

JANUARY 2009

CLARION

A Publication of the Colorado Lake and Reservoir Management Association

Colorado winters are times of year when many of our CLRMA members prepare for the upcoming field season for water deliveries, lake monitoring, and water operations activities. For those who collect data, winter is also the time when you compile, analyze, graph and write up reports and prepare presentations for client, stakeholder, management, or scientific meetings. If you have results to share with other CLRMA members, please let me know. You can reach the Clarion editor, Sharon Campbell, at 970-226-9331 or by email campbells@usgs.gov. We'd love to include short articles of your lake-related activities in an upcoming Clarion issue!

Winter is also the time when water bodies freeze over - providing ice fishing, skating, cross country skiing, snowshoeing, snowmobiling and ice-boating opportunities on or around many Colorado lakes. Please be sure to check the ice thickness and any posted warnings before you go out on an ice-covered water body. Sometimes the ice cover thickness is highly variable depending on where inflows enter the water body, or other operational processes may thin ice cover. Under the ice, phytoplankton can continue to grow, as long as light can penetrate snow cover, and other aquatic organisms may thrive including lake trout and other desirable sport fishes. As winter progresses, particularly if snow cover on the ice deepens, a winter kill phenomenon can occur as oxygen is depleted and perhaps toxic concentrations of heavy metals are released at the sediment water interface and are transported throughout the water column. Like everything else in life, winter conditions in lakes can be either a boom or a bust!

In this issue of the Clarion, we have the usual sections such as the President's Dock where 2008 President Travis Bray hands off to 2009 President Sarah Sauter. Steve Lundt is a prolific author in this issue with the LakesPert section, a report on the 2008 Colorado Volunteer Monitoring Program results and in our Reflections section, a portion of a NALMS Lakeline article on Barr Lake. Elizabeth Brown has provided an article for our Ripples section on how budget cuts will or will not impact the Aquatic Nuisance Species program to control or prevent the spread of Zebra and Quagga mussels in Colorado water bodies. The Spotlight feature of the Clarion is on one of our longtime members, Linda Rosales. Also in this issue is a memorial article for Jim LaBounty, who unexpectedly passed away on December 18, 2008. Jim was a founding member of CLRMA and gave many presentations through the years at various CLRMA meetings on his work at Lake Mead and other locations including Twin Lakes, Colorado.

The economic downturn, increasing unemployment, changing administration, budget cuts, and the depths of winter when utility bills represent a bigger slice of everyone's budget, are all challenges that we must face. These may be offset by lower gas prices, an abundance of snow pack, a favorite state son's gaining office in the new administration, and developing cooperative ventures or partnerships to achieve critical goals in water management and operation in Colorado Lakes. We all live downstream, even those of us who live in a headwater state!



President's Dock – Past President Travis Bray and President Sarah Sauter

Travis Bray: It is hard to believe that another year has already passed. CLRMA was as active as ever last year and it seemed like as soon as we finished planning one event the next event was already here. We held a Spring Conference and CVLM training luncheon in April and July brought a Lakes Appreciation Month 'Day on the Rez' at Boulder Reservoir. Two events were held in the Fall: our annual awards banquet and membership meeting was held at Coors Field during a Colorado Rockies game and we co-hosted the third annual Sustaining Colorado Watersheds Conference held in Vail. Additionally, we published four newsletters and awarded two research grants to college students.

Thank you for the opportunity to be your president in 2008. It was truly a pleasure to work with the numerous volunteers who make CLRMA possible. The gavel has now been passed to Sarah Sauter who will continue CLRMA's objective of promoting the understanding and comprehensive management of lakes, reservoirs, and watersheds in Colorado.

Sarah Sauter: The days are getting longer and it is once again time to plan for the New Year. As the 2009 President of CLRMA, I have been giving some thought to the direction for the year. It only seems natural that, as CLRMA's first West Slope President, we should promote more West Slope awareness and participation this year. CLRMA has historically had a difficult time finding a West Slope director, as required in our bi-laws. This year we are fortunate enough to have two board members that call the West Slope home. I currently live in Paonia and our returning board member and West Slope representative, Sarah Clements, lives in Grand County.

2009 will be another great year for CLRMA. We are again planning our annual Spring Luncheon and Colorado Volunteers Lake Monitoring program (CVLM) training. This year will be CLRMA's fifth year promoting a Colorado lake or reservoir for Lakes Appreciation Month. While we don't have a location picked out yet, you can bet we will try to make a West Slope appearance. CLRMA is again partnering with the Colorado Watershed Assembly (CWA), Colorado Riparian Society, and AWARE Colorado to host the fourth annual joint Sustaining Colorado Watersheds Conference. As the conference chair this year, CLRMA hopes to bring a strong lake and reservoir management component to the agenda. This year's conference will be held on October 7-9 at the Vail Cascade and Resort. Back by popular demand will be the CLRMA Awards Ceremony in conjunction with a BBQ and Rockies game. Despite the Rockies loss, everyone had great time last year and we plan to keep this tradition alive. Thanks to Steve Lundt for the great idea. Lastly, we are planning a fall half-day luncheon/business meeting to ensure that the needs of our membership are met. Many of this years dates and locations are still to be determined, as snow and icy roads delayed our January board meeting. Please check our website www.clrma.org regularly for details as they emerge.

Thank you for your interest and participation in CLRMA. If you would like to become more involved or want to share a great idea, please contact me or any of the board members. Happy New Year!



CLRMA 2009 Officers and Board Members

<u>Title</u>	<u>Name</u>	<u>Phone</u>	<u>Email</u>
President	Sarah Sauter	303.291.7388	sarah@coloradowatershed.org
President-Elect	Shelley Stanley	303.450.8905	ssstanley@northglenn.org
Past	Travis Bray	303.628.6551	travis.bray@denverwater.org
Secretary	Elizabeth Brown	303.547.8690	elizabeth.brown@state.co.us
Treasurer	Cindy Brady	303.628.6367	cynthia.brady@denverwater.org
Director at large	Kelly Cline	303.658.2400 ext 2462	kcline@ci.westminster.co.us
Director	Steve Lundt	303.286.3272	slundt@mwr.dst.co.us
Director	Vic Lucero	303.255.7771	vic.lucero@cityofthorton.net
Director	Laurie Rink	303.777.0188	lrink@uos.net
West Slope Director	Sarah Clements	970.534.7099	SarahClements@rkymtnhi.com
NALMS Regional Director	Chris Knud-Hansen	303.469.9606	Chris@solarbee.com

REFLECTIONS: Raising the “Barr “for a High Plains Reservoir in Colorado by Steve Lundt, CLM

Descending towards the Denver International Airport, you will notice several cottonwood-rimmed lakes that seem quiet and remote. Barr Lake is the last one visible just before touching down. Instead of heading straight to the popular mountain destinations like most visitors, a short detour north to Barr Lake will reveal a ground-level perspective of a Kansas-like, high plains landscape interrupted by a highly managed, irrigation reservoir.



Barr Lake, Colorado



Barr Lake, like virtually every other lentic system below 7,000 feet in Colorado, is actually a shallow, warm-water reservoir. In addition to cottonwoods near the shore, there is a ring of white mineral deposits along the concrete dam and a sterile, sandy shoreline exposed from the annual 15-foot draw down. Tranquility noticed from the airplane's window is now rattled by the sounds of a busy interstate, 10 coal trains per day lumbering towards Denver, daily changing of canal headgates sending water to various cornfields, and the humming of suburban development that is quickly encroaching the State Park that buffers the reservoir.

Defining History

Barr Lake actually began as an oasis and has been described as an "oasis" on several occasions throughout its 120+ year history. Before the late 1800's, the site was a buffalo wallow, a welcoming site, and a true oasis for the long cattle drives coming up from Texas. By 1885, Oasis Reservoir was built and filled by a 19-mile canal from the South Platte River, quickly becoming an aristocratic get-away for the Denver elite. Soon, the agricultural development of the dry grasslands around Denver provided the economic push to change ownership, and by 1908 Oasis Reservoir was doubled in size and renamed Barr Lake. For the past 100 years, Barr Lake has been owned and operated by an irrigation company for the sole purpose of providing a reliable source of water to the local share-holding farmers. As long as the reservoir was full at the beginning of the summer, all was well.

Water quality issues finally stepped into the picture in the 1960's when Barr Lake was labeled as the nation's largest in-land sewage lagoon (Barr Lake State Parks 2000). The history of water quantity had finally caught up with Barr Lake. After 50 years of receiving raw and partially treated wastewater and urban/industrial runoff from Denver, Barr Lake was void of any dissolved oxygen, even in the canal inlet water. The typical gas releases that come with anoxia impaired the livability of Brighton, Colorado, a small town just 3 miles north of the reservoir. Residents had to keep their windows closed at night thanks to the blanket of decomposing smells that covered the small town.

By 1966, a new central wastewater treatment facility was brought on-line to improve downstream conditions by consolidating the treatment of wastewater and adding secondary treatment. The new wastewater treatment plant was built further downstream, which placed the new outfalls below Barr Lake's diversion point. (This is where the uniqueness of the dry Southwest challenges a lake professional's beliefs). The owners of Barr Lake, instead of being ecstatic that the location of the wastewater treatment facility was downstream from their diversion, sued to claim their right to the wastewater effluent that used to flow by gravity into Barr Lake. After a complex lawsuit and agreement with water and wastewater utilities, effluent pumps were installed at the new regional wastewater treatment facility so that secondary effluent could be pumped uphill to Barr Lake by the request of the reservoir owners. What's ironic is that this occurred at the exact same time as the infamous wastewater diversion case that involved diverting wastewater away from Lake Washington (Washington). Two completely opposite lake management decisions, Barr Lake's driven by water quantity while Lake Washington's was driven by water quality.

In Lake Washington's case, the diversion of wastewater away from the lake prevented degradation. For Barr Lake, the diversion of wastewater to a reservoir allowed for restoration. The improvement from primary to secondary wastewater treatment and less dependence on wastewater inflows changed Barr Lake from a dead, sewage lagoon to an oasis again, providing a thriving wildlife refuge for some 350 different bird species that have been observed using the reservoir. Barr Lake became a state park in 1976. In just 12 years, Barr Lake's water quality condition experienced a dramatic improvement.



The next major management change occurred when municipalities started eyeing Barr Lake as a secondary drinking water source, another oasis for their thirsty costumers. Those who were relying on deep aquifers had to quickly find new, long range sources for drinking water because the water table quickly dropped. Barr Lake is now a source of drinking water and has been heavily monitored and managed since the early 1990's.

Dry Climate

Water quantity has almost always trumped water quality in the Southwest because of the climate and the lack of precipitation. East of the Rockies, Colorado is considered semi-arid. Denver's typical annual precipitation is 14 inches, right in the middle of the semi-arid range of 10-20 inches per year (Smith 1996). Severe droughts, flash floods, and unpredictable precipitation patterns are common around Barr Lake. If the availability and quantity of water were similar to the Pacific Northwest or other wetter locations, then Barr Lake would probably have better water quality and would not be so dependent on treated effluent as a source of inflow.

The Value of More Water

Scarcity of any commodity means elevated prices. What is an acre-foot of water worth in the Southwest compared to the Northeast? How valuable is an "oasis" to the thirsty people of Colorado, especially those newer communities facing rapid growth? The trend for the high plains irrigation reservoirs in eastern Colorado is to sell the agricultural water rights to municipalities for drinking water. Several irrigation reservoirs are now used strictly for domestic water supply use. Along with the water comes very important senior appropriation dates that can guarantee a city water during the driest summers.

The price of water in a reservoir like Barr Lake can range anywhere between \$10,000 to \$25,000 per acre-foot. At the high end of that range in value, Barr Lake could be worth close to \$750 million at full-pool. The future can only mean higher prices for water; higher demand for both quantity and quality. The Denver area is almost in a constant state of water shortage - the demand is always greater than the supply. All of the water in the South Platte River has been appropriated. Recently, it seems each month's rain totals are below the norm, and it is estimated that another 2.0 million people will be moving to the Denver area by 2035 (DRCOG 2008). The pristine Rocky Mountain water was claimed long ago thanks to perspicacious municipalities (Denver Water) and industries (Coors Brewery). Now it is time to get creative with western water laws to keep up with the demand.

The Cost of Cleaner Water

Barr Lake is a great example to show how much people are willing to spend in semi-arid climates to find new sources of drinking water. The reservoir water is ideal for watering crops, with plenty of nutrients to help fertilize the land. In 2004, domestic water supply use was added to Barr Lake. Drinking water standards are considerably more stringent than those allowed for irrigation only.

Barr Lake has been exceeding the state's pH standard of 6.5-9.0 and is currently on Colorado's 303(d) list. This listing triggered the formation of a watershed association in 2004 to help write and implement a pH TMDL for Barr Lake. The TMDL and the implementation plan will include a long-term monitoring program, potentially half a billion dollars spent on building tertiary treatment systems for up to nine wastewater treatment facilities upstream, an annual commitment by several key stakeholders



to participate in the planning stages, and changing of social norms for the 2.5 million people who live in the Denver metropolitan area. Half of Colorado's population lives within the Barr Lake watershed, just 850 square miles.

The cost to improve water quality conditions in Barr Lake will be just as staggering as the \$25,000 per acre-foot water price. Rate payers will have to share the burden of tertiary upgrades with higher utility bills, residents will have to pay higher stormwater bills to help build pollution reduction facilities throughout the watershed, and cost monitoring is anticipated to cost \$250,000 annually that the public will have to share.

Water Runs Uphill

A positive side to the lack of water is that it fosters creativity when it comes to water resource management. Re-use of wastewater, water rights exchanges, flow monitoring, water conservation, and an overall higher appreciation of water are a way of life in Colorado because of the lack of precipitation. Not a drop of water that comes out of the sky goes unused, and the water is typically used multiple times by pushing it uphill.

Effluent Pumps: The only two sources of water for Barr Lake are the South Platte River and Metro Wastewater Reclamation District. The owners of Barr Lake have control over the effluent pumps that deliver about 10%-20% of the total water to Barr Lake. Metro Wastewater Reclamation District has no control over where the water goes and owns no water rights.

Re-use: In Colorado, 80% of the precipitation lands on the west side of the Continental Divide, while about 80% of the people and water use occurs on the east side where most Coloradans live. Trans-Continental water, west slope water pumped uphill through massive tunnels to the east slope, can be used to extinction. Many Front Range municipalities have built re-use treatment plants connected to the end of a wastewater treatment facility to provide non-potable water for irrigating public parks and golf courses. Since wastewater treatment facilities are always downstream, it requires a complex pumping and distribution system to get re-use water back uphill to be used.

Water Exchanges: Some of the water that gets to Barr Lake actually comes from downstream water users that have sold their water rights to upstream cities. This kind of transfer of a water right not only moves water uphill but it does so without even using a pump. For example, a municipality that needs to store more drinking water in Barr Lake can buy a farm that is a county or two downstream that has a senior agricultural water right. Once the water exchange has been approved, the municipality can change that water right to drinking water and move the point of diversion upstream to Barr Lake with the understanding that the land where the old ranch was will dry up completely.

Side Bank or Sand Filtration: Municipalities that are drawing their drinking water from effluent-dominated rivers and reservoirs are using the sandy loams to pull their water up through the alluvial aquifer. The ground is one big sand filtration system removing particulates and organic matter from the water. After the pumped, shallow groundwater is pulled out of the ground, it is usually sent back upstream to a drinking water treatment plant to be polished and sent back out for drinking water. The cycle of water starts all over again.

If a person could track the movement of each water molecule, there would be definite patterns of spiraling and grand circulations around the Denver area going from drinking water to wastewater and then back to drinking water. At a given location along the South Platte River, it looks like water is



flowing nicely downhill but with a closer look, the water (that should have gone to the Pacific Ocean) is just heading to another pump to be sent back uphill.

Reservoir/Watershed Management Challenges

Along with the challenges to find water to put into Barr Lake, the other struggle is to determine what water quality is appropriate for the designated uses in Barr Lake. Clearly a wallow was appropriate in the 1800's, but how should a shallow, irrigation reservoir turned drinking water reservoir downstream of 2.5 million people look? The past 100 years was a struggle for quantity, and the next 100 years will be a struggle for both quantity and quality.

Barr Lake's 303(d) listing for pH directly relates to the usual cultural eutrophication process that chokes so many of our world's lakes and reservoirs. On average, 200,000 pounds of total phosphorus is loaded to Barr Lake each year, usually when the reservoir refills each winter (Boyer 2008). By 2010, there will be state-wide nutrient criteria applied to Colorado water bodies. For so many years, quantity has been the focus for reservoir management decisions at Barr Lake, sometimes helping water quality. Now, with the management swing from agriculture to water supply use, water quality and water quantity decisions are dipolar. It is important to make sure that water quality conditions and regulations do not change Barr Lake from an oasis into a mirage.

Summary

The lack of precipitation has been the driving force behind Barr Lake's existence, while at the same time the steady presence of water in Barr Lake has made it an oasis for hundreds of years. There has always been just enough water to meet the needs; a wallow for the buffalo, a small reservoir for the Denver elite, a fluctuating irrigation reservoir for farmers, and now a reliable drinking water reservoir for expanding communities. Groundwater, rain, snowmelt, stormwater, and wastewater effluent have supported Barr Lake and its users for the past 120 years. The next challenge is to make sure the quality of water is appropriate to protect the uses for the future.

Oasis has two definitions that both apply to this reservoir: 1) *a fertile spot in a desert, made so by the presence of water, and 2) A situation preserved from surrounding unpleasantness; a refuge* (American Heritage Dictionary 2008). Barr Lake clearly satisfies the first definition historically. It is the second definition that may be more appropriate for the future of Barr Lake. Barr Lake is a refuge for water managers trying to provide more drinking water in an unpleasant situation – too little water and too much phosphorus.

References

- Smith, R.L. 1996. *Ecology and Field Biology, 5th Edition*
Barr Lake State Park, 2000. *A Land in Transition, The History of Barr Lake*
DRCOG 2008. *Metro Vision 2035 Plan*
"oasis." *The American Heritage® Dictionary of the English Language, Fourth Edition*. Houghton Mifflin Company, 2004. 14 Oct. 2008. <Dictionary.com
Boyer, J.M. 2008. *Barr Lake Reservoir Assessment*. AMEC, Inc.





Jim LaBounty, then NALMS Business Manager, Carol Winge, and NALMS Treasurer, Sue Robertson, at the Rocky Mountain Regional Conference in February, 2006

James F. LaBounty (Jim) – December 14, 1942 – December 18, 2008.

December 17, 2008, was an unusually cold and snowy time at Lake Mead. Unfortunately, instead of battling the elements on the lake he had studied for so long, Jim was in a hospital in Miami fighting the battle we all must lose one day. He finally succumbed to complications brought on by a combination of pneumonia and a long battle with a lung disease.

Jim grew up in Las Vegas, NV, and received his B.Sc. And M.Sc. in biology at the University of Nevada-Las Vegas. He went on to receive his Ph.D. at Arizona State University. Jim entered Federal service with the Bureau of Reclamation in 1969.

During his career with Reclamation, Jim led research efforts on many reservoirs throughout the western states, with concentrated studies at Twin Lakes, CO, and Lake Mead, AZ-NV. Jim was a plenary speaker for the Rocky Mountain Regional Lake and Reservoir Management Conference held in Denver in 2006 where he presented a lake retrospective titled "*The Lakes I Have Known*". His work on lakes both nationally and internationally included being Principal Investigator for the U.S.-Spain Cooperative Research Program on Reservoir Eutrophication from 1984 to 2000, but he also spent time in China providing technical advice on the Three Gorges Project. After "retiring" in 2000, Jim became a consultant with the Southern Nevada Water Authority, which allowed him to not only split his time between his home and Colorado and the City of Las Vegas where he grew up, but also to devote all of his efforts to the study of Lake Mead.

Most of us knew Jim more for his contributions to NALMS, which were immeasurable. He served as a NALMS Region 6 Director from 1988 to 1990, was the leading force behind the highly successful NALMS Symposium in Denver in 1991, and received the Secchi Disk award in 1993. While many might have viewed that as the goal line, to Jim it was just another starting line. He went on to edit the NALMS news magazine LakeLine from 1992-1995 and followed that by becoming the editor of Lake and Reservoir Management in 1996, a position he just recently stepped down from and for which he was honored at the Lake Louise symposium in November, 2008. Jim drew many fellow Coloradoans into the NALMS organization and was a founding member of CLRMA along with a core group of other individuals that still remain in our organization. Jim held the country club membership that allowed CLRMA to utilize the Mt. Vernon venue for the first CLRMA conference in 1996.

Jim was a loving husband, father and grandfather. He is survived by his wife of 39 years, Carole LaBounty, who regularly joined him in his travels, his children Jennifer and James, and his grandchildren Zane and Shaelyn. He was an avid gardener – I remember the highlight of summer field trips at Twin Lakes was when his tomatoes ripened. He would slice them thick, top them with cheese and sprinkle them with herbs prior to a quick zap in the microwave or a pass under the broiler for a delicious and healthy lunch. He collected stamps and would appear in your office asking if he could have a stamp that was on a piece of mail from a foreign country. He was the most optimistic person you would ever meet and made friends readily and frequently wherever he went, traveled, or worked. At the NALMS conference in 1999, Jim ran a collection of dollar donations from conference attendees through a slot machine and more than doubled the money to make a substantial donation



to the student scholarship fund. He and his mother, Audrey, had a dinner and slots night each week in Las Vegas in old town, where they would spend an evening playing slots and enjoying each other's company. He loved cars and toys. He had one of the first video recorders and claimed to have all the Super Bowls on tape without commercials. He loved pets and had an African Gray parrot and a cockatiel. He kept a fish tank for many, many years and initiated the two large fish tanks at the Bureau of Reclamation's lab on either side of the entry door. He had a cyclid fish that lived more than 20 years. He attended the Desert Fishes meeting year after year to keep up on the status of the Desert pupfish, the subject of his PhD. Dissertation research. Jim was a great guy and a highly respected limnologist. He will be missed throughout the limnology community as well as every place he lived, worked and visited during his lifetime.



Twin Lakes, Colorado



Lake Mead Boulder Basin, Nevada



Ripples : State ANS Program Update by Elizabeth Brown, Invasive Species Coordinator, Division of Wildlife

As the New Year begins, the State Aquatic Nuisance Species (ANS) Program's strategic planning comes to an initial conclusion. In December, the Division of Wildlife (DOW) completed the State Zebra and Quagga Mussel Management Plan (ZQM Plan). The ZQM Plan describes the collaborative approach to detect, contain, and substantially reduce the risk of the spread and further infestation by zebra/quagga mussels in Colorado. Its primary components are early detection, containment, prevention, education/outreach and research.



The foundation of the ZQM Plan is a mandatory watercraft inspection and decontamination program to prevent the spread of mussels overland on recreational watercraft. We are essentially managing the number 1 vector of spread for zebra and quagga mussels, while also limiting aquatic weeds and other aquatic nuisance animals from being unintentionally transported to non-infested waters. The inspection protocol requires all water, mud and plant material be removed from the watercraft, trailer and vehicle. A State ANS Inspection Handbook has been compiled and is being finalized by a team of state and municipal representatives with 2008 practical experience. The Handbook will have all state standard forms and protocols, and will be the basis for the extensive training and certification program beginning in 2009.



It is of critical importance that all watercraft be clean, drained and dry in between waters. Boaters should remove all visible plants and mud from the boat and trailer, and drain all water from the boat. The juvenile stages of the mussels are microscopic and can be transported in water carried from one reservoir to another. The adult mussels are initially almost too small to see and grow to be 1-2 inches. Mussels can live in mud and on plants that boats move to new waters. Several Front Range municipalities implemented preventative inspection

programs in 2008 and we are hoping more will come on board in 2009. The boating public was especially helpful and cooperative with the response program in 2008 and we are asking for their assistance again in 2009. All managers, recreational users and partners have the ability to protect our waters by ensuring watercraft is clean, drained and dry before launching. In addition, it is highly recommended that infrastructure and distribution systems undergo facility assessment to assess risk and get preventative recommendations. Getting ahead of the mussels is much more cost efficient than trying to control them in perpetuity.

In addition to the ZQM Plan, regulations have been drafted as required by the State ANS Act. The regulations will be presented to the Parks Board for adoption in February. They define ANS (plant

and animal); set the standard requirements for scientific collection, sampling, identification, watercraft inspection, decontamination, quarantine, training, and reporting. The draft regulations require all trailered motorized watercraft to submit to an inspection prior to leaving an infested reservoir, prior to entering a high risk reservoir and prior to launching in any water of the state, if the watercraft has been in out of state waters in the last 30 days. Inspection stations are proposed for a variety of locations around the state, including infested waters, high risk waters, State Parks and select DOW offices.



The Co ANS Management Plan (CANS Plan) is the final piece of the strategic puzzle. The CANS Plan was drafted by the Co ANS Steering Committee which includes 15 members from state, federal, local governments, private industry and NGOs. It was written from 2007-2008 and details the recommended programmatic approach for managing ANS (plant, animal and pathogen) in Colorado. The Steering Committee is currently seeking approval for this plan.

Statewide sampling will continue in 2009 for zebra and quagga mussels. In addition, we plan to resume statewide sampling for over 25 species of aquatic weeds and over 20 animal species, while collecting baseline data on native species. DOW conducts visual and molecular identification for aquatic species at the Aquatic Animal Health Lab. Samples of plants or animals can be sent there for identification following the DOW protocol.

The statewide ANS education program is being ramped up again in 2009. Key elements include expanding the billboard campaign, invasive species webpage, increasing signage at waters, and distribution of print information. DOW is developing curriculum for grade school, junior high and high school on invasive species utilizing zebra mussels as the poster species. The curriculum will explore invasive species to teach students Math, Geography and Biology.

With the implementation of the ZQM Plan, the CANS Plan and the ANS regulations on the horizon for 2009, the budget is under constant evaluation. The ANS Act allocated an initial FY08-09 budget of \$3.9M to DOW and \$3.2M to Parks. The Act also allocated an annual budget of \$1.3M to DOW and \$2.7M to Parks beginning in FY09-10. Also, Parks was allocated 7 permanent FTE in the ANS Act.

The budgets allocated in the ANS Act were based on the state having a single positive water (Lake Pueblo) and currently there are 7 positive waters (Pueblo, Grand Lake, Lake Granby, Shadow Mountain, Willow Creek, Jumbo and Tarryall). With increased needs for containment, implementation of prevention at high risk waters statewide and increased sampling and education needs, the ANS budget is in need of growth at a time when most budgets are getting cut. Although funding is currently frozen, we are working to maintain the budget allocations granted in the Act. Education, information and monitoring are high priorities for funding.

The highest priority for funding is the containment of positively identified waters. Out of the 7 positive waters: 1 is a State Park, 2 are managed by DOW, 3 are managed by USFS and 1 is managed by the Town of Grand Lake. Site specific containment plans either have been developed or are under



development for all infested waters. Stakeholder groups have formed for each water body and are working collectively to implement a containment program.

The second priority for funding is off-site watercraft inspection and decontamination stations targeting watercraft that is coming from out of state waters. There are 10 proposed and the goal is to have 5 fully operational by Memorial Day. The others are planned to be phased in over time.

The third priority is the roving patrols with mobile decontamination units. These patrols will staff watercraft inspection and decontamination stations at waters that do not have permanent stations. They will staff 1-3 waters a day, and will enforce the “expect to be inspected” message on boaters. This will be modeled after the hunting and fishing license enforcement program and will have a high educational component.

Although prevention is the highest priority, there are high risk waters that are recommended for preventative inspections and decontamination stations that may not get staffed due to tough budget times. Most waters are multi-jurisdictional and extremely complex to negotiate. Many agencies do not have a budget line for ANS or watercraft inspections. Education will be in place at all these waters, along with our lower risk waters. If we are able to inspect all boats leaving infested waters and all boats coming from out of state, then we should also be doing a good job of prevention at other waters.

The program relies on the boat owner taking responsibility for their own vessel, and for the water owner or manager doing what they can to protect it. The State is trying to cast a net across the state targeting at the highest risks, but we can't do it alone. A State ANS Task Force has formed of 30 representatives from State, Federal and Local Governments, as well as private industry and NGOs. There is a strong partnership working to collectively address the challenges we are facing to manage this costly invasive species. CDOW is also an active member of the 100th Meridian Initiative; Western Regional Panel, Western Association of Fish & Wildlife Agencies and several national efforts to gain resources standardize protocols and raise awareness.

If you have any questions or would like additional information, please call me at 303-547-8690 or send an email to Elizabeth.Brown@state.co.us

Ask the *LakesPert* by Steve Lundt

Q: What is a ‘bathtub ring’ when they are talking about lakes and what does it mean if your lake has one?

Thanks, Armin Hammere (Powder Wash, CO)

A: Using the term “bathtub ring” is a visual way to describe what a lake or reservoir looks like when its water elevation has decreased, thus exposing a somewhat uniform “ring” around the body of water. Typically, the “ring” is the newly exposed shoreline that used to be littoral zone. Exposed dirt, sand, or bedrock that is exposed when a lake’s volume has decreased gives an obvious visual sensation similar to the high water mark left by soap scum in a bathtub.



Another common reason for a visual ring around a lake that has dropped in volume is the deposition of minerals. This “ring” tends to be more noticeable due to the white color that is left behind on the rocks, tree stumps, and any dam or shoreline concrete structures.

Calcium is the main mineral that causes the white deposits to form during the summer months. This is a good way to tell if your lake is a hard-water lake and is driven by the carbonate-bicarbonate water chemistry system. The white mineral is actual calcium carbonate or Calcite (CaCO₃). This “ring” of calcium is caused by the rapid increases in the rates of photosynthesis by algae. The pH goes up when photosynthesis goes up and the calcium carbonate forms when pH goes above 8 or 9.

No need to go scrubbing, it is just a part of lake and reservoir life.



Lake Mead in 2002 showing off its bathtub ring

Call Today!
1-866-437-8076



SolarBee[®]
Circulating the World's Water



Solar-Powered, Long-Distance Circulation for Improved Water Quality in:

Freshwater

- Prevent and control harmful blue-green algae blooms
- Reduce taste and odor problems in drinking water
- Improve aesthetics, water clarity and biodiversity
- Improve dissolved oxygen (DO) and pH levels
- Reduce invasive aquatic weed growth
- Improve fish habitats and prevent fish kills
- Prevent accumulation of Mn, Fe, H₂S and methyl mercury from bottom waters



Before Long-Distance Circulation



After Long-Distance Circulation



Potable Water



- Completely mix tanks of all sizes, to the boundary layers
- Solve water age issues, low residual issues • Prevent ice buildup



Wastewater

- Reduce energy consumption • Improve regulatory compliance • Reduce odors

www.solarbee.com/CLRMA • www.solarbee.com/CLRMA • www.solarbee.com/CLRMA



CVLM Program – Summary of the Fourth Season by Steve Lundt

Volunteers visited 25 Colorado lakes and reservoirs in 2008 collecting 260 Secchi depth readings! Since this program started in 2005, volunteers have increased the number of lake visits each year. Starting in 2005, volunteers collected 97 reads. Then in 2006 and 2007, volunteers collected 178 and 200 readings. This continuous increase in data collection shows just how important this program is and how dedicated our volunteers are.

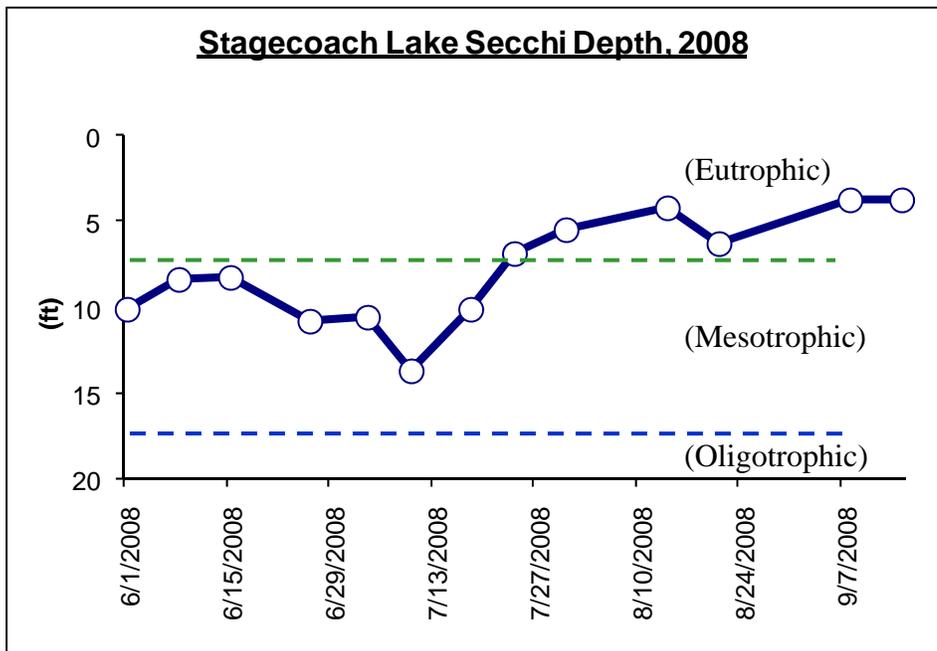
Here is a summary table of the 2008 CVLM program data, ranked in order of deepest to shallowest Secchi depth average:

Lakes/Reservoirs	County	Ave. Secchi Depth (feet)	Dips
Aurora Reservoir	Arapahoe	13.2	16
Button Rock Reservoir	Boulder	12.8	8
Belisle Reservoir	Arapahoe	11.9	7
Steamboat Lake	Routt	11.3	6
Vega Reservoir	Mesa	9.5	8
Grand Lake (middle)	Grand	8.9	8
Ridgeway Reservoir	Ouray	8.3	4
Stagecoach Lake	Routt	7.9	13
McLellan	Arapahoe	6.9	8
Horsetooth Reservoir	Larimer	6.8	3
Lake San Christobal (3 sites)	Hinsdale	6.3	6
Barr Lake	Adams	6.1	7
Quincy Reservoir	Arapahoe	5.9	16
Boyd Lake	Larimer	5.7	7
Little Deer Lake	Larimer	5.5	9
North Sterling Reservoir	Logan	4.0	7
Meadow Lake	Larimer	3.9	9
Sunset Lake	Larimer	3.8	9
Trinidad Lake	Las Animas	3.5	10
Rainbow Lake	Larimer	3.4	9
Cherry Creek Reservoir (3 sites)	Arapahoe	3.1	27
Jackson	Morgan	2.8	1
Willow Lake	Larimer	2.4	9
Mirror Lake	Larimer	1.9	9
Viele Lake	Boulder	1.8	1



The lakes that participated in 2008 include: Aurora, Button Rock, Belisle, Steamboat, Vega, Grand, Ridgeway, Stagecoach, McLellan, Horsetooth, Lake San Christobal, Barr, Quincy, Boyd, Little Deer, North Sterling, Meadow, Sunset, Trinidad, Rainbow, Cherry Creek, Jackson, Willow, Mirror and Viele.

All volunteers will get their annual report card for the 2008 season by mail before the spring. The report card summarizes the volunteer information, lists all the data that was collected, graphs the water clarity over the summer, and calculates the Trophic State Index. Some of these volunteer lakes are starting to get a long term record of how their lakes look during the summer season. Steamboat Lake did a great job in 2008 by getting a steady record of water clarity. You can really tell when the lake was the clearest and when the summer time algae kicked in.



Again, the Colorado State Parks did a great job participating in 2008. Of the 25 monitored lakes, 10 were managed by the state parks system. These high profile lakes and reservoirs that so many people go to visit each year are crucial to the CVLM program. Visitors and volunteers at the state parks can be educated about water quality and what water clarity means to their park.

For 2009, we will continue to heavily recruit new volunteers on lakes and reservoirs that have not seen much attention over the years. CLRMA would like to get more volunteers on west slope lakes and to encourage more recreational lake users to volunteer. The State is also providing water quality probes that will be able to be used by volunteers to record profile data for pH, dissolved oxygen, temperature, and conductivity. So we are looking for a few dedicated volunteers on lakes with little profile data to sign up for an extended program.

And as always, your volunteer efforts will be rewarded with a free membership to CLRMA. Thanks to all the past and current volunteers for your great and important efforts, and we look forward to 2009 season. Training will occur again in the spring at the luncheon and the details will be coming out soon.





The 2008 NALMS Annual Symposium was held at Chateau Lake Louise in Banff National Park. A fresh snowfall greeted everyone upon arriving. The weather was brisk, but refreshing and comfortable and nearly everyone took a break at some point and hiked around Lake Louise. Some went Nordic skiing or hiked up towards the glaciers until they were postholing in the snow. Chateau Lake Louise was everything that was advertised and the symposium was very well organized thanks to NALMS staff and the host committee.

The Banquet had an interesting assortment of entertainment ranging from an amazing native hoop dancer to a singing couple that presented the geologic history of Banff National Park as a musical comedy skit, complete with props. The hospitality suite, though a bit mellower than the Banff experience ten years ago, was well attended and situated in a comfortable reception area with views and a fireplace. Friday night was dinner in Banff and then on to the Hot Springs. The cost of Cuban cigars has increased exponentially since the last Banff conference 10 years (sorry Vic!) and the exchange rate favorable to the US dollar.

CLRMA attendees included Jean Marie Boyer, Joni Nuttle (outgoing Region VIII Director) and Kelly DiNatale. Other Colorado attendees included Sarah Johnson, CDPHE and Sarah Dominick, Denver Water, Craig Wolf, GEI/Chadwick and Jim LaBounty. I was fortunate to spend a short time having a nice visit with Jim LaBounty, not suspecting that his health was in serious decline. U.S. federal government employees, limited in attendance due to budget considerations, were noticeable in their absence.

Colorado had a good representation in presentations. Sarah Dominick (presenter), Travis Bray, Alex Horne (presenter) and Kelly DiNatale authored two presentations on Marston Reservoir, one on the Speece Cone installation and the other on wetlands pretreatment for Conduit No. 15/Bear Creek inflows to Marston. Jean Marie Boyer (presenter), Mike Happe, Mary Fabisiak and Tom Settle authored a presentation on the City of Westminster's mussel control program for boats entering Standley Lake. Craig Wolf (presenter) and Steve Canton authored a presentation on the installation of the mixing system at Cherry Creek Reservoir. These presentations were well received and all had a few questions from the audience. As usual at a NALMS Symposium, many other presenters were peppered with a few skeptical questions, especially from the academics in the audience.

It was great to catch up with fellow NALMS members from all over the continent and make some new acquaintances. Many members that had missed some of the more recent symposiums made sure they made this one. The Certified Lake Managers/Professionals Luncheon was also an opportunity to catch up with fellow lake managers.



SPOTLIGHT - Linda Rosales, Denver Water

Age: 53

Yrs w/ CLRMA/NALMS: I really don't remember when I first joined so it must be a few years back!

Yrs in CO: 53

What do you do: I work with Denver Water as a Water Quality Specialist. I'm responsible for all metals analyses and routine monitoring of selected reservoirs in our system. I have a general interest in lakes, wetlands, and nutrients and am also involved in projects relating to these issues.

Family: I have a 24 year old son named Ben. Other family members in the area include my mom, my sister and her family, and my brother and his wife. Guess I should also give a nod to my two cats, Jack and Belle.

When I'm not working I am...gardening, cooking, hiking, reading, going to plays, seeing movies, or catching a Rockies game.

Your idea of happiness: A warm summer evening spent at a concert at Denver Botanic Gardens with friends, a picnic supper, and a bottle (or two) of wine.

Not many people know that... I love opera and have season tickets to Opera Colorado.

What do I like to do most: I recently had my kitchen and adjoining rooms remodeled, so now I enjoy having family or friends over for a meal in my new space.

If I won the lottery: I would pay some bills, travel more, and put a portion of the money to work for those who haven't had the good fortune I've enjoyed.

Last book I read: Out Stealing Horses by Per Petterson, a beautifully written introspective novel set in Norway.

What political office: I love to discuss/argue politics but I've got no political aspirations of my own.

Toughest aspect of my job: Honestly, there are not too many aspects of my job that would qualify as tough. There are times when I'm out on a nice morning on one of DW's reservoirs that I think I can't believe I get paid to do this!

What famous person would you like to meet most: I'm going with the moment and choosing Barack Obama.

