



Director's Update: Looking Back on 2008 and Forward to 2009!!!

By Paul Hempel, Executive Director of the Boulder Creek Watershed Initiative

Dedicated to informing the community about water resource issues that affect the health of the Boulder Creek Watershed.

BCWI is a 501(c)3 non-profit.

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Greetings Members and Friends of BCWI!

Over the past year, the Boulder Creek Watershed Initiative (BCWI) has become a prominent player in the issues that affect the Boulder Creek watershed. Among our accomplishments, BCWI produced six Watershed Forums at the Boulder Public Library to bring our overall Watershed Forum total over the past 12 years to 104! Seven more Watershed Forums are scheduled for the upcoming year including an all day symposium honoring the "Ditches of Boulder County". BCWI also continued our history of organizing Creek Clean-ups involving local volunteers, completing four of these efforts in '08.

On the special events front, BCWI produced the first annual "Green Gala" which was held at the Rembrandt Yard in Boulder. This benefit was in partnership with the Wild Bear Center for Nature Discovery and featured food supplied by Whole Foods that was prepared in gourmet style by Providence Catering. Dam Liquors and Boulder Beer supplied the libations. Over 60 local area businesses donated to the silent auction and a net total of \$2000 was raised for both BCWI and Wild Bear.

BCWI was also awarded a \$3,000 grant from Boulder County and a \$12,500 grant from the Healthy Rivers Fund, formerly the Colorado Watershed Protection Fund, to continue our highly successful water quality monitoring Stream Team program (see accompanying article). Two other grants are pending and if awarded, will strengthen this program.

BCWI also brought in two new members to our Board of Directors. Diane McKnight is a professor and researcher at the University of Colorado and rejoins the BCWI board after a short absence. Charlotte Raby, who produced this newsletter, brings writing experience and unbridled enthusiasm to the post. As we continue to expand our organization, BCWI continues to look for additional board members, especially in the areas of marketing, accounting, the arts, and representatives from both the agricultural community and wastewater industry.

For 2009, BCWI plans to build upon the above activities to become further involved in protecting Boulder Creek. Be on the lookout as the Watershed Forum series kicks off January 27th. This coming year will see BCWI partnering with the City of Boulder and Volunteer Connection in collaborative Creek Clean-ups, bringing together numerous volunteers throughout the watershed, cleaning up the creek in multiple locations. 2009 will see two additional Stream Teams being organized in selected locations to monitor the health of Boulder Creek.

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Fall Forums

By Charlotte Raby

September 23, 2008: Stream Teams

Together with the Keep It Clean Partnership, BCWI is wrapping up the first year of its Stream Team program, having trained and certified five teams that test the water quality of Boulder Creek in Boulder, Louisville and Eldora. The data that the teams collect supplement data collected monthly by area towns and cities, Boulder County and the State of Colorado.

Each team is assigned a location on Boulder Creek or one of its tributaries and accepts responsibility for testing the water at least six times annually. Each testing session takes approximately one and a half hours. Teams are trained to measure temperature, dissolved oxygen, flow, pH (for acidity/alkalinity), nitrates, phosphates, and conductivity. While most teams consist of a minimum of three adults, sometimes family members get involved in some of the tasks, such as data recording, and it's always social and educational.



Bob Rowland of the Louisville Stream Team tests the water. Photo: Paul Hempel

As the teams gain experience in their testing, they begin to understand what the measurements mean to the overall health of the creek. For example, conductivity increases as pollution levels of the creek increase. Recently the conductivity of Middle Boulder Creek in Eldora was measured at 49 $\mu\text{s}/\text{cm}$ (microSiemens per centimeter), and 300 to 500 $\mu\text{s}/\text{cm}$ in Boulder. This difference could be attributed to the fact that water running off from impervious surfaces goes directly from storm drains into the creek thus contributing high amounts of heavy metals and other constituents.

Stream Teams have also been trained to conduct physical habitat evaluations and biological monitoring of aquatic bugs, or macroinvertebrates. These activities will be officially incorporated into the overall program for 2009.

Among other parameters, physical habitat evaluations look at the quality and quantity of stream bank vegetation and the types of stream bottom substrate consisting of boulders, cobbles, sand and silt. Fish lay their eggs in the nooks and crannies between the cobbles, so the amount, types, sizes, and quantities of the substrate material is important in determining the quality of habitat necessary to sustain healthy populations of fish and macroinvertebrates. When streambank vegetation is removed or absent, sediment entering the creek increases and eventually covers up the cobbles. This decreases the number of egg-laying locations for fish and subsequently their overall reproduction rates.

The first biological monitoring took place in October. Macroinvertebrates are good indicators of water quality because the presence or absence of certain types can help determine pollution problems in or near the stream. For instance, the presence of pollution *intolerant* mayfly, caddisfly or stonefly larva is an indication of a healthy stream while the presence of pollution tolerant worms, midges and snails is an indication of a polluted stream.

Together, water chemistry, physical habitat evaluations and biological monitoring make up a comprehensive evaluation of the overall health of Boulder Creek and its tributaries.

All funding for equipment and the management of the Stream Teams comes from grants obtained from Boulder County, the Community Foundation Serving Boulder County and the Healthy Rivers Fund (formerly the Colorado Watershed Protection Fund). The Healthy Rivers Fund is an individual donation opportunity via the Colorado State Income Tax Form and recently BCWI received an additional \$12,500 from the Healthy Rivers Fund to train and outfit two more Stream Teams!

In addition to supporting the Stream Teams, the Keep It Clean Partnership also provides school programs for K-adult, watershed stewardship programs, and speakers for civic groups. Both organizations can be contacted through links from basin.org (Boulder Area Sustainability Information Network), or by going directly to their websites: <http://keepitcleanpartnership.org> and <http://bcn.boulder.co.us/basin/bcwi>.

October 28, 2008: Vehicle Emissions - Pollutants, Challenges, and Alternatives, with Dr. Donald Stedman of the University of Denver, and Andrew Bascue and Randall Rutsch with the City of Boulder

Dr. Stedman, Brainerd F. Phillipson Professor of Chemistry at the University of Denver, co-invented a remote sensing system that tests the emissions of moving vehicles. His system measures up to 5,000 vehicles per day, and over the last decade has tested over three million vehicles across twenty countries.

The device is set up across a single lane, so that beams of infrared and ultraviolet light are shot through the emissions of a car as it passes. The beams are then captured on the other side of the

road and the wavelengths analyzed to gain emissions information on quantities of carbon monoxide, hydrocarbons, ammonia, and nitric oxide, measured in grams of pollutant per kilogram of fuel. The vehicle's speed and acceleration and a photographic image of the license plate of each car are recorded with the emissions data, which is used to obtain vehicle-specific data, such as its age and model.

Dr. Stedman's data, which correlates with data collected at government emissions test sites, shows that there have been large decreases in fuel specific vehicle emissions across all ages of vehicles. For example, CO reductions were 56% for Denver, and 71% for Chicago, with Phoenix, West Los Angeles, and Los Angeles/Riverside falling within that range. These reductions were not attributed to inspections, maintenance, or fuel reformulations, but to improvements in durability and function of vehicle emission control systems such as the addition of more oxygen sensors to monitor catalyst, as well as improved on-board diagnostics systems. The results show that cars from 1997 and newer are so clean that they are nearly irrelevant.

The full report, entitled [A Decade of On-road Emissions Measurements](#) by Gary A. Bishop and Donald H. Stedman can be found in *Environmental Science & Technology*, volume 42, No. 5, 2008, pages 1651 - 1656. Additional information on the study can be found at www.feat.biochem.du.edu.

Andrew Bascue is the Sustainability Coordinator of the transportation division for ClimateSmart, a nationwide program which supports Boulder's Climate Action Plan. ClimateSmart helps individuals and businesses decrease their carbon footprints through conservation, efficiency, and the development and use of renewable energy sources.

While vehicles produce 25% of Denver's ozone problem, compared to the national average of 26%, Boulder's traffic contributes less, at 22%, because it's a destination city, which means it has less traffic using its roadways to pass through to other locations. However, the effects of emissions in Boulder can be seen in the measurable retreat of Arapahoe Glacier, which is one of the city's main sources of water:



Arapahoe Glacier, 1898. Photo: NASA Earth Observatory.



Arapahoe Glacier, 2003, showing climate change through melting of glacier. Photo: NASA Earth Observatory.

Single occupant vehicles are the most carbon-heavy modes of transportation. The City of Boulder and ClimateSmart provide several options to help Boulder residents decrease Boulder's vehicle miles travelled (VMT). Several bus lines run frequently enough that schedules generally aren't needed. Bus routes

are available at www.rtd-denver.com. The many bike paths in Boulder also provide an alternative, and bicyclists can map their routes at www.GOBikeBoulder.net. Boulder residents who remain car-free can become members of Boulder Car Share, which allows them to borrow cars that are stationed around town. Find more information, at www.BoulderCarShare.org

Newer model cars that use petroleum based fuels are more efficient, but alternative-fuel vehicles are becoming more affordable and attractive. Tax rebates are provided on purchases of some hybrid electric models, as well as for converting hybrids into plug-in electric vehicles. Diesel vehicles made after 1993 are usually Flexible Fuel Vehicles (FFV), meaning they are able to use biodiesel fuels. They can also be converted to run on liquid natural gas.

At this time, 99% of the country's fuel is petroleum based, and ClimateSmart is working to develop and encourage use of a variety of fuels and transportation methods, to eliminate being boxed in as we are now, and to facilitate necessary changes as they become necessary over time. One future idea that may exist in the future is a "Smart Grid" in Boulder that can communicate with electric vehicles, charging their batteries when energy demand in the city is low, and pulling out energy when it is needed elsewhere in the city.

To find out if a diesel car is an FFV, go to www.e85fuel.com. To learn more about electric vehicles and scooters, ClimateSmart's other programs for homes and business, and to calculate an individual or household carbon footprint, go to www.beClimateSmart.com.

Randall Rutsch is the Senior Transportation Planner for the City of Boulder, responsible for coordinating the city's transportation master plan, transportation funding, and regional

transportation plans. He discussed what the city planned over the last twenty years and how they are meeting their goals.

The burning of one gallon of gasoline emits twenty-two pounds of carbon dioxide into the air, and a two mile trip in a car from cold-start, creates an equal amount of emissions as a one-hundred mile trip. Therefore, it's important that Boulder's citizens begin to incorporate other modes of transportation into their travels around the city.

In 1989, the city set as one of its goals the reduction of single occupant vehicle travel. In 1996, it planned to hold VMT to 1994 limits, instead of increasing with the national rate of 5% per year. In order to accomplish these goals, it was necessary to plan communities differently than they had been planned in the past.

Most cities plan their transportation needs first, and then plan their communities around that. Boulder decided to begin planning communities first, and then their transportation needs around those. This allowed for more pleasant living conditions as well as a variety of modes of transportation. Broadway is the city's model for what is called "complete streets", which incorporate pedestrian, bicycle, and vehicular traffic-ways at a higher level of safety and visibility for pedestrians and bicyclists, reduce noise levels along busy streets, and provide more beauty. Right now, 28th Street is their main project.

Plans for bicycle paths that connect all areas of the city are 85% complete. On October 1, 2008, Boulder joined Portland, Oregon and Davis, California as the only recipients of the Platinum designation as a bicycle friendly city from The League of American Bicyclists. Platinum is the highest rating a city can receive, and is based on engineering, education, encouragement, enforcement, and evaluation and planning. To route a bicycle journey through the city, one can visit www.GoBikeBoulder.net.

High frequency transit is another option for commuters. The Dash, Hop, Skip, and Jump buses run frequently enough that schedules are not required to plan travel around the city. Bus routes can be found at www.rtd-denver.com. Eco-passes are available through employers and provide unlimited use.

Boulder's transportation plans for the future include a fast track along US36 which would get a commuter from Boulder to Denver in 23 minutes instead of today's two hours, and plans for "managed parking," which means decreasing the amount of free parking in the city, including that provided by employers to their employees.

By providing transportation alternatives and making driving and parking in the city a less attractive option, the City of Boulder hopes that its citizens will begin to incorporate those alternatives into their transportation plans. If they do, Boulder will continue to maintain its VMT at its 1994 levels.

Upcoming Forums

**Please join us for our 2009 forums at the
Boulder Public Library Auditorium:**

Jan. 27, 2009

Feb. 24, 2009

Mar. 31, 2009

April 28, 2009

May 16, 2009

Oct. 27, 2009

The Boulder Creek Watershed Forum series is sponsored by:

- Boulder Creek Watershed Initiative.
- United States Geological Survey.
- City of Boulder
- Boulder Public Library.
- Moe's Broadway Bagels
<http://moesbroadwaybagel.com>
- Breadworks <http://breadworks.net>
- Caffe Solé <http://www.caffesole.com>

Missed a Boulder Creek Watershed Forum?

Videotapes of all forums are available at the Boulder Public Library and can be checked out for home viewing.

Forums are also televised on Channel 8:
 Wednesday 3 PM
 Saturday 10:30 AM and 7:30 PM
 Sunday 7:30 PM

Volunteer Spotlight: Bonnie Greenwood

BCWI and Boulder are lucky to have a volunteer such as Bonnie Greenwood, who has devoted her life to studying, improving, and educating others about the environment. Armed with a B.S. in Marine Biology (with minors in horticulture and chemistry) from Roger Williams University and an M.S. in Entomology and Plant Pathology from the University of Rhode Island, Bonnie arrived in Boulder in 1990 to begin her career with the Boulder County Public Health Department (BCPH).

As an Environmental Health Specialist, Bonnie works with the BCPH and the Colorado Department of Public Health and Environment to monitor and assure air pollution compliance. She also supports Partners for a Clean Environment, a contractor to the Keep it Clean Partnership, in their efforts toward the prevention of storm water pollution. She audits municipal facilities and educates their employees in the identification and reporting of storm water pollutants to help ensure compliance to storm water discharge standards.

Ms. Greenwood's commitment to the environment spans into her personal life as well. She rides the bus or her bicycle to work nearly

every day and is always on the lookout for pollution and stormwater discharges to report. She also enjoys skiing, mountain biking, hiking, native plants and gardening. Bonnie joined and became leader of the Nederland stream team in March 2008, and takes great satisfaction in the camaraderie, passion, and dedication of her teammates.



With her walking stick, Bonnie fishes a mushroom from the creek in order to identify it. Photo: A.C. Farace

Fall Creek Cleanup

By Cassy Bohnet



Boulder Creek. Photo: Sophia Floyd

On Saturday, September 20th eleven University of Colorado students and two other Boulder citizens helped clean-up Boulder Creek. The students are enrolled in a community service class that requires them to complete a total of six hours of community service.

All volunteers met at Scott Carpenter Park at the intersection of 30th St. and Arapahoe and cleaned up and downstream from the park in groups of two from 10:00am to 2:30pm.

The Clean-up was a success as volunteers collected approximately 30 bags of trash and recyclable material from Watch the BCWI website (<http://bcn.boulder.co.us/basin/bcwi>) for more information on future stream clean-up events that are open to anyone!

Non-indigenous Species in Boulder Creek

By Charlotte Raby

There are several non-indigenous species of plants and macro-invertebrate animals found in Boulder Creek which affect the ecosystem and the survival of native species.

Native to New Zealand and naturalized in Europe and Asia, the *Potamopyrgus antipodarum*, also known as the New Zealand Mudsail, was brought to the United States on shipping vessels and inside game fish. It was first discovered in Idaho in 1987, and in Boulder Creek in 1994. It thrives along the shore and in the shallows of the creek, among marine plants such as the *Didymospheria Geminata* (*D. geminata*), commonly known as rock snot, and the Eurasian Water milfoil (milfoil), which are both non-indigenous nuisance plants in Boulder Creek. The snails survive in fresh and brackish water, and burrow into silt in high flow environments or seasons. All of the snails in the United States are genetically identical females that reproduce asexually, each producing up to 230 new snails per year.



New Zealand Mudsail (P. antipodarum). Photo: USGS

Milfoil, natural to Europe and Asia, was first documented in Washington in 1965, but is assumed to have been introduced into North America on the east coast sometime between the late 1800's and 1940. Milfoil reproduces from minute plant fragments, so it is therefore believed to have been transferred to other bodies of water on fishing boats and tackle, and through mass water flow to the 48 contiguous states and Canada. The rapid reproduction rate

of milfoil was evidenced in North Carolina between 1965 and 1974, when milfoil densely infested approximately 32,000 hectares.

It grows in clear, warm water in sunny locations near the water surface, and urban runoff increases the nutrients on which the plant thrives. With thick stems and feathery leaves, the plant forms mats that clog waterways and create stagnant pools where mosquitoes breed and the mudsnail thrives. In addition, native aquatic life is affected. Milfoil mats block the transfer of oxygen from the surface to deeper water, thus reducing the amount of oxygen available to other marine plants and animals, but maintaining a high level where the mudsnail thrives. It also creates greater sedimentation on the creek bottom, reducing the number of egg-laying niches among the rocks and pebbles for native fish species.



Eurasain Water milfoil. Photo: OSMP

D. geminata is native to northern forests and alpine regions of the northern hemisphere, and has been documented as growing excessively in its native habitat. It was first documented in the United States in South Dakota in 2005, having spread from its native habitats over the last two decades from colder, still waters to warmer streams and rivers. In 2004, it was found for the first time in the southern hemisphere, in New Zealand.

Similarly to milfoil, rock snot also grows in mats in warm, shallow water. Their stocks adhere to the sands and rocks of the creek, eliminating areas for other alga species to grow, thereby destroying breeding grounds and feeding areas for native fish. It can reproduce rapidly from microscopic contamination in one drop of water.



Rock Snot (D. geminata). Photo: USEPA



Rock Snot; Fish and Game, New Zealand; Photo: USEPA

The mudsnail and these two nuisance plants survive within a wide range of water qualities, chemistries, and velocities. Documented procedures for the decontamination of *D. geminata* may be helpful in the decontamination of the mudsnail and milfoil. Decontamination can be performed by first removing and discarding any visible signs before leaving the creek. Away from the creek, all surfaces of equipment must be scrubbed for one minute in either very hot water (60° C, 140° F), or a 2% bleach solution, or a 5% solution of salt and antibacterial soap. Water absorbent equipment should be soaked thoroughly. If visible contamination is found on equipment once away from the creek, do not wash it down the drain. Treat it in the solutions listed above, allow to dry, and then discard in the trash. An alternative to washing would be to allow equipment to remain unused and in a dry state for 48 hours after it had become completely dry, before returning it to another body of water.

Although recent studies have added to what is known about these non-indigenous aquatic species, still more study is needed on how to control contamination and growth. It is suggested that increasing riparian plants along banks, which will lower temperatures and block sunlight, will help decrease growth of the Eurasian Water milfoil. In addition, the State of Washington is attempting removal of the milfoil through aquatic herbicide, harvesting, underwater rototilling, creek bed barriers, and sterile grass carp. Investigations are ongoing into the use of the milfoil weevil. Managed variable flows will help remove and control the *D. geminata*. Since the New Zealand Mudsnail survives through the widest range of variables, at this point, emphasis is on the decontamination of fishing and other water-sport equipment to slow its spread. Indeed, educating the public on how to contain the spread of non-indigenous species of plants and macro invertebrates is key to protecting our native habitats and species.

Sources:

Miller, McKnight, Cullis, Greene, Vietti; *Factors controlling streambed coverage of Didymosphenia geminata in two regulated streams in the Colorado Front Range*; University of Colorado, Boulder, Co; 2008

Fairlee, Eric; *Eurasian Watermilfoil and Riparian Health*; The Green Line, V17, n4; City of Boulder and Mountain Parks Department, Boulder, CO; 2006; <http://coloradoriparian.org/GreenLine/V17-4/Watermilfoil.php>

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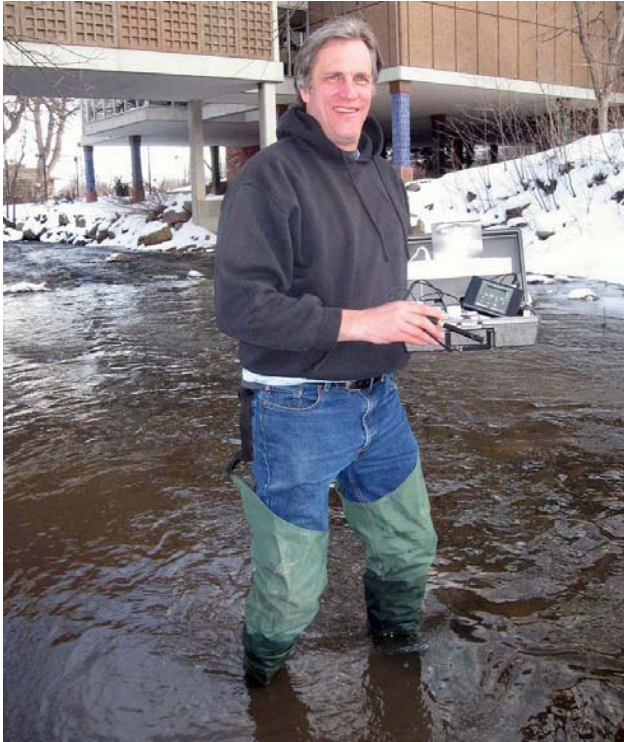
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Didymosphenia geminata; Wikipedia;
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Eurasian Water milfoil; Wikipedia;
http://en.wikipedia.org/wiki/Eurasian_watermilfoil



Volunteer with BCWI!



BCWI Executive Director Paul Hempel testing water quality of Boulder Creek Photo: Jim Cowart

BCWI needs more people to join our team of volunteers. Opportunities include:

- Board of Directors, especially:
 1. From the agricultural community.
 2. From the arts and culture community.
 3. With marketing experience.
- Newsletter article writer.
- Accountant and bookkeeper.
- Working with local companies to raise funds and donations of products and services.
- Web page design.
- Coordinating internships via CU and Naropa.

BCWI also needs office space, equipment, and supplies.

THANKS for your continuing support!

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Schedule a FREE water presentation for you community/neighborhood group today!

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waterprograms@bouldercolorado.gov
www.keepitcleanpartnership.org

Director's Update *Continued from page 1.*

Also, BCWI will continue to strengthen our organization by reaching out and collaborating with local businesses, writing additional grants to fund our projects, and connecting with our membership base to support our community programs. Finally, come see us for the third consecutive year at the 2009 Boulder Creek Festival and at the Boulder Farmers Market.

We are looking for volunteers to get involved in all of these important and fun projects! So please contact us if you are interested!

Enjoy reading the articles in our current newsletter and feel free to join us at any of our upcoming events. See you around the watershed!

Paul Hempel, Executive Director



Members of the Nederland Stream Team collect, sort, and identify macroinvertebrates.



Moriah Fremd conducting physical habitat survey. Members of four Stream Teams identify macroinvertebrates.

Photos: Paul Hempel



Bug sampling. Photo: Paul Hempel

Corporate and individual sponsors welcome!

YES! I will make a (tax-deductible) contribution to the Boulder Creek Watershed Initiative!

My level of support is (check one):



_____ \$ 500 & up Belted Kingfisher *Ceryle alcyon*



_____ \$ 100 - 499 Greenback Cutthroat Trout *Oncorhynchus clarki stomias*



_____ \$ 50 - 99 Tiger Salamander *Ambystoma tigrinum*



_____ \$ 20 - 49 Green Darner *Anax junius*



_____ \$ 0 - 19 Golden Stonefly *Hesperoperla pacifica*

Enclosed is my check for \$_____. The entire watershed thanks you.

BCWI also needs volunteers! Tasks include video editing, creek cleanup, and outreach events. To get involved, let us know your interests and how to reach you!



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