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Characterization of Stream Quality of Five Ouachita River Tributaries Utilizing Macroinvertebrate Species and Fish Populations

Hunter Jones

Ouachita Baptist University

Brockton Brown

Ouachita Baptist University

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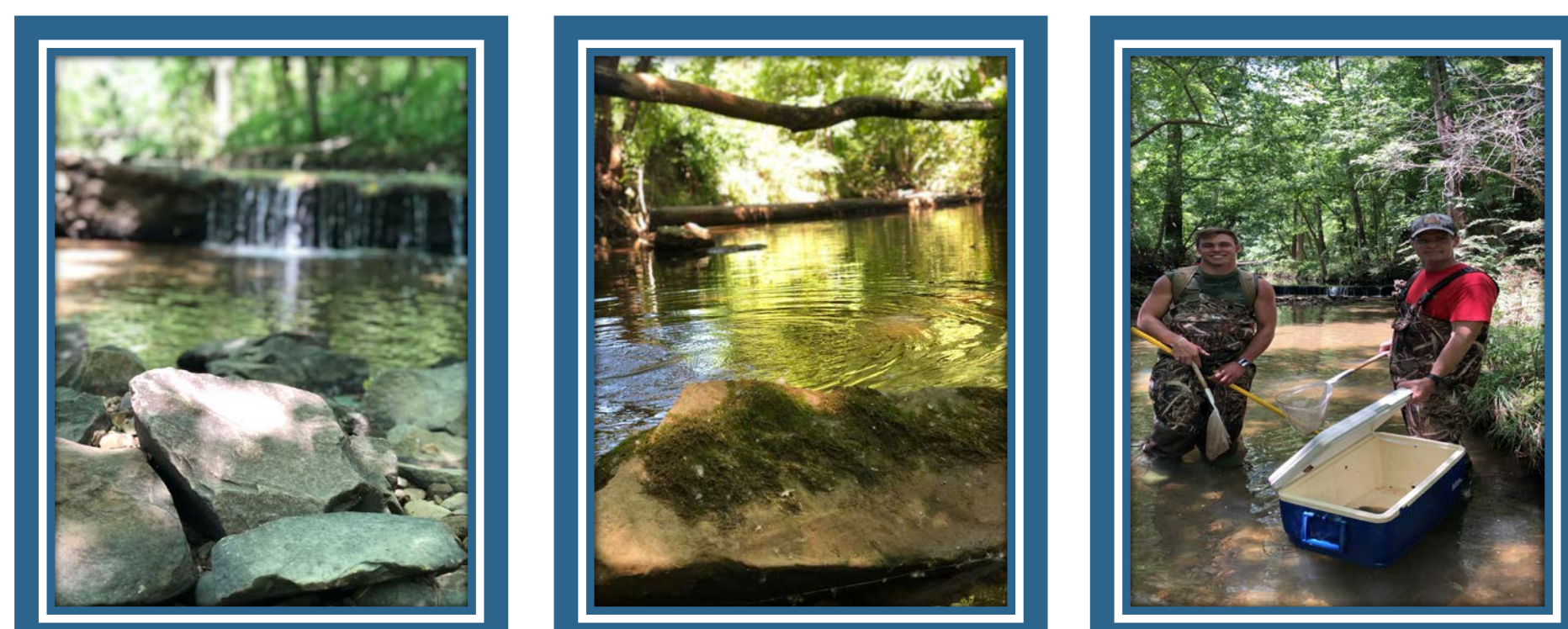
Hunter Jones, Brocton Brown, and Dr. John T. Knight – Ouachita Baptist University Department of Biology

ABSTRACT

The Ouachita River originates in west central Arkansas and exits the state in southcentral Arkansas near El Dorado. There are many tributaries that make up the Ouachita River through its Arkansas journey. Five of these tributaries are located in Clark County and will be selected for this research. Basic in situ water quality parameters were measured and the riparian zone was characterized at each sample site. The five streams selected were Deceiper/Little Deceiper Creek, Mill Creek, DeRoche Creek, Saline Bayou, and Tupelo Creek. Macroinvertebrate and fish surveys were conducted at two sites (upper and lower) on each creek except Saline Bayou and Tupelo Creek which included only one site each. Streams will be characterized using the tolerant and intolerant species. Potential impacts of these streams include runoff from agriculture, municipal runoff from the city of Arkadelphia, and miscellaneous anthropomorphic sources from town. Presence of intolerant species indicates less impact while finding only tolerant species indicates potential disturbance that warrants further investigation.

INTRODUCTION

In a study performed by the Department of Environmental Services titled *Clark County Stream and Health Report*, "Current water quality data shows that, out of 24 subwatersheds scored, six have good water quality." Stream quality can be affected by a variety of environmental factors. In order to determine the water quality of each stream selected, fish and macroinvertebrate species were collected and examined. Through researching each species of fish and macroinvertebrates, we were able to identify both tolerant and intolerant species. Using tolerant and intolerant as a preliminary identifier was key in determining a first look at the overall condition of the streams.



METHODS

Stream Survey

- Flow rate meter (m/s)
- Multiparameter meter
 - Dissolved Oxygen (mg/L)
 - Temperature (C°)
 - Turbidity (NTU)
 - Conductivity (spc)
- Stream Quality Survey sheets
 - Documentation of stream characteristics



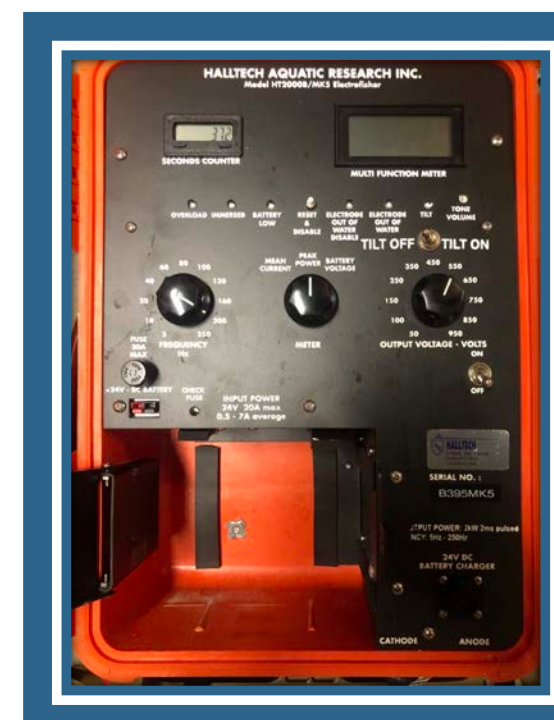
Macroinvertebrate species

- D-ring and kick nets were used to capture benthic organisms.
- Organisms were then identified and documented in the field or in the laboratory via pictures.
- A total of seven collection samples, spaced evenly, were conducted per test site.

Protocol Followed: We followed a modified version of Benthic Macroinvertebrate Sampling Standard Operating Procedure from the Colorado Water Quality Control Division.

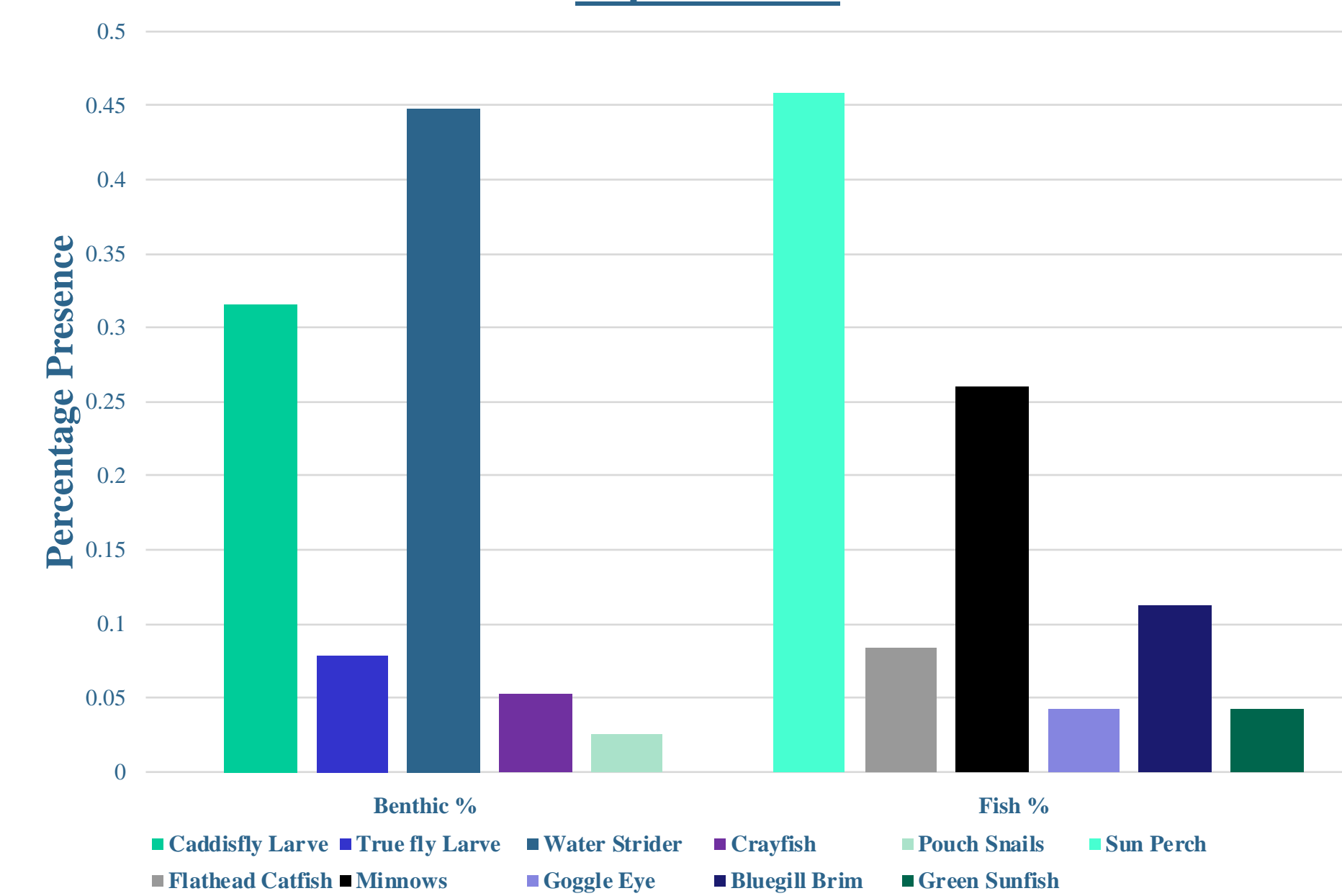
Fish populations

- Halltech Research backpack shocker was used to stun fish
- Two individuals on either side of shocker used nets to capture fish
- Total shocking distanced ranged from 60-100 yards.
- Fish species were documented, and counted in the field but identified in the laboratory via pictures.



RESULTS

Tupelo Creek

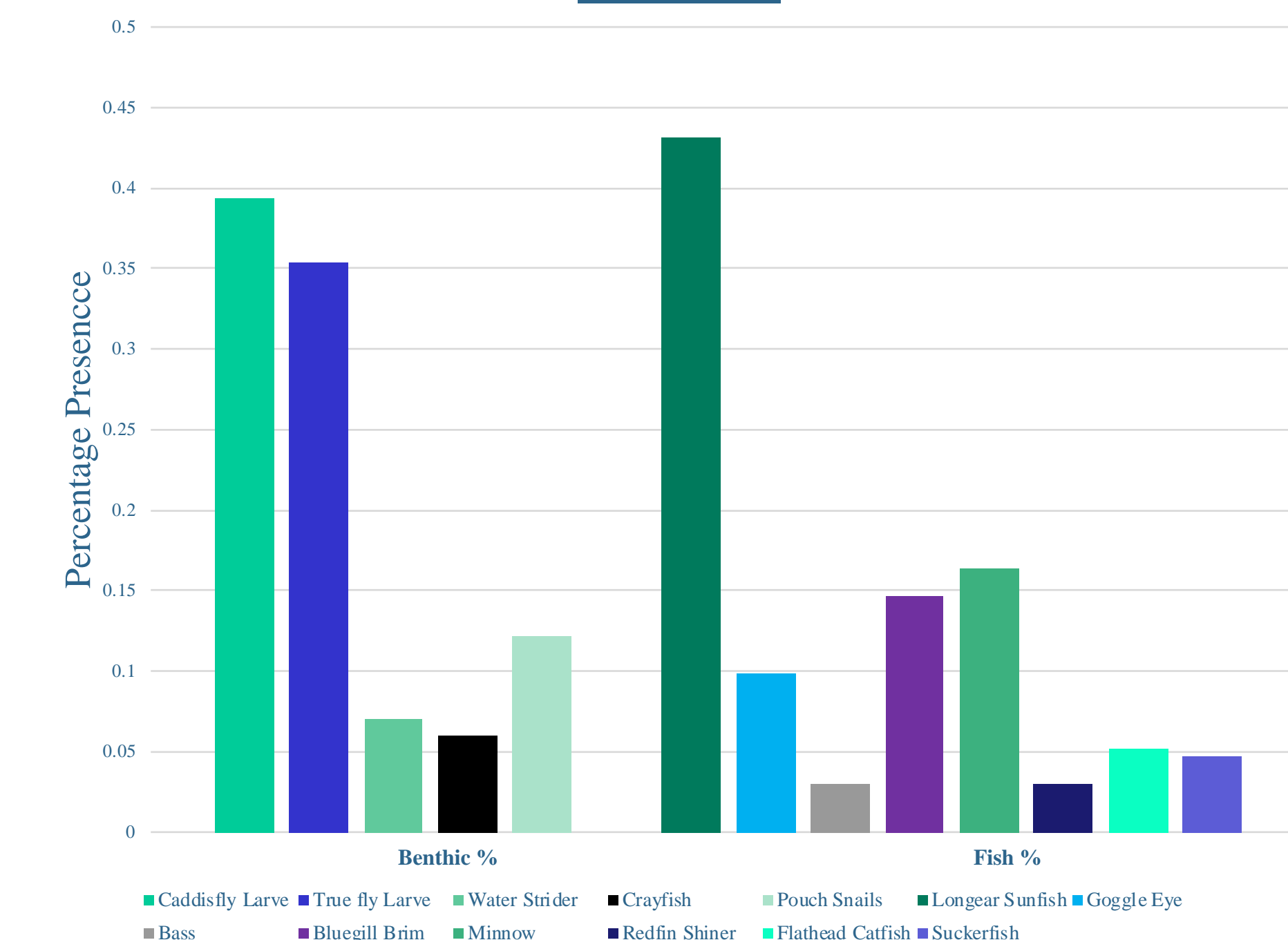


Common Name: Chain Pickerel (Jackfish)
Scientific Name: *Esox niger* -Tolerant



Common Name: Redfin Shiner
Scientific Name: *Lythrurus umbratilis*
Tolerant

Mill Creek



DISCUSSION

In Clark County, a total of five streams were sampled. Three of these streams displayed distinct upstream and downstream regions. The graphs presented here are from Tupelo and Mill Creek. These sites are representative of all data collected thus far. Our data indicates that the overall water quality is average but not excellent. This is evident due to the lack of intolerant fish and benthic species found at each sight. However, the large quantity of fish suggests that the water is a suitable environment for less sensitive species. In the future, we plan to collect several more samples from previous sampling sites as well as unsampled streams. The Shannon Weiner Biodiversity Index will then be used to compare fish and benthic species found in streams sampled in Clark County to reference streams throughout Arkansas.



Common Name: Razorback Musk Turtle
Scientific Name: *Sternotherus odoratus*
Tolerant



Common Name: Green Sunfish
Scientific Name: *Lepomis cyanellus* -Tolerant

REFERENCES

- "Clark County Stream Health Report." *Clark Green Neighbors*, Department of Environmental Services, 2010, clarkgreenneighbors.org/images/pdf/2010_Water-shed Report.pdf.
- "Benthic Macroinvertebrate Sampling Standard Operating Procedure." *Benthic Macroinvertebrate Sampling Standard Operating Procedure*, Water Quality Control Division, 17 Nov. 2016, www.colorado.gov/pacific/sites/default/files/WQ_NPS_SOPCollectionofBenthicMacroinvertebrates11-17-16.pdf.

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