

Lake of the Ozarks (LOWA) General Meeting 7-16-07  
Escollo Room, The Lodge of 4 Seasons

Donna Swall, Executive Director of LOWA, brought the meeting to order at 6:30 pm with a welcome to all and a thank you for coming. Announcement: NO PUBLIC MEETING IN AUGUST. This time will be used for committee work. Everyone, please find a place of special interest to you and volunteer some time and energy to one of LOWA's focus/working groups/committees. You can learn about each of LOWA's standing groups by accessing LOWA's website and clicking on the various links. While you are there, you can sign up to volunteer for one of those groups! LOWA's website is [www.soslowa.org](http://www.soslowa.org). Then there were introductions all around.

Looking at LOWA's logo, we see the entire Lake of the Ozarks watershed, extending even into Kansas. This large picture watershed encompasses many smaller watersheds within it, each of which flows, first to its own stream or creek and then, eventually, into the Lake of the Ozarks. LOWA, while cognizant of the whole picture, has adopted a portion of the whole Lake of the Ozarks' watershed that is more immediate to this Lake area. This portion of watershed takes 4 counties into effect - Miller, Morgan, Benton, and Camden - and utilizes map units called HUC-14's (a hydrologic watershed management term). The map that will identify the boundaries of LOWA and of the Lake District 4 County Alliance can be seen on and downloaded from the LOWA website.

The main speaker for the evening was James E. Vandike with the MO DNR Water Resources Center and the talk was entitled Karst Hydrology in the MO Ozarks. There are 2 main layers in the ground. The layers not saturated with water are called the Vadose or unsaturated zone and the layers that are saturated with water are called the saturated or Phreatic zone. Groundwater is found in the saturated zone and basically is water that has filled all the air holes between the particles making up that particular rock layer and water filling cracks within a rock layer. An aquifer is a group of geologic units (generally rock layers) capable of yielding an economically significant source of water. Groundwater makes up about 66% of Earth's freshwater resources. If one excludes icecaps and glaciers, then groundwater makes up about 95% of Earth's freshwater. Most rock in the Ozarks is limestone or dolomite, both of which are soluble in rain water. So as rain (which has carbonic acid in it when pure and sulfuric and nitric acids as well when polluted to be acid rain - all rain is naturally a little bit acidic)

falls and percolates through the ground, some of the underlying limestones and dolomites are dissolving, cracks in the rocks are widening, and caverns are forming. The solid whitish deposits in our water heaters are basically those limestones and dolomites coming back out of solution. These cavities and widenings in the carbonate rocks help make those good aquifer layers. Sandstone can also be a good aquifer rock (air spaces between the sand particles) and around the Ozarks we have the Gunter Sandstone. Shale and siltstone are not good aquifer rock types because water cannot flow through them but they do make good confining layers - layers that hold the water in place. Red clay is the residuum left behind when the rocks erode, along with that hard, sharp rock known as chert. This material is not compacted and so water can move through it. Chert is the rock used by the Indians to make arrowheads because it chips to such a sharp edge. Chert does not weather and erode away like the other rocks do. Chert is chemically very similar to quartz and glass. Chert is the rock on the gravel roads that chews up car tires. Granites and rhyolites finish out the large picture and they are the deep basement confining rock units.

The western Ozarks has thin, shaley limestones and sandstones that do not have good water-bearing features. Down by Springfield, the limestones and sandstones also do not hold a lot of water. But the Ozark Plateau, of which the Lake of the Ozarks is in the middle, has thick dolomites and sandstones which do hold an abundance of water. The hydrogeology of the Ozarks Plateau is greatly affected by the history of the area. These rocks are very old and even though they were originally laid down in very flat layers, in the hundreds of millions of years since deposition, the rock layers have been uplifted, down folded, and in general, tilted and cracked. Hydro refers to water and the ultimate source of water is precipitation. Missouri averages 35-47 inches of precipitation per year. Some of the moisture that falls is returned to the atmosphere by evaporation of water from water surfaces and from soil, and some moisture is returned by moving through a plant and evaporating from leaves and other plant surfaces. The plant evaporation is called transpiration and together the entire process of moisture returning to the atmosphere is referred to as evapotranspiration and estimates of moisture return through evapotranspiration are 26-30 inches per year. Groundwater recharge is the process of returning water to groundwater. People affect the amount of groundwater recharge by how much water they pump out of the ground from wells or from rivers to use for drinking, manufacturing, agriculture, or any of the many other uses people have for

water. Surface runoff also affects the amount of water returning to the groundwater system. In general, the total amount of groundwater recharge is difficult to measure but usually this part of the Ozarks has an average groundwater recharge of 6-14 inches per year. So, total water pumped out of the system has to be monitored so that the aquifers are not depleted by more water being taken out than is put back through recharge. There are 2 general types of groundwater recharge - diffuse and discreet. Diffuse recharge is the slow, downward percolation of water from the land surface to the groundwater table. This occurs over a large area of land and is non-concentrated. Discreet recharge is localized and concentrated - sinkholes are often areas of discreet recharge. With diffuse recharge, soils and rocks can, to an extent, filter the percolating waters. However, with discreet recharge, there is often no filtering at all and large amounts of water from the surface can enter the groundwater system very quickly. The Ozarks, in general, because of their cracked up and dissolved limestones and dolomites, tend to not filter water from the surface very well. Water from the surface can travel through the cracks and cavities underground very rapidly in the Ozarks compared to other parts of the country. This makes our wonderful aquifers very vulnerable to pollution since rain waters can pick up chemicals and other pollutants on the surface and carry those substances into the groundwater relatively unfiltered or cleaned. The name for this kind of land surface is karst. A karst region is characterized by having geologic features formed by dissolution of soluble rocks such as limestone and dolomite. Sinkholes, springs, caves, and losing streams are all examples of the geologic features of a karst region. The Ozarks of Missouri is a karst region. The sinkholes, springs, and caves form an underground plumbing system and many are connected. Often the drainage patterns associated with above-ground rivers and their watersheds are completely different from the movement of waters underground through the rocks. This is typical of karst regions and makes the hydrology of such regions fairly complicated. Karst systems have recharge features of sinkholes and losing streams, transport features such as caves, cracks in the rocks, springs, and solution enlarged conduits and openings, and discharge features such as large springs. Sinkholes begin forming underground and over time can become quite large. They can appear seemingly quickly by the collapse of overhanging sediments. Sinkholes become natural funnels, channeling runoff into the sinkhole and that can affect the underground water and springs. Sinkholes can also form permanent or temporary ponds. West Plains had a

sewage lagoon that collapsed into a sinkhole, sending all that sewage to Mammoth Springs, Arkansas. What a surprise. Houses, cars, etc. can disappear into sinkholes that appear quickly also. A losing stream channels most of its flow underground instead of on the surface. In times of high precipitation, when the water table rises, water may actually flow on the surface of a losing stream channel. Many people know a losing stream as a dry creek bed that only flows when it rains. Openings in the bedrock of a losing stream can transport water quickly away from the surface so that the water moves down, out of the stream bed, and flows underground. The same stream can be losing in one spot and flowing on the surface at another spot. The state of Missouri does monitor groundwater recharge around the state with groundwater level observation platforms. Also, water tracing is used to track the flow of water through the springs, losing streams, and sinkholes of the Ozarks. Sinkholes make very bad dumps. Subsurface waters in one watershed can surface in a different watershed. There is an illegal sinkhole dump in Laclede County that, when dye traced, showed the rain water runoff flowing from the sinkhole dump to the Ha Ha Tonka spring. Ha Ha Tonka State Park shows, wonderfully, all the major geologic features of karst regions with magnificent sinkholes, losing streams, springs, and caves all present. Most surface caves, by the way, are not active underwater conduits. Missouri's aquifers hold some 500 trillion gallons of potable water and 87% of that is in the Ozarks of southern Missouri. For more groundwater information, please go to:

<http://www.dnr.mo.gov/env/wrc/groundwater/gwnetwork.htm>

Next, Greg Stoner, LOWA Water Quality chair, reported on the *E. coli* study in the coves of the Lake of the Ozarks. Three of the six samplings for this year have now been conducted. Each site is sampled 3 times with alternate months sampling alternate sites. The vast majority of sites sampled so far have shown very low *E. coli* amounts. In May, 3 sites (out of 62) showed levels of *E. coli* greater than the 126 mpn/100mL level for the standard. One site that showed 866 mpn/100mL in May showed only 8 mpn/100mL when retested in the July sampling. One other that showed high in May also tested low in July. However, one site that was above the standard in May, did show up above the 126 mpn/100mL again in July. The 126 mpn/100mL is the maximum number of bacteria colonies from a sample that can be found and still have the lake water considered safe for whole body immersion. People should remember that this is a number that can fluctuate quickly depending on factors such as weather, precipitation and

temperature. One reading does not a crisis make, but these readings do send up a red flag that the departments of health and natural resources respond to and investigate. LOWA has no authority in these matters but sees its function, in part, to disseminate the information found. Of all the samples tested in May, only 3 were greater than 126 mpn/100mL, 5 were between 40.1 and 126, 23 were between 10 and 40 mpn/100mL, and 31 samples were less than 10 mpn/100mL. This data is on the Lakes of Missouri Volunteer Program (LMVP) website, which can be linked from the LOWA website, or accessed directly at [www.lmvp.org](http://www.lmvp.org). MO DNR's SW office has the Lake of the Ozarks (LOZ) in its region and they have been looking into the coves with high numbers to try to find out why those numbers were so high. All data LOWA receives gets passed on to the 3 counties' health departments, as well. Results from June, from the alternate set of sites, showed only 1 sample greater than 126mpn/100mL. July's results showed only one site greater than 126mpn/100mL also and that was the site mentioned above, which in May tested at 488 mpn/100mL and in July tested at 228 mpn/100mL. This site is located in a cove that is unnamed on maps, but is now being referred to as Wheel House Cove. It is cove # 09 and is west of Downy Branch Cove. Next year, this 5-year bacteria study will concentrate on a different set of about 120 sites, but will include sites from this year that prove problematic. All of this data is on a map on the LMVP link accessed from the LOWA website. The map shows the location of each sample site and denotes the site by a color-coded balloon. When a person clicks on a balloon, the data collected from that site pops up for easy reference. Jonathon Blodgett, with MO DNR, has been investigating some of the sites of concern where high numbers for *E. coli* have shown up and he reported that he has not, as of yet, found any of the water treatment facilities in that area to be malfunctioning. A comment from the audience indicated that public perception of the Lake of the Ozarks is that the Lake is full of *E. coli* because of the way some press reports have been written. Some LOWA members and officers have been receiving phone calls from Kansas City, St. Louis, and even Chicago, asking about the bacteria in the Lake. We all need to be careful what we say and how we say it so people don't get the wrong idea about the Lake. Data from the sites sampled so far actually indicate a pretty clean Lake, but all data is preliminary and no conclusions should be drawn from the data yet. A simple summation of the data collected in the bacteria study so far is being prepared by Lindsay

Tempinson of MO DNR who is also working on the bacteria study. She will try to explain what all these numbers really mean.

LOWA is working with McDuffy Labs so that LOWA members can collect their own water sample and get it tested at a discount price of \$23.00. On LOWA's website are instructions for how to properly collect the sample without outside contamination for accurate test results.

Next on the agenda was Chris Hall, LOWA LDP Chair. **LDP (Lake District Plan)** is the working group responsible for writing the watershed management plan for the Lake of the Ozarks Watershed Alliance (LOWA). This document is officially called the Lake District Plan 4 County Alliance. The LDP is all about how we will be growing here at the Lake of the Ozarks. The group has officially adopted a map showing the boundaries of the Lake District (and LOWA) and now the decision makers around the Lake, the community leaders and organization heads, all need to have their voices heard by LDP and LOWA so that their needs and dreams can be addressed in this document. Any city, town, community, or organization in this watershed will be able to use this document in writing grants and funding projects, so everyone's voice needs to be heard. Now that the boundaries have been established, the next task for the LDP group is to gather data about this area to find out where we are at right now. We need to determine what we have, what we don't have, and what we'll need for the future. Physical, biological, chemical and demographic information will be collected and summarized. Then, the LDP group will begin a new tour around the Lake to gather input from all the communities within the watershed about their needs and how they feel about the Lake. Then the LDP group will be able to write goals and objectives that reflect all the voices and proceed with action plans. Finally, the document will include implementation plans with benchmarks and evaluation procedures. This will take a lot of work to get this written by the LDP group's target of Oct 08. This is also everyone's opportunity to have their voice heard so that we can become Our Lake, One Voice. The Lake District Plan (LDP) group meets every 2<sup>nd</sup> Tuesday at Laurie Central Bank from 11:30-1:30 and a light lunch is provided by LOWA. Donna Swall reminds us that part of LDP is working with the population changes that have been happening and will be happening around the Lake. The Lake of the Ozarks is a beautiful, clean lake but it can be stressed. LOWA is trying to be proactive to help keep the Lake healthy.

In quick reports from other committees:

**Water Safety** is starting its Designated Captain on Board program by working with area restaurants and marinas to give the DC (Designated Captain on Board) free sodas. The DC will carry a special key chain to show his/her status. The Water Safety group also has a campaign going to increase people's awareness of the importance of wearing a life jacket (personal floatation device, aka pfd).

**Education/Outreach** desperately needs people to help man a table at local area festivals, tournaments, and fairs, even if only for an hour on a weekend. Lots of helpers are needed. Anyone may volunteer by contacting the Education/Outreach link on the LOWA website or by contacting any of the officers of LOWA. More information can be found online and new information is posted regularly. Thank you!

**Stream Team** group announces a Discover Our Niangua Rivers celebration of two of the rivers that flow into the Lake of the Ozarks, the Niangua River and the Little Niangua River. Stream Teams and people simply interested in streams are all invited to Bennett Springs on Oct 13<sup>th</sup>. We'll gather around 9 am for morning refreshments (coffee!), then go out and sample some sites on the two rivers, and come back for a BBQ lunch, hosted by LOWA. Please watch for more information on the Stream Team link on the LOWA website.

**Waste Water:** LOWA's Pump-Out Program, this year beginning in Camden County and expanding to Miller, Morgan and Benton counties in the next years, is targeted to begin in August. The goal is for 120 septic tanks to be pumped out this year and raise awareness about septic systems and the importance of them working properly. The public is invited to come out and watch a pump out to learn about what happens, why it's necessary, and how proper care of septic systems can positively impact the Lake. People will also be able to visit a sewage lagoon to see the correct way to take care of septic system wastes. Applications will soon be available on LOWA's website and in both the LakeSun Leader and the WestSide Star. Improperly working septic systems can affect the quality of your drinking water and of the Lake water.

LOWA's Pump Out brochure is being redone and will be available again shortly. This brochure has a map showing the location and names of all the marina's, campgrounds, and RV parks around the Lake that have pump out stations to help keep the Lake's waters clean.

**Membership** - Carol Lee Prosser has designed a new membership card and has membership application forms online and on both brochures. Encourage your friends and neighbors to join. Hey, why don't you join, too!

Bob Schultz, head of the Stream Team program had a word about the Americorps Project, which placed 12 Stream Team Assistants across the state last year. This year, LOWA will hopefully get an Americorps Project Stream Team Assistant to help with LOWA's everyday correspondences and business. Assistants can also organize and help with projects (like the Pump Out project) and do presentations and educational events. LOWA must fund a part of the assistant's salary and provide some office space and is in the process of trying to arrange all that. If anyone is interested in becoming an Americorps Stream Team Assistant or to find out more information about the program and its many benefits, please contact Bob Schultz at the Missouri Dept of Conservation, [www.mostreamteam.org](http://www.mostreamteam.org). The link is at the bottom of the page.

The next LOWA meeting will be SEPTEMBER 17, 20 07 at the WILLMORE LODGE in Lake Ozark. From Hwy 54, turn onto Business 54. Go  $\frac{1}{4}$  mile on Business 54 to the entrance of Willmore Lodge.

These minutes respectfully submitted by C. King Toole, LOWA Recording Secretary.