

SAVE THESE DATES

(Don't miss these upcoming opportunities)

Lakes Appreciation Event

July 18, 2009, Barr Lake State Park

This is a fun event for the entire family. The festivities will start early with a shoreline cleanup event, followed by a free zero-waste catered lunch to thank the volunteers. Afternoon events will once again feature free fishing poles and demonstrations from the Division of Wildlife, free canoe lessons, face painting, sponsor booths and more! Park entrance fees will be waived for event volunteers.

Board Meeting

July 28, 2009, Metro WRD, (9:00 am – Noon)

Stakeholder Meeting / Annual Watershed Tour and Picnic

August 25, 2009, (9:00 am – 2:00 pm)

Join us in the morning for a brief stakeholder meeting, followed by a tour of several local water quality BMPs in action! Call Darcie Garland-Renn @404-2944 x22 to reserve your seat now, since space is limited.

Additional details will be announced closer to the date.

Please see the calendar page at www.barr-milton.org for event confirmation, agendas and additional details.



The Barrimeter

A Publication of the Barr/Milton Watershed Association

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Barr Lake History By Michelle Seubert, Colorado State Parks



View of Old Stone House at Barr Lake—1900

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(Mailing Area)

The year 2009 will mark the one hundred-year anniversary of the dam at Barr Lake, originally constructed to provide water to farmers in the region. At that time, Barr Lake was still a frontier, with herds of buffalo and Native Americans both frequenting the area seeking refuge and food. Prior to this time, the Barr Lake area was also the location of the historic Goodnight-Loving trail, which was used to transport cattle from Denver, Colorado to Cheyenne, Wyoming.

Not long after the cattle trail days, the rapid expansion of railroads in the U.S brought the Chicago, Burlington and Quincy Railroad line to Barr Lake; it was built there in 1883. Shortly after the arrival of the railroad, settlers constructed the original dam and dug several canals to the South Platte River, which resulted in the Oasis Reservoir. The reservoir

was later renamed Barr Lake, a name that was derived from a civil engineer who worked on the construction of the railroad. A new dam was constructed in 1909 to provide water and meet the needs of farmers in the region. The Farmers Reservoir and Irrigation Company organized during this time, which assured water for the farming community even in times of drought

Colorado State Parks received a recreational lease for Barr Lake State Park in 1975, and two years later the lake became an official state park. The Colorado Bird Observatory headquarters, founded in 1988, also currently exists at the park. Bird lovers come from all over the state to enjoy over 350 different species of birds that inhabit the park.

State and International Lake Management Organizations

By Steve Lundt, Metro Wastewater Reclamation District

Lake and reservoir management, as many of the BMW stakeholders are finding out, is not as easy as it sounds. There are many in-reservoir and watershed aspects to properly managing a reservoir such as Barr Lake and Milton Reservoir – when do you bring in and release water, how do you monitor it, what tools are out there to help fix an algae problem, and how do you balance all the uses are just a few of the big questions that need answering.

As with most professions, there is a tiered system of getting help and support for lake and reservoir management. In Colorado, the next level beyond a watershed or lake association is the Colorado Lake and Reservoir Management Association (CLRMA). This non-profit, statewide group has been helping Coloradoans with lake and reservoir management for the past 13 years. For a very small membership fee, you can have access to a group of lake professionals that have probably encountered and solved your lake problem. There are about 150 members who participate in annual meetings and events. CLRMA also coordinates a statewide volunteer lake monitoring program to help smaller groups with monitoring. To learn more and to join, go to www.clrma.org.



The next level is the North American Lake Management Society (NALMS). This international group includes the cream of the crop when it comes to lake managers and professionals. NALMS administers a Certified Lake Manager (CLM) program and provides a great service by having these CLMs across the country to help local organizations. There are about six CLMs in Colorado! NALMS also is involved in Washington D.C. to help participate in federal agencies and legislation that impacts lakes. Also, NALMS has been putting on an annual fall symposium for the past 29 years bringing lake managers, consultants, lake users, and industry together for a multi-day conference. To learn more about NALMS and to join, go to www.nalms.org.



Reminder:



Monetary support from our membership is essential to the continued operation of the BMW Association as we work towards improvements in water quality in Barr Lake, Milton Reservoir, and the connecting waterways. Membership is also important as “match” contributions required to maintain the 6-year grant awarded to the BMW Association through the Colorado Department of Public Health and Environment. These funds support the BMW Coordinator position, information and education outreach expenses, and contractor’s fees for the extensive technical analyses that are needed to complete the pH TMDL and meet water quality goals.

You can download a membership form and learn more about the three levels of membership at: www.barr-milton.org. Please submit your membership forms and payment to BMW Association Coordinator Darcie Garland-Renn at 12303 Airport Way, Suite 370, Broomfield, CO 80021. All contributions are well appreciated, including both membership dues and your personal investment of time.



Modeling work undertaken by the BMW Association is drawing to a close. AECOM (formerly known as ENSR) will be finalizing the modeling report by the end of June. The modeling work will now serve as the foundation from which a pH TMDL (total maximum daily load) will be developed.

So why is a pH TMDL required? Section 303(d) of the Clean Water Act requires that each state identify those waters for which existing technology-based pollution controls are not stringent enough to attain or maintain state water quality standards. In 2008, the Water Quality Control Commission adopted a 303(d) list of impaired waterbodies for Colorado. Both Barr Lake and Milton Reservoir are included on this list because neither meets the acceptable pH standard range of 6.5 to 9.0 units. Both reservoirs exceed the upper limit of 9.0 units more than 15% of the time sampled. Because the reservoirs are “impaired” for pH, a TMDL is required.

A TMDL is a calculation of the maximum amount of a pollutant that a water body can receive and still meet water quality standards, and an allocation of that amount to the pollutant’s sources. In mathematical terms:

$$\text{TMDL} = \text{LA} + \text{WLA} + \text{MOS}$$

TMDL = total daily maximum load
LA = nonpoint source load allocation
WLA = point source waste load allocation

If TMDLs address pollutants, then how does this work for pH since pH is not a pollutant? pH is simply a measure of the concentration of hydrogen ions that defines how acidic or basic the water is. Photosynthesis uses up hydrogen molecules, which causes the concentration of hydrogen ions to decrease and therefore the pH to increase. The excessive algal populations in the reservoirs are photosynthetically active and are largely responsible for affecting the hydrogen ion balance, which drives the pH above 9.0. The modeling work has concluded that high levels of nutrients, particularly phosphorus, fuel the growth of the algae. So the ultimate solution for controlling pH is to control phosphorus, which now becomes the pollutant of concern.

What are the components of the TMDL that will be addressed by AECOM? •

- Selection of water quality targets. In order to meet the existing pH standard, an in-lake target concentration for the pollutant, phosphorus, will be determined. It is also likely that a target concentration for chlorophyll will be selected. Chlorophyll is the parameter commonly used to measure and monitor algal productivity.
- Descriptions of the magnitude, seasonality, and duration for the selected water quality targets.
- Identification of allowable nutrient loads to meet water quality targets. The loads will probably target phosphorus and be expressed in terms of allowable pounds flowing into the reservoir over a given period of time.
- A definition of the margin of safety (MOS). The MOS is designed to account for uncertainty in calcula-

- Characterization of internal loading and how that influences the TMDL equation. Phosphorus loading into the reservoir over time has resulted in an accumulation of phosphorus in the lake bed sediments. This internal source will flush out over time as external sources are reduced, but in the short-term needs to be considered a source that will influence target in-lake phosphorus concentrations
- Identification of existing nutrient loads specific to each reservoir by source, type (e.g., publically-owned treatment works, MS4 stormwater sources, nonpoint sources, internal load, etc.), and season.
- Allocation of nutrient loads to wasteload (WLA) and load (LA) to meet the allowable load, with supporting rationale for assigning allocations

A first draft of the TMDL should be available by fall of 2009. The Water Quality Control Division intends to work with the stakeholders on development of the draft and its finalization through 2010. Ultimately, the Environmental Protection Agency needs to approve the final TMDL before it is implemented.

Gardening Naturally

by Brandy Vignali, Colorado State Parks



Changing your gardening techniques and gardening naturally can be an easy way to improve local water conditions and limit water consumption. By using less water and fertilizer, you can help the environment and our water supply. Fertilizers and pesticides can enter the watershed through runoff, or by leaching into the ground water. Whether you want a flower or vegetable garden, there are many ways to have a successful garden without the use of these chemicals.

When you start your garden, find out what type of soil you have and choose plants that will grow well in your soil type. If you are planting a garden that will require soil amendment, choose a natural way to do this, such as peat or lime. Soil amendments are added to help improve soil properties and provide conditions for healthier plants. If your soil requires a lot of amending, a raised bed may be a good option as the soil will be contained.

The next step to maintain a healthy natural garden is to choose good quality seeds. It is important to choose seeds that are resistant to disease and that will tolerate light conditions where you plan to grow them. In other words, don't try to grow plants that require shade in a sunny spot, or vice

versa. For a flower garden, choose native species. These plants will grow best in your soil type and with the water that your area receives naturally. Native species will also limit the amount of fertilizing and watering required for a successful garden.

Another important step in achieving a successful and healthy natural garden is fertilizing with compost. This is the best option for fertilizing your garden since it can be used like regular fertilizer to add missing nutrients to your soil. It's easy to create your own compost from kitchen scraps or to buy compost at your local garden center. Compost is beneficial to a natural garden whether you are growing for flowers or vegetables.

There are many resources available to help maintain a successful natural garden here in Colorado. Colorado Weed Management Association publishes a book of native plant options for your garden called *Garden Smart Colorado*, as well as a book on invasive plants available at <http://www.cwma.org/publ.htm>.



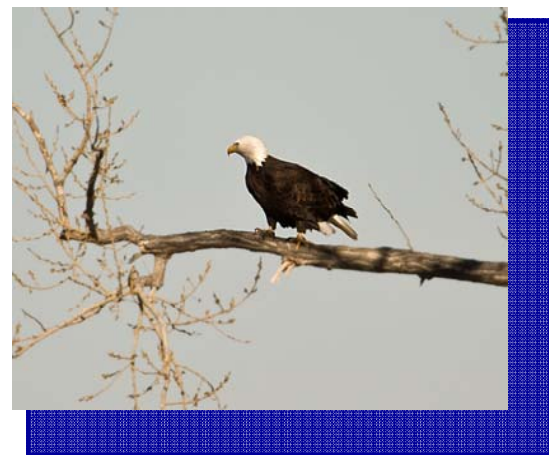
You can also find great tips on composting at www.eHow.com and on CSU's website at <http://www.colostate.edu/Dept/CoopExt/4DMG/New/coloway.htm>.

Bald Eagle Nesting at Barr Lake

Join the celebration of more than 20 years of bald eagle nesting and public viewing at Barr Lake State Park's wildlife refuge, including the hatch of two eaglets which occurred this spring. Barr Lake contains the ideal habitat for nesting bald eagles with large old cottonwoods, rich food sources, and little disturbance. A pair of bald eagles has attended a nest in the wildlife refuge since 1986 fledging 36 young from eight different nests.

The Rocky Mountain Bird Observatory's (RMBO) Bald Eagle Watch volunteers carefully monitor the bald eagle pair each year when they begin nesting in late February. On March 27th, RMBO volunteers observed parents feeding young in the nest. If all goes well, these juveniles will fly from the nest in early July and remain in the area with their parents for most of the summer.

You can come to the park and see the eaglets in their nest, and watch as they learn to fly and hunt. A 2.5-mile walk from the nature center to the newly constructed blind provides the best view of the nest. You can also take a ride on the Eagle Express motorized tram to the area every Saturday at 10 a.m. and Sunday at 11 a.m. Reserve your spot on the Eagle Express by calling the Barr Lake Nature Center at 303-659-6005. Be a part of the celebration of bald eagles and come visit Barr Lake State Park.



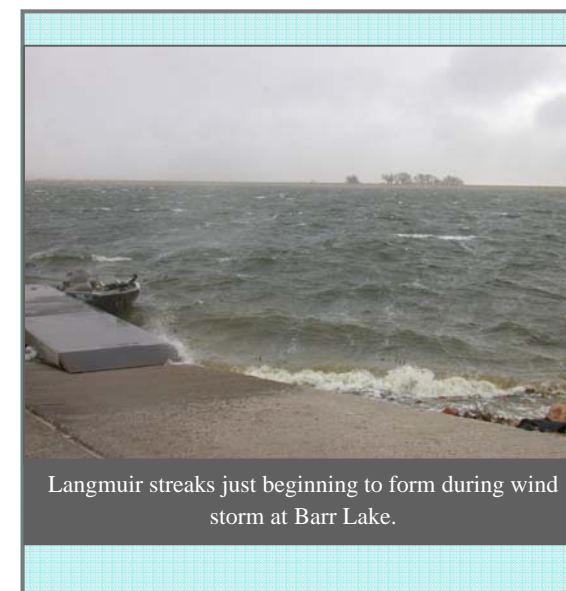
Tech Corner...

What makes those straight, white lines out on the reservoir and why does my hat fly off while I am looking at them? The answer is wind.

Wind between 7-16 mph makes these lines and can easily take off a loose hat. The lines are called *Langmuir streaks*, discovered by Irving Langmuir in about 1938 when he noticed them as he crossed the Atlantic Ocean on a ship.

The theory is that when wind speeds between 3-7 m/sec (7-16 mph) occur over the surface of a large body of water, the sporadic turbulence begins to organize into vertical, helical currents in the upper layers of the water (Langmuir cells). Convection from this vertical motion generates streaks, which are oriented parallel to the wind direction. The streaks are at the point where two parallel, horizontal cells are converging, creating a collection point of surface debris and floating foam.

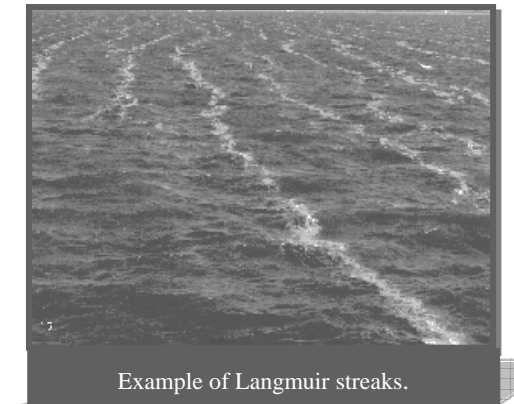
Like most lakes and reservoirs, both Barr Lake and Milton Reservoir tend to always have some floating debris such as, wood, tumbleweed, styrofoam, and other foreign material to collect at these merging points. Also, Barr and Milton are high in phosphorus, which causes the foaming to occur.



Langmuir streaks just beginning to form during wind storm at Barr Lake.

Langmuir Streaks

By Steve Lundt, Metro Wastewater Reclamation District



Example of Langmuir streaks.

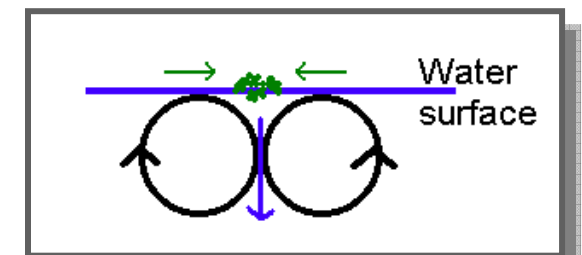


Diagram of two Langmuir cells merging.

The usual Langmuir cell will be 4-6 meters deep. However, in certain situations in the ocean, mixing can occur as much as 200 meters below the water surface. Typically the cell axes are aligned along the wind direction but can vary as much as 20 degrees. When wind directions change, the cells will gradually shift to realign, lagging behind by 15-20 minutes.

Why does this matter? These cells are providing a great opportunity for mixing to occur in the reservoir. Mixing can cause many different things to happen: 1: Downwelling from the surface can help pull down oxygenated water to deeper, oxygen deprived water, 2: At the same time, upwelling can pull up nutrient-rich, bottom water, creating a nutrient rich top layer of water which when mixed with sunlight can cause an algae bloom days later. Understanding how the water mixes during windy weather can help with reservoir modeling and predicting the movement of water, algae, nutrients, and other pollutants.