. Mussel presence was defined as any historic observation of live mussels, mussel tracks, or shells. Mussel absence was defined as no historical evidence of mussels in the vicinity of study area, specifically within the Mad River or its tributaries upstream to the Highway 101 Bridge.

2.4 Field Methods

The field survey was conducted on 18 May 2021 by a two-person team employing a snorkel survey method. Mussel presence was defined as observing live mussels, mussel tracks, or recently dead mussel shells based on shells being clean and intact. Since mussel absence is difficult to definitively determine, a determination of "no mussels observed" was applied when none of the mussel presence criteria were observed.

3 RESULTS

3.1 Information Review

A query of CNDDDB and the California Freshwater Species Database (Aquarius) for Western pearlshell and California floater freshwater mussels found no historic records indicating presence in the lower Mad River downstream of Highway 101. One record of Western pearlshell mussels was observed in Mill Creek, a tributary to the Lower Mad River, entering approximately 525 m (1,722 ft) upstream of the discharge point. Upon further review, this record, along with all other records in the Mad River, was based on the species range and habitat conditions, not an actual observation. The California Freshwater Species Database referenced, "Howard, Jeanette. 2014. Compilation of Freshwater Mussel Surveys (Unpublished data). The Nature Conservancy, San Francisco, CA." for the Mad River mussel records. Email correspondence with Jeanette Howard, after consulting her historical records spreadsheet compiled from various museum collections (Smithsonian, California Academy of Sciences, Natural History Museum Philadelphia, Los Angeles Natural History Museum) and published and unpublished records revealed no historic records in the lower Mad River. No mussel observations were recorded in CDFW stream inventories in tributaries to the lower Mad River or published papers on Northern California freshwater mussel distribution (Howard and Cuffey 2003, 2006). In conclusion, multiple sources confirm freshwater mussels have not been observed in the lower Mad River or its tributaries.

3.2 Field Survey

The field survey was performed mid-day on 18 May 2021 during low flow and tide conditions, when water clarity was sufficient to visually determine the presence/absence of freshwater mussels (Figures 2 and 3). The survey area had a wetted width of approximately 100 m (328 ft) and maximum depth of 1.8 m (6 ft). The dominate substrate was small cobble/sand and riparian canopy cover was present on the upstream portion of the river left bank and downstream portion of the river right bank. A high percentage of the substrate was beginning to become covered in

algae. Discharge at the U.S. Geological Survey Mad River gage (#11481000) during the survey was 128 cfs.



Figure 2. Snorkel survey near discharge point.



Figure 3. Snorkel survey within the main channel of the Mad River.

Neither Western pearlshell or California floater mussels were observed within the study area during the 120 minute field survey. In addition, no freshwater mussel tracks or shells were observed during the survey. Juvenile steelhead (*Oncorhynchus mykiss*), Chinook salmon (*Oncorhynchus tshawytscha*), Three-spine stickleback (*Gasterosteus aculeatus*), and sculpin (*Cottus* spp.) were observed in the study area. Scat and chewed sticks indicated that a beaver (*Castor canadensis*) may be residing in the study area.

4 DISCUSSION

The Mad River is subject to very high flow events and streambed mobilization on an annual basis. Freshwater mussels are extremely intolerant of high flow conditions that scour substrate (Vannote and Minshall 1982). Due to a minimal amount of boulder (riprap) or bedrock protrusions along the channel banks, refugia from high flows within this reach of the Mad River are limited to near the Hammond Railroad Bridge. Additionally, the study area is tidally influenced, and although this does not preclude the occurrence of freshwater mussels, daily saltwater intrusion is seen as a less favorable condition for freshwater mussel existence (J. Howard 2021, pers. comm. 7 June). Therefore, the lack of freshwater mussel observations and historical records from within the study area may be the result of unfavorable stream, habitat, and substrate conditions. No further studies are recommended under the study plan due to no historic records or current detection of freshwater mussels in the study area.

5 REFERENCES

- CDFW (California Department of Fish and Wildlife). 2021. BIOS database. <https://apps.wildlife.ca.gov/bios/?bookmark=327>
- Howard, J. K., and K. M. Cuffey. 2003. Freshwater Mussels in a California North Coast Range River: Occurrence, Distribution, and Controls. *Journal of the North American Benthological Society* 22: 63.
- Howard, J. K., and K. M. Cuffey. 2006. Factors controlling the age structure of *Margaritifera falcata* in two northern California streams. *Journal of the North American Benthological Society* 25: 677–690.
- Klausmeyer, K., K. Fesenmyer, J. Howard, and S. Morrison. 2015. California Freshwater Species Database, Version 2.0.7. The Nature Conservancy. San Francisco, California.
- Moonstone Associates, Inc. 2020. McKinleyville Wastewater Management Facility Freshwater Mussel Study Work Plan. WDR Order No. R1-2018-0032. NPDES Permit No. CA0024490. Facility ID. No. 1B82084OHUM.
- USEPA (U.S. Environmental Protection Agency). 2013. Technical support document for conducting and reviewing freshwater mussel occurrence surveys for the development of site-specific water quality criteria for ammonia. EPA-800-R-13-003. Office of Water. Washington D.C.

Vannote, R. L., and G. W. Minshall. 1982. Fluvial processes and local lithology controlling abundance, structure, and composition of mussel beds. *Proceedings of the National Academy of Sciences* 79:103–4,107.

6 ATTACHMENTS

Freshwater Mussel Habitat Assessment Form

Project Information

Project Name: McKinleyville CSD Mussel Study

County: Humboldt City/Town: McKinleyville

Latitude (DD.DDDD): 40.9245 Longitude (DD.DDDD): -121.1204

River/Stream: Mad River Watershed/Drainage Area: 34.65 mi²

Methods

Name of Surveyor(s): San Rizza and Doyle Coyne

Qualification of Surveyor(s): USFWS Approved CDFW Approved Aquatic Biologist (minimum)

Date of Survey: 5-18-21 Distance Surveyed (ft.): 1819

Survey Start/End Time: 1:30 / 3:30 Total Survey Time (min. x people): 240

General notes, including any deviations from the approved habitat assessment methods :

deep pool near discharge point under bridge. Best mussel habitat along river left bank but none observed.

Habitat Description of Survey Area

Drainage Area at Survey Location (mi²): 34.65 Water Temp. (°F): 66 Air Temp. (°F): 57

Substrate Types (include %):

<input checked="" type="checkbox"/> Boulder <u>5</u>	<input checked="" type="checkbox"/> Gravel <u>10</u>	<input checked="" type="checkbox"/> Bedrock <u>1</u>	<input type="checkbox"/> Detritus _____	<input checked="" type="checkbox"/> Silt <u>3</u>
<input checked="" type="checkbox"/> Cobble <u>50</u>	<input checked="" type="checkbox"/> Sand <u>30</u>	<input type="checkbox"/> Hardpan _____	<input checked="" type="checkbox"/> Muck <u>1</u>	<input type="checkbox"/> Artificial _____

Water Level: High Up Normal Low Dry/Interstitial

Visibility: 0-15 cm 15-30 cm 30-50 cm >50 cm Visible to Bottom

Average Depth (cm): Riffle 45 Run 106 Pool 140

Max Depth (cm): Riffle 60 Run 138 Pool 200

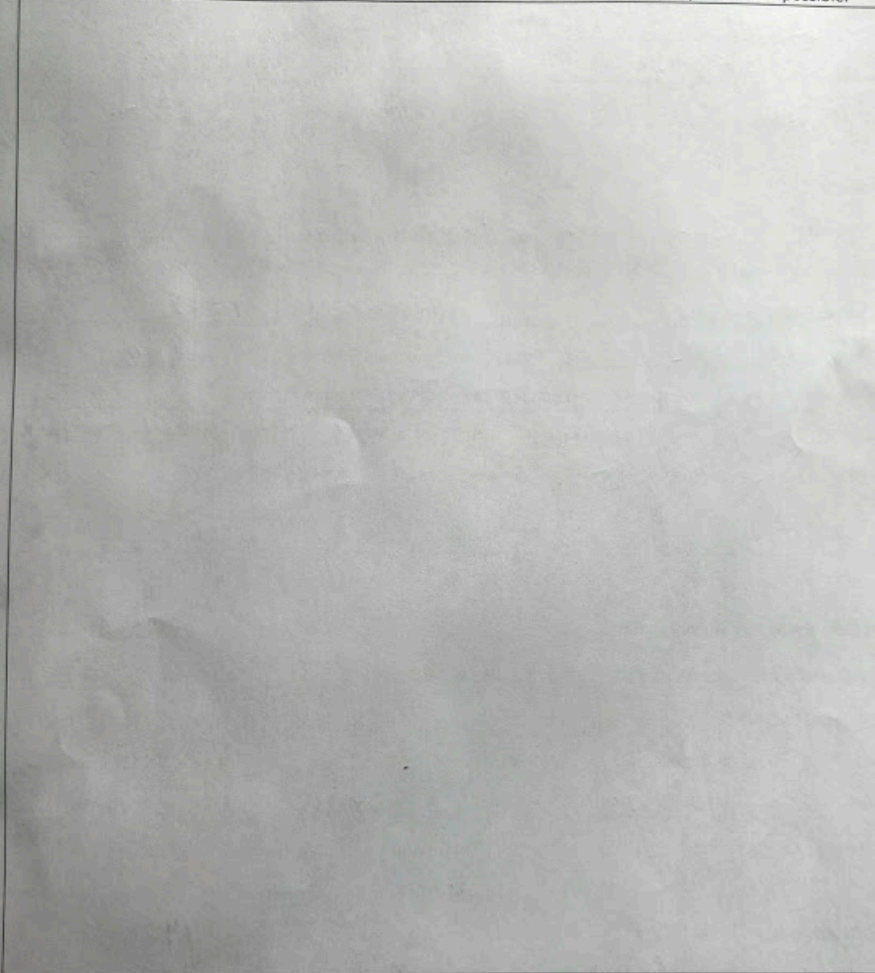
Results

Evidence of Mussels:

Presence of fresh dead mussel shells and/or living mussels will trigger a qualitative mussel survey.

- None Mussel Shell Only - Subfossil Mussel Shell Only - Weathered Dead Mussel Shell Only - Fresh Dead Living Mussels

Site Sketch. Approximate numbers and locations of shells and live mussels. Include species list if possible.



Required Attachments 1) Location Map and 2) Photo Log

See report