Colorado Watershed Assembly Colorado Healthy Rivers Fund Grant Request- River Watch Macroinvertebrate Bio-Indicator Assessment Project
PO # #13-106

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Final Report for HRF Project: River Watch Macroinvertebrate Bio-Indicator Assessment Project (2012 2013)

Program Summary

River Watch is a statewide, volunteer-run water quality monitoring program that operates under the non-profit, 501(c)(3), Colorado Watershed Assembly and in conjunction with Colorado Parks & Wildlife. Since 1989, the mission of River Watch has been to work with voluntary environmental stewards to monitor water quality and other indicators of watershed health while utilizing the high quality data that is collected to educate citizens and inform decision makers about the overall health and condition of Colorado's rivers, streams, and creeks.

River Watch is comprised of volunteers from about 130 different public, private, and charter school groups, watershed organizations, and private individuals that monitor over 300 different river sites throughout Colorado each year. Each volunteer receives in-depth training, support, and all of the water quality collection equipment they need to routinely monitor their sites in a specific and precise manner. Our strong base of volunteers allows us to produce a high quality and large quantity of data that could not otherwise be generated in such a cost effective manner.

Volunteers collect monthly metal samples and biannual nutrient samples, and most groups collect an annual macro-invertebrate sample. The metals samples are analyzed using an inductively coupled plasma spectrophotometer. The nutrient samples are analyzed using a Lachat auto-analyzer. The macroinvertebrate samples are analyzed by a state approved taxonomist. Additionally, River Watch volunteers perform pH, alkalinity, hardness, dissolved oxygen, temperature, stream discharge, and physical habitat analyses for all of their respective sites. The data collected by our volunteers is stored electronically on a River Watch database server and can be accessed by any public or private entity.

Our dedicated, passionate, and skilled volunteers have been key in providing high quality data that is used in the formulation of water management plans at the local and state levels. Through their participation with River Watch, our volunteers are actively involved in the decisions that will shape the future of their watersheds.

River Watch does not provide any data interpretation. We are a data collection entity. The Colorado Department of Public Health and Environment (CDPHE), the Water Quality Control Commission (WQCC), Colorado Parks & Wildlife (CPW), and other grassroots watershed groups currently utilize River Watch data to manage and protect Colorado's waters.

Finally, quality assurance and quality control are essential in the success of the River Watch program. Each volunteer group samples and analyzes their data according to River Watch's very specific, uniform set of guidelines and protocols set forth by CPW, CDPHE and the U.S. Environmental Protection Agency. River Watch staff perform quality assurance checks regularly throughout the year, including annual site visits to each volunteer group. This ensures that volunteers and the River Watch laboratory accurately conform to the established methods and collection of blank and duplicate samples.

Project Summary – 2012 2013 RW Macroinvertebrate Program

For 25 years, River Watch has had the two goals. The first goal is to generate watershed data of sound quality for key decision making processes. The targeted decision process include those associated with the Colorado Clean Water Act (CWA) and include Basin Rule Making Hearings, Section 303(d) Impaired Steam Listing/Delisting, Temporary Modifications, standards development, reference site assessment and the Section 391 the Non Point Source Program. Colorado Parks and Wildlife (CPW) staff, water managers, watershed coordinators and citizens compose other target audiences. Thus, River Watch data objectives and corresponding methods, field and laboratory protocols align with the both the Water Quality Control Commission (WQCC) and CPW objectives. Because of this, in the 2012-2013 collection season, River Watch monitoring stations were prioritized by needs of the WQCC and CPW in context with the location of active volunteers.

River Watch does not interpret the data as a program, but generates data for all decision makers who have the same or compatible data objectives. The primary River Watch data objective is to collect baseline data over space and time to track the health of our rivers. This aligns with the CWA objective that rivers are fishable and swimmable – i.e. healthy enough so that animals and people do not get sick from consuming or being in the water. River Watch provides the data for others to interpret based on their own questions and perspectives. For example, CPW staff interpret River Watch data for CPW management decisions.

The second River Watch goal is to promote environmental stewardship. Through River Watch, participants get to know their local river in regards to the ecologic, economic and social value and the function it serves their community through the hands-on, real science sampling a river monthly provides. The average retention rate for a River Watch group is twelve years and the average River Watch volunteer citizen serves five years. There is a wide variety of age and backgrounds in our citizen based volunteer groups. The result of participating in River Watch leads to engaging in river protection and restoration activities, educating and informing others, increased used of the river, becoming anglers and or active members in local water organizations.

River Watch works because it is a collaboration that composes a three legged stool. All legs are needed for the River Watch program and the data it supplies to exist. The legs comprise the necessary elements to complete the “data to action” continuum. The first leg of the stool is the volunteer who lives and works by rivers in the state. It is their proximity to rivers that River Watch leverages. One of the most expensive aspects of monitoring is labor to sample. While a volunteer’s time is not free, the effect of a statewide network of volunteers to collect samples is extremely cost effective. On average, River Watch has around 125 groups actively collecting river samples on a monthly basis. The second leg of the stool is a foundation, both funding and scientific. CPW provides the science, base funding, laboratory, foundation and is the entity that takes River Watch data to decision maker endpoints. This includes all CWA processes, uploads to CPW database, Colorado Water Quality Monitoring Council’s database, Colorado Data Sharing Network (CWQMC CDSN), EPA National STORET database and other data requests. The third leg is our partners. Partners assist with funding, training, recruitment, data needs and users.

Partners include Water Quality Control Division, Colorado Watershed Assembly, Healthy Rivers Grant, Colorado Trout Unlimited, funders, watershed organizations, municipalities and water

districts to name a few. These are the entities that use the data and turn it into a decision or action. They also provide additional financial, political and in-kind support.

It is this three prong approach that allows River Watch to support up to 130 groups annually to monitor over 350 rivers for chemical, macroinvertebrates and physical habitat. It is this combination that allows River Watch to apply 95 cents of every dollar directly generating data. River Watch has more data than any other program in National EPA STORET and generates more data than any other statewide monitoring program on an annual basis. Currently, River Watch cannot serve the demand that exists for this program. The potential of this network is still untapped. Increased funding could lead to increase stations; more parameters sampled; add monitoring of in stream flows, periphyton and even move into lakes and reservoirs.

A specific example of the success of River Watch was the 2012-2013 macroinvertebrate portion of the program. River Watch has yet to fully fund the upstart equipment for all groups in this program but still generates valuable information by being strategic. River Watch received funds from the Healthy Waters Program to apply to the River Watch Macroinvertebrate program. A total of 60 stations were sampled by River Watch volunteer groups with these funds. A conservative cost savings is estimated at 60% of the total cost if work was completed by one agency or commercially.

With funds from the 2012 2013 Healthy Rivers Grant, River Watch analyzed 41 samples from our dedicated volunteer base of regular stations. Data from these sites provide more of a broad sampling approach in that these sites are not selected because there is a regulatory data need. Bug samples are collected from sites where water quality data is routinely collected. In this sense, these sites are providing data that helps protect Colorado's rivers versus collections from impaired sites and monitoring for level of impairment or success of restoration.

In addition to the 41 sites sampled for overall assessments, River Watch worked with the Colorado Water Quality Control Division (WQCD) staff to select priority stations where data was needed for Clean Water Act management purposes. The WQCD only had resources to sample six of their 32 priority sites. River Watch was able to match a volunteer to all remaining 26 sites. Unfortunately, attempts to collect a sample at seven sites did not produce a macroinvertebrate sample because two sites were dry, two were inaccessible due to fire activity at the time, two remained un-sampled because location information was not accurate and at one the water was too high. River Watch successfully sampled 19 sites. Table 1 illustrates the stations River Watch did sample and why the WQCD need the data; Table 2 provides a list of stations River Watch was unable to sample.

Table 1. WQCD Priority Macroinvertebrate sites successfully collected 2012-2013

Water Body	RW Station	Latitude	Longitude	Data Need
Good Spring Cr, At CR 51 Axial	702	40.29942	-107.7848	Class 2 w/ High MMI Score earlier than 2007
Beaver Brook, At Hwy 40	710	39.7186	-105.3678	Class 2 w/ High MMI Score earlier than 2007

Water Body	RW Station	Latitude	Longitude	Data Need
Grape Cr, At Temple Canyon Pk	714	38.4076	-105.3263	Class 2 w/ High MMI Score earlier than 2007
Swift Cr,	715	38.1681	-105.5732	Class 2 w/ High MMI Score earlier than 2007
Bear Cr, Abv 8th St, C Spgs	722	38.8194	-104.8456	Class 2 w/ High MMI Score earlier than 2007
Bear Cr, Bear Canyon	325	38.81832	-104.8932	Class 2 w/ High MMI Score earlier than 2007
Embargo Cr, CG Abv Cathedrial Cr	724	37.8215	-106.6032	Refinement- Initial sample <150 individuals
Vallecito Cr, At Vallecito Rd	3275	37.4407	-107.5461	Refinement- Initial sample <150 individuals
Mount Vernon Cr, At Mouth Clear Cr	728	39.6536	-105.1919	Refinement- Initial sample <150 individuals
Slate R, Abv Pittsburg Crossing	730	38.9495	-107.0627	Refinement- Initial sample <150 individuals
Noname Cr, About 6 mi abv mouth	731	39.58166	-107.28809	Ref site refinement, low MMI score
Crystal R, 2.5 Mi from FS Rd 742	734	38.72388	-106.6731	Ref site refinement, low MMI score
Dolores R, Abv Roc Cr	725	38.4528	-108.8609	Big River
Dolores R, At Z6.0 Rd	742	38.5648	-108.9175	Big River
Dolores R, Gateway	290	38.68049263	-108.9797332	Big River
Gunnison R, Near Delta	747	38.7474	-108.1201	Big River
Gunnison R, Abv Whitewater	753	38.9544	-108.4613	Big River
Gunnison R, Abv 64 Rd Br	261	38.77583582	-107.9609751	Big River
Yampa R, Hwy 318	756	40.54804	-108.1859	Big River

Table 2. WQCD Priority Macroinvertebrate not collected 2012-2013

Water Body	Latitude	Longitude	Data Need	Comment
Wilson Cr At CR 51	40.31433	-107.7975	Class 2 w/ High MMI Score earlier than 2007	Bone dry no water
Hardscrabble Cr Abv Greenwood	38.21227	-105.09563	Class 2 w/ High MMI Score earlier than 2007	Not accessible due to active or very recent fire activity
N Hardscrabble Cr	38.17444	-105.17083	Class 2 w/ High MMI Score earlier than 2007	Not accessible due to active or very recent fire activity
White R Abv 24Rd Br	40.067468	-108.94786	Big River	Could not find with information had, does not exist
White R Abv 65 Rd Br	40.154034	-108.69955	Big River	Flow too high to sample
Yampa R Blw Little Snake R	40.43986	-108.50014	Big River	Could not locate station access to station
Trinchera Cr At Lasauses, CO	37.31612051	-105.7428	Big River	Did not Attempt

Water quality data was collected and analyzed with each sample as well. All results were entered into the River Watch database, which is available to the public, as well as uploaded to the Colorado Water Quality Monitoring Council's Data Sharing Network (CDSN) and EPA's National Water Quality Database Warehouse, STORET. In addition, a separate data dump was provided to the WQCD to be used with their macroinvertebrate multi-metric indexed update as well as stored in their overall database. The data is being used and is available for anyone to view which is one of River Watch's goals.

Physical habitat data at most of these sites was also collected and includes a microhabitat analyses of substrate composition for each of four bug kicks and a macro-habitat or stream reach evaluation for substrate, debris, erosion, riparian vegetation, bank stability, aquatic vegetation, stream depth and width, transect profile and bank land use. Not all stations have the macro-habitat analyses because some could not be safely crossed. This data is available via the River Watch Website, CDSN and STORET and for this report upon request.

River Watch macroinvertebrate protocol is more quantitative than the WQCD's. Pre development of macroinvertebrate metrics River Watch and WQCD protocols matched, however the WQCD reduced some quantifying aspects of their protocol. The WQCD has a method to equate data at different levels of effort while maintaining a minimum effort requirement. River Watch as a different method for habitat sampled between rocky and sandy substrates. In all cases, the effort is the same at four, 60 second kicks in relevant habitat. All kicks are composited and processed in the field through a sieve the same pore size as the net. Organisms' visual to the eye on the net or sieve and on large debris such as cobble, large twigs and leaves are plucked and put in alcohol. All algal mats, finite organic debris are placed in alcohol in its entirety. This mixture is decanted and replaced with fresh alcohol and given to a professional taxonomist to identify to genus species (chironomidea slides are made for future identification if needed) via WQCD and standard 300 count protocols. River Watch maintains a reference collection of this data.

In the 2012 2013 season, River Watch sampling uncovered one potential new species, and identified two potential mollusk invasion locations. River Watch's macroinvertebrate program is likely more important than the water quality samples. First, some stations have multiple years of macroinvertebrate data, which is rare in Colorado, much less statewide. Second, no other entity besides the WQCD is doing statewide macroinvertebrate monitoring. While other entities might be gathering macroinvertebrate data at one or multiple stations, often this monitoring is for a project or finite period and is not statewide. Third, the Rocky Mountain Region is severely lacking in macroinvertebrate data relative to other regions in the country such as the east coast and northwest in order to develop sensitive, responsive and accurate benthic indices to track the health of our rivers. Macroinvertebrates are keystone species in this regard and can tell us much about condition of our rivers in relatively cheap and easy manner.

River Watch applied for and received funding for macroinvertebrate sampling analysis. This funding was crucial to the efforts of monitoring and protecting Colorado's waters. Monitoring macroinvertebrates is particularly beneficial to a comprehensive watershed monitoring program because it can help characterize ecosystems and identify actual aquatic life impairments that chemistry alone cannot. Macroinvertebrates are a key indicator of watershed health. According to taxonomist Dave Rees, "You can definitely say that Riverwatch continues to assist Colorado State University by providing distribution information for rare or unusual taxa. We are not sure what

this Rhyacophila sp. from Embargo Creek is yet, but we are trying to figure out if it may be at least a new state record."

It is important to note the value of this data. Without River Watch this data would not have been collected or exist. The assumed commercial cost to collect the macroinvertebrate data (only, no chemical or physical) would approximately be per sample: $250 per sample analyses, $310 in supplies and equipment, $630 in labor (assuming $35/per hour for 3 adults, at 6 hour minimum) to collect, $200 in travel costs, $280 in validation and uploading to various databases per sample for a total of $1670 per sample. Collection of 60 samples at that rate would equate to $100,200. If not for leveraging a network program like River Watch and collaboration with the WQCD and others funding this source, this macroinvertebrate data would not exist. However, it is exactly this kind of data that is needed today to understand if we are successfully protecting and restoring our waters with the tools and approaches in place today.

River Watch received $15000 in funds from the CWPF to improve our macroinvertebrate portion of the program and the money was used in the following manner:

1. Analysis of Samples($15000 CHRF)

River Watch was able to have 60 samples analyzed using funds from the Healthy River grant. A list of these sites and the raw data have been submitted with the invoices. **River Watch does not do any data interpretation of the samples collected. We validate the data and store it on our website.** The data is available publically for anyone to view.

Additional Information:

We used an outside lab to provide us macroinvertebrate analysis and have received the data back. Colorado Parks and Wildlife has validated and uploaded the samples and provided CDPHE with data. This data was also submitted to CDPHE for 303d water body assessment use of biological impairment criteria.