



APRIL 2007

# CLARION

A Publication of the Colorado Lake and Reservoir Management Association



**CLRMA Members, Volunteer Monitors, and Speakers on the deck of the Cherry Creek Marina following the Spring Luncheon, April 11, 2007.**

CLRMA wishes to thank Cherry Creek State Park and the Cherry Creek Marina for donating park access and facilities for the Spring Luncheon. This generous contribution helped to make this event a huge success. Thirty two people were present to hear presentations from Lucia Machado from the Colorado Department of Public Health and Environment on “Mercury in Colorado Fish Tissue Study”; Al Polonsky, from the Denver Department of Environmental Health on “Bacteria in Denver’s Lakes and Streams”; and Bill Battaglin from U.S. Geological Survey on “Emerging Contaminant Issues”. Ms. Machado told us to check the CDPHE website for both locations of, fish species, and meal size and consumption frequencies in Colorado (<http://www.cdphe.state.co.us/ic/division2.asp>). Mercury concentrations most often exceed the state action level of 0.5 ppm in large fish, top level predator fish, and warm water fish. Al Polonsky reported on *E. coli* monitoring in the Denver area. Sloans Lake is the only water body that allows full contact (water skiing) and bacteria concentrations were generally high in summer and fall months. Check the web site for 2007 results at (<http://www.denvergov.org/EAP/WaterQualityProgram/WaterQualityImportance/RecreationBacteriaConcentrations/tabid/424851/Default.aspx>). Bill Bataglin reported that USGS had been finding low concentrations of substances such as DEET, detergent breakdown chemicals, hormones, anti-inflammatories, and many other contaminants. The surprise element to their studies was finding these contaminants in wells and groundwater in addition to below sewage treatment outfalls. There is a newly formed consortium for research and education on emerging contaminants. Check the website at (<http://co.water.usgs.gov/CREEC/index.html>).



## CLRMA Spotlight Questionnaire

### Laurie Rink

Age: 44

Yrs w/ CLRMA/NALMS: Seven or so.

Yrs in CO: 23

What do you do: Wetland mitigation banking and environmental consulting

Family: My daughter Anisa who is nine, and myself

When I'm not working I am... Maintaining the "magic" mix of rest, relaxation, playing, reading, travel, making good food, and having family time.

Your idea of happiness: Lying in a hammock under the shade of a palm tree on the beach with a bucket of cervezas, smelling the ocean, reading a book, watching my daughter play

Not many people know that... I experiment with beer making

What do I like to do most: Cook and eat great food

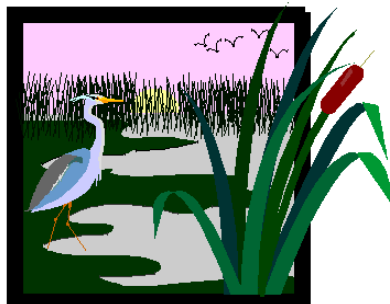
If I won the lottery: Anisa and I would play hooky for a year and travel around world. We already have our itinerary planned.

Last book I read: Rain of Gold by Victor Villasenor, a non-fiction account of a family's migration over three generations from Mexico to southern California

What political office: None – it would drive me crazy.

Toughest aspect of my job: Explaining what I do for a living

What famous person would you like to meet most: Carlo Petrini, the initiator of the Slow Food International movement. He's said to be a modern day visionary that started a whole social movement centered around the value of good food locally grown and produced, carefully prepared, and slowly enjoyed with family and friends.



## **PRESIDENTS DOCK** by Vic Lucero

In 2007 the Colorado Department of Public Health & Environment will implement the EPA's Survey of the Nation's Lakes Program. The goal of this Lakes Survey is to address two key questions about the quality of the Nation's lakes, ponds, and reservoirs.



1. What percentage of the Nation's lakes are in good, fair or poor condition.
2. What are the key stressors such as nutrients and pathogens and what is their relative importance.

The lakes that will be sampled were selected at random and were selected to represent the diverse conditions across each region. A "probability-based network" has been developed to evaluate the lake data and provide a statistically valid estimate of the condition of lakes. A total of 909 lakes were selected for the survey. The lakes selected have at least 10 surface acres and are at least one meter deep.

The data collected and the methods for collection will be consistent to ensure the data can be accurately compared from region to region. Key indicators will be measured including, temperature, oxygen, nutrients, chlorophyll a, Secchi depth, turbidity, phytoplankton, zooplankton, habitat, macro invertebrates, pathogens and algal toxins. Other testing may be performed, funding permitted. Field sampling will be conducted in the summer of 2007, data will be evaluated in 2008, and a final report should be available for distribution in 2009. The intent of the EPA is to perform this survey every five years.

Colorado has contracted with USGS to conduct the 2007 Colorado Lake Survey. Planning is underway to finalize the list of approximately 30 lakes to be surveyed and to provide training to the field staff. In discussions with USGS, it appears there is an opportunity for CLRMA to participate in this Lake Survey Program as a volunteer. It is our vision that CLRMA will recruit members and area college students to participate in up to three of the lake surveys. CLRMA would also like to meld this effort with the CLRMA Scholarship Program.

In addition to the Lake Survey Program, the EPA will also implement a Reference Lake Survey Program that will identify lakes with the "best expected conditions" for the various regions. One hundred lakes will be evaluated nationally with potentially two or three lakes in Colorado. The reference lakes will be monitored for the same key indicators as the Lakes Survey Program. A Work Group has been organized by Region VIII EPA for the Colorado effort. CLRMA will be represented on this Work Group. This program will not have State of Colorado involvement and will be handled by volunteers, contractors, or a combination of both with direct coordination with Region VIII EPA. This is an issue that the Work Group will be addressing.

If you are interested in participating with these exciting projects contact me at 303-255-7771 or [vic.lucero@cityofthornton.net](mailto:vic.lucero@cityofthornton.net). These project will help CLRMA in their mission to monitor and protect the water quality of Colorado Lakes; the "Jewels of the West."



## Ask the *Lakespert* by Steve Lundt

**Q:** *We are having issues with our raw drinking water. The dissolved manganese and iron in our drinking reservoir seems to be up this winter? What's causing this?*

*Thanks, Rick Brinkman (City of Grand Junction, CO)*

**A:** Deee Ohhhh . . . DO . . . Dissolved Oxygen. This is my personal theory but many of Colorado's deeper lakes and reservoirs are going to experience unusually low levels of dissolved oxygen this winter and early spring. The result of this lower DO will create symptoms of taste and odor issues, stained water, and higher dissolved metals.

This winter, especially early in December, was not your normal un-normal winter. Does that confuse you? This winter, at least for the eastern slope, produced a normal snow accumulation finally and had winter-like temperatures in December and January. For the past few years, the winters have been mild (Christmas day of 2005 it was 69 F in Denver!!) so the reservoirs have not seen much ice. This winter, many of Colorado's lakes and reservoirs were iced over from early December until the early part of March. These 90+ days of ice cover for some lakes may have affected the dissolved oxygen levels. I also know second-hand that many of the lakes and ponds around Denver have experienced a winter fish kill. Fish kills are noticed after the ice comes off and this might be another symptom that lake managers are seeing around the state this spring.

Barr Lake is also another example. This 10-meter reservoir typically has a few weeks of anoxic conditions starting in about May. This year, anoxia started at the sediment interface on January 17<sup>th</sup> and has increased to the bottom 4 meters (March 13<sup>th</sup>) of the water column.

So my answer to your dissolved metals questions is that your reservoir might have experienced lower levels of dissolved oxygen because of the prolonged ice cover season this winter. It will be interesting to see how these affected lakes respond later in the spring or if it has an impact on the nutrient and algae make-up during the summer.



## Third Year and Still Going Strong – CVLM Program by Steve Lundt

June 1<sup>st</sup> of this year will kick off the third straight year for the Colorado Volunteer Lake Monitoring (CVLM) program. It's never too late to join! The great thing about this is that most of the volunteers this year have stuck it out for the past 2 years and see it as a worthwhile activity.

New lakes and reservoirs to the program this year include: Sweitzer Reservoir, Steamboat Lake, McLellan Reservoir, and Belisle Reservoir. The total number of lakes and reservoirs that will have volunteers on them this summer is 27. Of those, 12 lakes are located inside State Parks.

This year is especially important because EPA is conducting their national lake survey. The water clarity data that volunteers collect this summer can be compared to the data that EPA gathers on their own. It will be interested to compare the results.

If you are interested in this program or have a lake or reservoir that you would like to learn more about, contact Steve Lundt ([slundt@mwr.dst.co.us](mailto:slundt@mwr.dst.co.us)) and sign up for the CVLM program.



## Lakes Appreciation Month, July 2007 – Barr Lake by Steve Lundt

Two years ago, we focused on Grand Lake and had a great Buffalo BBQ weekend and some tasty homemade lasagna thanks to Sarah Clements. Last year both the Governor and Lieutenant Governor enjoyed free ice cream and measured water clarity at Cherry Creek Reservoir. This year, we are sure to get more tasty and memorable moments during the month of July.

CLRMA will sponsor another great Lakes Appreciation event celebration at Barr Lake in July, 2007. Barr Lake is a state park with one of the state's most used wildlife refuges. Over 320 bird species have been spotted at the lake. A nesting pair of bald eagles has utilized Barr Lake for 21 years! Barr Lake provides fishing and boating, water for agriculture and drinking. LAM is a time when we can give a special thanks back to Barr Lake. There will be activities for all ages. Colorado DOW will provide free fishing gear for kids. There will be a self-guided boat tour. Volunteers can participate in a shoreline clean up and noxious weed removal and other fun activities will be planned. CLRMA will post all information about Lakes Appreciation Month on the updated CLRMA website and in the monthly e-mail updates.



# THORNTON'S EAST GRAVEL LAKES RECONFIGURATION

## South Tani Lake by Vic Lucero



From late 2004 through early 2006 the City of Thornton reconfigured three small gravel pits (located at the bottom of the picture above) into one much larger lake; the South Tani Reservoir. The gravel pits, East Gravel Lakes #1, #2, and #3 were constructed in the early 1990's. The East Gravel Lakes stored water diverted from the South Platte River for use as a drinking water supply. These lakes had a depth of 5 to 15 feet, total surface area of 194 acres, and a total storage capacity of 2,700 acre feet.

The new South Tani Reservoir has a capacity of 7,200 acre feet, a depth of 35 ft and a surface area of 229 acres. During the project, 4 million cubic yards of earth were moved. Much of the soil was used to raise the level of the reservoir. The cost of the project was approximately 30 million dollars. The reservoir began to fill in April of 2006; however, drought conditions prevented the filling of the reservoir. Water purchased later in the summer from several other water providers and priority water rights that became available in late summer, allowed the filling of the reservoir by October of 2006.

South Tani Reservoir provides additional water storage for future growth within Thornton and will hopefully provide valuable water quality enhancements. The increased depth should provide colder water, lower percentage area of phototrophic zone, greater stratification reducing nutrients of the surface waters, all translating to an overall lower susceptibility to eutrophication. This will be a big challenge with intake phosphorus loadings of 0.3 to 1.0 mg/l. The greater storage capacity will also allow for longer water retention times which will maximize water quality enhancement from natural



processes. The Thornton Water Quality staff will be busy this year summer collecting water quality data to compare to the water quality of the East Gravel Lakes.

A fish stocking plan has also been recommended by the Department of Wildlife. A healthy biological environment should provide additional water quality benefits. This will require a good balance of nutrients, phytoplankton, zooplankton, and fish. Fish will initially be stocked in the spring of 2007 and 2009.

The construction of South Tani Reservoir will provide Thornton with addition water for growth into the future and will provide water quality improvements that should help improve and protect its' public water supply.



View of South Tani Reservoir Partially Filled  
Summer of 2006





Historic Moment  
First Flow of Water into South Tani Reservoir  
April 3, 2006



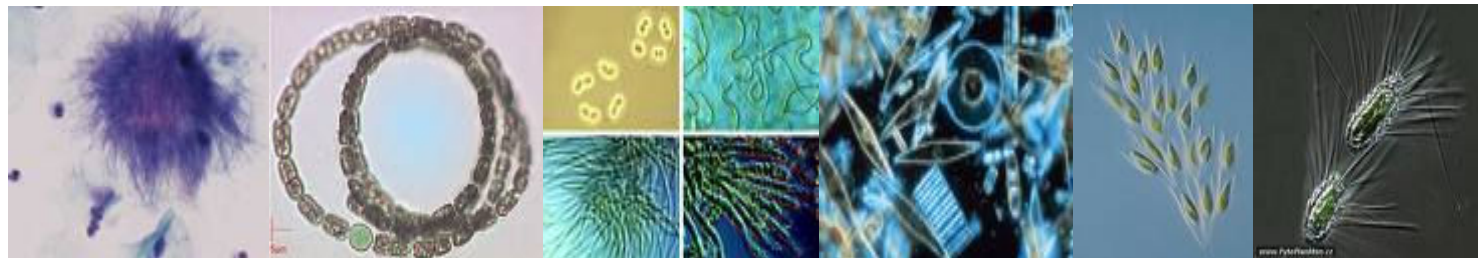
### **Limno 101: Taste and Odor** by Dr. Chris Knud-Hansen

Lakes provide a number of functions and benefits to the surrounding ecosystem, including diverse wildlife habitats and sources of food and water for terrestrial inhabitants. Arguably the most important benefit lakes can provide to those of us in the human community is a reliable source of drinking water. In fact, rivers are frequently impounded for the primary purpose of storing and supplying drinking water to nearby communities. When these rivers are impounded, the change from a flowing (i.e., lotic) water to a static (i.e., lentic) water system allows planktonic algae to grow. As water treatment plant (WTP) operators well appreciate, in addition to filter clogging, many species of algae can impart some pretty awful tastes and odors to the water.

The two primary chemicals responsible for many taste and odor events in drinking water reservoirs are 2-methylisoborneol (MIB) and geosmin, where concentrations as low as 5-10 parts per billion are enough to wrinkle the discriminating nose. MIB is the primary compound that gives off a "musty" odor, while geosmin imparts a more "earthy" taste and odor. These chemicals were first identified in the mid 1960s. However, it was not until the mid 1970s before cyanobacteria (Division Cyanophyta, also known as blue-



green algae) were identified as the major source of MIB and geosmin in lakes. MIB and geosmin are also produced by actinomycetes, a gram-positive filamentous bacteria common in soils and associated with suspended sediments in water, but cyanobacteria are typically the major source in aquatic systems. This conclusion is supported by a recent study identifying 41 different cyanobacteria species responsible for MIB and geosmin production, and the fact that taste and odor issues often disappear when cyanobacteria blooms are prevented.



Actinomyces

Anabaena

Cyanobacteria

Diatoms

Dinobryon

Mallomonas

In addition to MIB and geosmin, cyanobacteria decomposition can impart pungent septic odors as well. However, cyanobacteria are not the only sources of bad taste and odor in drinking water supply reservoirs. There are some diatoms (e.g., *Tabellaria*, *Synedra*, and *Asterionella*) and other members of the Division Chrysophyta (e.g., *Mallomonas*, *Uroglena*, *Dinobryon* and *Synura*) that can produce more “fishy” and “spicy” odors. Several species of dinoflagellates (Division Pyrrophyta), including *Peridinium*, *Ceratium*, and *Gymnodidium*, also produce “fishy” and “garlic” odors. Some green algae (Division Chlorophyta) can produce “grassy” and other odors, but green algae are not typically significant contributors to taste and odor issues.

Additional taste and odor problems can arise when the intake to the WTP is in deeper water, below the thermocline during periods of summer stratification. When lakes and reservoirs are plagued with cyanobacteria blooms in surface waters, bottom waters are often anoxic as these inedible algae die, settle to the bottom, and decompose. This decomposition strips bottom waters of dissolved oxygen, allowing soluble iron, manganese, and hydrogen sulfide to diffuse up the water column and be brought into the WTP. Iron and manganese can give a metallic taste to water, as well as discolor the water. Hydrogen sulfide gives the water a “rotten egg” odor as this gas is released to the atmosphere.

Although WTPs can treat the water with activated carbon, ozone, and/or reverse osmosis to mitigate bad taste and odor, these events can come up suddenly giving the WTP fits. A good indicator of the severity of the situation is the amount of complaining phone calls to the WTP. However, there is some level of predictability. The link between nutrient inputs, cyanobacteria blooms, and subsequent taste and odor events is pretty strong. For example, summer storm events can bring in suspended solids with actinomycetes, as well as algal nutrients to stimulate a cyanobacteria bloom. Cyanobacteria are typically found only during the summer in Colorado, but can bloom (and create taste and odor problems) nearly all year in the warmer climates of Florida, Texas and California.

So, as you stroll around your favorite lake this summer, take some time to smell the water (and maybe follow that up with some flowers....). The more frequent the visit, the more you may be able to associate various odors with rain events, visible algal blooms, mixing events, and other ecological processes. Then, as you enjoy that nice glass of tap water, you can thank your local WTP for great job they are doing keeping MIB, geosmin, and other naturally-produced noxious-odor chemicals from your nose and lips.

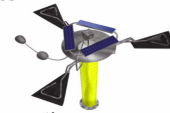


## 2007 CLRMA BOARD OF DIRECTORS

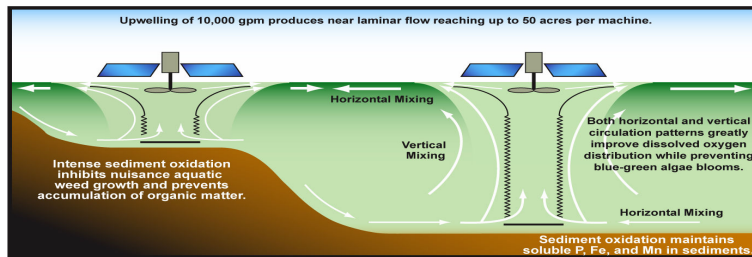
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The **SolarBee®** is a floating solar-powered circulator with a unique capability to:

- eliminate cyanobacteria (blue-green algae) blooms,
- enhance water clarity and secondary production,
- oxygenate lake bottom waters and sediments to prevent release of hydrogen sulfide, iron, manganese, and phosphorus,
- prevent seasonal fish kills, and
- reduce nuisance aquatic weed growth,



*all without either toxic chemicals or fossil fuel consumption.*



In addition, the SolarBee is economical for virtually any size of lake or reservoir, requires minimal maintenance, no infrastructure changes, and can operate 24/7 using only solar energy.



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Solar-Powered Reservoir Circulator  
"Quality Water, Naturally"

See [www.solarbee.com](http://www.solarbee.com) or call toll free 1-866-437-8076

### What's Happening in NALMS?

### Poster Contest for Kids

Lakes Appreciation Month Posters are created by school children. The art contest for the 2008 Poster is now on. All posters must be received



**SAVE the  
DATE!**

October 2-4, 2007  
Summit County, CO

*The Village at Breckenridge*

**A joint conference hosted**

**by:** Colorado Watershed Network, Colorado Watershed Assembly, Colorado Riparian Association, Colorado Lake & Reservoir Management Association, and AWARE Colorado/ League of Women Voters of Colorado Education Fund.



# Sustaining Colorado's Watersheds:

*Making the Water Quality Connections*



*Please join us for the second annual joint Sustaining Colorado's Watershed Conference. Water quality issues continue to affect our water resources. In Colorado, they include new legislation, standards, abandoned mines, coal bed methane development, riparian mitigation, and increasing urban growth.*

*For more information or instructions for submitting a poster abstract (due by August 15, 2007) visit [www.coloradowater.org](http://www.coloradowater.org)*

## Tentative Conference Agenda

### Day 1

**Overlapping Interests: Balancing Water Quality, Quantity, & Energy** with Harris Sherman (CDNR Director), Jim Martin (CDPHE Director) and a legislative panel

**Interactive Forum**

**Cocktail hour and dinner**

### Day 3

**Field Trips / Workshops**

### Day 2

**Keynote Speaker** Luther Propst of the Sonoran Institute

**Presentation topics will include:**

**The Big Picture:**

Understanding the Health of Colorado's Waters

- The View from Downstream: water quality in our rivers & streams
- Reflecting Waters: multi-system impacts on lakes & reservoirs
- Issues on the cutting edge
- Pooling our Resources: watershed monitoring across Colorado

**The Ripple Effect: Water Resource Challenges**

- Third Drought: connecting water quality & supply
- Wild about Water: wildlife & habitat
- Living in a Watershed: linking land use & water quality
- Looking for New Solutions