



Mission: To Preserve and Enhance the Natural Resources of Benzie County

FINAL PROJECT REPORT

Project Name: *Stream Flow Monitoring of Cold Creek Inlet & Crystal Lake Outlet*

Grantee: Benzie Conservation District 231-882-4391
280 S Benzie Blvd, PO Box 408
Beulah, MI 49617

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Project goals and objectives

The Goal of this project is to gain a better understanding of the hydrological balance of the Crystal Lake Watershed through quantitation of both inlet and outlet stream flows of Crystal Lake, and to associate these flows with specific concerns for water quality, water distribution, and water uses for better water resource management.

Objectives:

1. Attend MiCorps training session - A half-day training session for staff and volunteers, led by MiCorps staff will be attended by the Project Manager and others prior to the start of field monitoring.
2. Select sample sites - Project Manager and partners will be involved in a collaborative effort with the DEQ or MiCorps staff to finalize stream flow monitoring locations throughout the watershed project area prior to the start of field monitoring.
3. Train volunteers - A training event will be organized by the Project Manager to extend training knowledge to volunteers that were unable to attend the MiCorps training session. This will occur prior to the start of field monitoring.
4. Flow monitoring - Monitoring events at the 10 locations will occur between the 4th and the 15th of each month (July, August, and September) at base flow conditions. For quality control, three measurements will be taken at a USGS gauge station. These samples will be taken at a single gauge location, at least two weeks apart and following the same schedule as the 10 designated monitoring sites.
5. Submit data - Data will be submitted to MiCorps staff at the end of the field season.
6. Present at MiCorps Conference - Project manager will give a 20-25 minutes presentation on the project at the MiCorps Conference.

7. Progress reports - Project progress reports will be developed and submitted by August 31st, 2016 and December 31st, 2016 and will include a narrative update on task completion as well as a financial status update. To be compiled and submitted by Project Manager and/or Administrator.
8. Grant closeout - Submit final report, financials, and other deliverables as needed.

Summary of training and monitoring events

Volunteers from the Crystal Lake & Watershed Association and staff from the Benzie Conservation District (BCD) monitored a total of 10 sampling sites in Cold Creek, Crystal Lake Outlet and Betsie River. In total four volunteers spend 37 hours on the project. For each event the Project Manager, intern and at least one volunteer spent on average about 9 hours monitoring all sites. Typically the flow monitoring consisted of two people measuring flow at specified locations across the river and one person recording the data in the datasheet.

1. A one and half hour training event with Paul Steen (MICorps staff) was held on June 9, 2016 with the Project Manager, and three volunteers. Project interns and other volunteers were trained on site during monitoring events.
2. Four flow monitoring events were held during the grant period from July through December 2016. The Project Manager was present at each monitoring event. Data was entered by the project intern and checked by the project manager.

Objectives Met

The Benzie Conservation District (BCD) has been able to meet most project objectives. We did not submit the August progress report (objective 7) after completing only one of three required monitoring event. Due to scheduling conflicts and rainy weather we had to move our September monitoring to early October.

Overall, the flow monitoring program was very successful and we were able to take three discharge measurements at 10 sites and an additional measurement at four sites over the course of the project. We have great confidence in the flow data collected based on the small amount of error from our quality assurance check at the USGS gauge station. The program was successful because of the training provided, the easy to follow protocol, datasheets, and Excel database set up before the project.

The amount of time needed to complete the project was initially overestimated causing the dramatic difference between the amounts of grant money and local match projected versus what was actually used during the project. For example, we project 78 hours for the project manager and used 44.75 hours, 160 hours for volunteer time and only had 37 hours, and projected 80 hours for an intern and only used 39.25 hours. However, the 80 hours of volunteer time for a Scientific Consultant (at \$23.07/hour) was the largest deficit of matching funds for the grant. As we learned that after the grant writing and site selection there was not a need for major consulting.

One of the main reasons for the success of the project was the use of an intern to collect and enter data. Having a paid intern position guaranteed a reliable and flexible person to help with the collection day. Due to the variable nature of the project's schedule, often volunteers were unable to help for a full day if at all. Typically monitoring days required three (or more) people including the project manager, intern and volunteers.

The BCD also had a flow meter of the same make and model as the one provided for this project. This allowed us to complete the monitoring in about half the time per site. This made a huge difference in the amount of time spent per sampling day. Typically it took approximately 9 hours to sample all sites using both flow meters. If we didn't have the extra flow meter, monitoring events would take multiple days which would have made scheduling with volunteers and staff more difficult.

Problems encountered

1. One of the largest obstacles during the project was scheduling volunteers to help for the collection events. The goal of the flow monitoring was to collect data at baseline flow conditions at ten sites. Often scheduled monitoring events would have to be delayed because of rain. This variability in monitoring dates caused some volunteers to miss whole or partial monitoring days. Having an intern on the project allowed us to monitor with only one available volunteer.
2. Some of our sites on the north and middle branches of Cold Creek and at the Crystal Lake Outlet had very low flow (near 0 cubic feet/second). The flow meter we used was not sensitive to these extremely low flow conditions. We would physically see flow in the stream that wasn't being "picked up" by the flow meter. Overall, this didn't cause a significant difference in our flow measurements because of the small amount of water moving in these streams during baseline flow conditions.
3. In September our flow monitoring event was pushed into back into October due to scheduling conflicts and rain events that occurred in late September.
4. In December we decided to measure flow a four of our sites to get more data at some of the most significant sites. Unfortunately our volunteers were unable to join us for the December sampling event.

Environmental and other benefits of the project

The stream discharge data collected directly relates to the overall goal of this project: to gain a better understanding of the hydrological balance of the Crystal Lake Watershed through quantitation of both inlet and outlet stream flows of Crystal Lake, and to associate these flows with specific concerns for water quality, water distribution, and water uses for better water resource management.

We now have baseline data for the hydrologic flow through the Crystal Lake Watershed. This information will be used by the project partners to create a protocol to track nutrients and sediment loading into Crystal Lake. Additionally, the discharge information can help us better understand fluctuations in the water level of the lake.

One of our monitoring sites on the Betsie River is also the site of a citizen science crowd hydrology river gauge. We can correlate the discharge data and gauge data to help monitor the discharge of the Betsie River.

Project Sustainability

The BCD and CL&WA plan to continue monitoring stream discharge at some of the sites in this project. We hope to couple this data with nutrient and suspended solids data to measure nutrient and sediment loading into Crystal Lake. The BCD also hopes to work with local volunteers to expand flow monitoring to the five crowd hydrology river gauges throughout the Betsie River Watershed. Overall this project has helped expand the BCD's capabilities to monitor flows throughout Benzie County.

Partners

Benzie Conservation District (BCD)

Crystal Lake & Watershed Association (CL&WA)

Benzie County Drain Commissioner

Products Completed

Stream flow database – submitted to grant administrator

Stream flow datasheets

MICorps conference Power Point Presentation with stream discharge figures

Project photos



Project volunteers participate in a “hands on” training session on Cold Creek



Volunteer Dave Wynne and intern Ashley Garver measure stream flow on the north branch of Cold Creek.



Project intern Ashley Garver takes flow measurements at the USGS gauge station on the Platte River.



Volunteer Max Bromley and intern Jane Perrino on the Betsie River.



County Drain Commissioner and project volunteer Ed Hoogterp and intern Jane on Cold Creek.



Project manager John Ransom and Ed working in the heavily vegetated middle branch of the Cold Creek.