NEWSLETTER OF THE LAKES OF MISSOURI VOLUNTEER PROGRAM

The Water Line

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The Great North American Secchi Dip-In Turns Ten

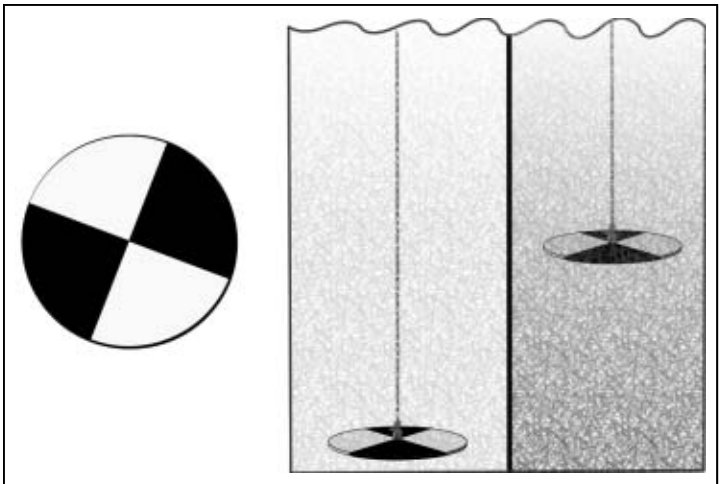
The Great North American Secchi Dip-In is 10 years old this year. The Dip-In began in 1994 as a pilot study in six Midwest states funding from the EPA's Clean Lakes Program. Since then more than 375 programs and 10,000 volunteers in the U.S., Canada, and several other countries have generated 30,000 records. These data are used to map regional differences in transparency and to detect trends.

LMVP volunteers have been participating in this program since 1995. You can look at the data for all Missouri sites at their website by selecting "Missouri" from the following list at the Dip-In website: http://dipin.kent.edu/lake.asp.

LMVP volunteers are encouraged to participate in this program. All you have to do to participate is:
1. Visit your lake site sometime from June 26 through July 18. If this coincides with your regularly scheduled sampling, you're already halfway there!
2. Record the date, time and sky conditions (sunny, partly cloudy, etc) and the Secchi transparency. If you're on the lake sampling anyway, all of this information will be on your datasheet already!
3. Either enter your data at their website (http://dipin.kent.edu/), or send it to me and I'll enter it for you. If you enter the data yourself, our program ID is 115.

Dip-In data shows that lakes in the northern parts of the U.S. and those in Canada have the clearest lakes, and that lakes in agricultural regions are the murkiest. One Nebraska lake had a Secchi value of one half of an inch. That means that the 8 inch black and white disk completely disappeared from view when only half an inch underwater. Some lakes in the northern portions of the continent (e.g. Alaska and Canada) can have Secchi values around 60 feet. LMVP Secchi values from Missouri lakes range from 3 inches at North Lake (near Harrisonville) to 33 feet at Table Rock.

The Dip-In has also collected data that measures the volunteers' perception of water quality. According to the Dip-In press release, noise, boat congestion, rude boaters and trash are important problems to volunteers. A 2002 survey of LMVP volunteers confirms this, with 68% of those responding saying that "too many boaters" is a problem on their lakes.



A Secchi disk is a tool used to measure water clarity. The black and white Secchi is lowered into the water until it disappears from view. This depth is recorded as the "Secchi value". Secchi values in Missouri range from 3 inches to 33 feet. Missouri water clarity will vary depending up on the amount of algae and sediment in the water.

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The Weird World of Waves

When the wind blows on a lake, you can see waves form on the surface. This is caused by the wind actually moving the water from one place to another. Why doesn't all of the water in a lake end up in a pile on the downwind side? It's because the water/wave eventually falls down as gravity takes over. If a lake is large enough and the wind blows for long enough, there can be an awful lot of water falling down. In these cases you can actually get waves *underwater*. These waves are called *internal gravity waves*, or *internal seiches* ("saysh-ĕz").

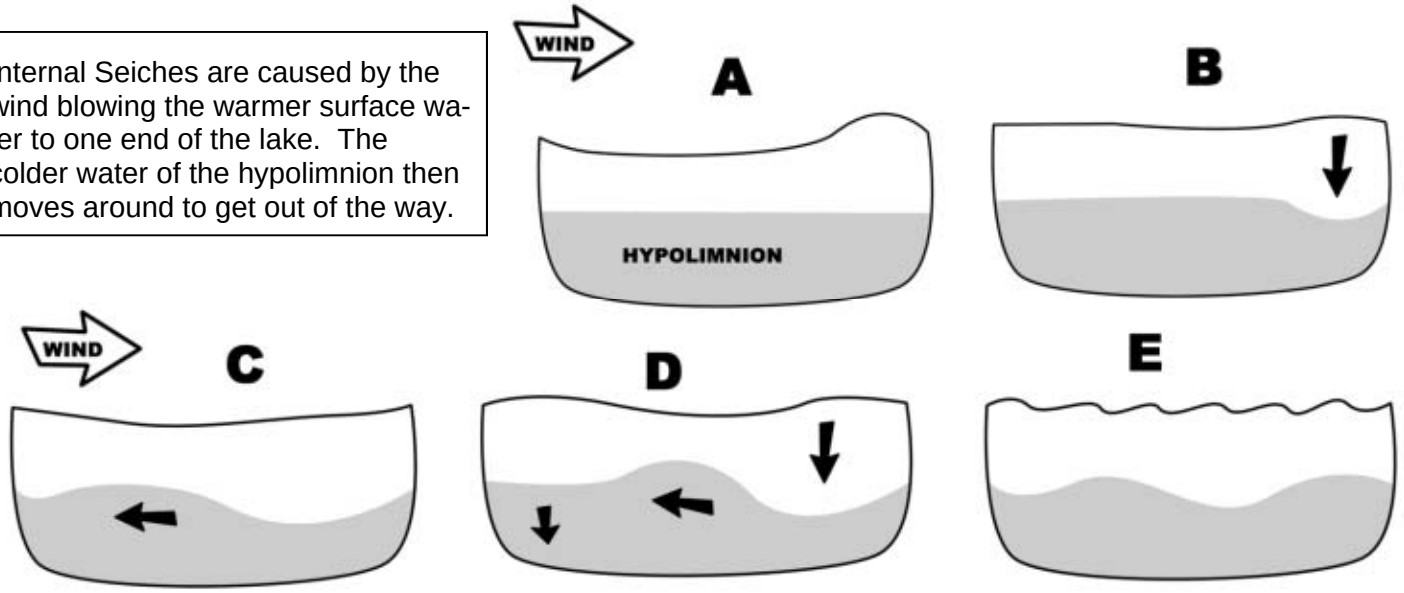
Internal seiches can only form on a stratified lake. A lake stratifies when the water down deep cools so much that it stops mixing with the warmer water nearer the surface. The depth at which this layer occurs is largely a function of light penetration, so in clearer lakes the "hypolimnion" (hypo- under, limnion- lake), or colder underwater layer, will be deeper. If you've ever swum in a small green lake, you have probably felt the water get quite cold near your feet. Most likely that's the hypolimnion. In murkier lakes, the light can't get in very far to warm the water, so the colder hypolimnion is close enough to the surface to feel with your feet.

On large lakes, if the wind blows in the same direction for long enough, the surface water will want to head toward the downwind side of the lake (**A** in figure below). When it gets there, it can't just hang out. Gravity wants the surface of the lake to be flat, so the water falls into the lake. This creates an abundance of the warmer surface water at the downwind end. The hypolimnion is compressed to make room for the warm water (**B** in figure). Of course that cold water in the hypolimnion needs somewhere to go also! Conveniently, the warm surface water just left the upwind end of the lake. That means that there's some elbow room at that end. Now the hypolimnion is leaning toward the upwind end of the lake (**C** in figure).

Well, gravity works under the water too, and cold water is heavier. That's why it's down near the bottom in the first place. So the hypolimnion needs to be flat, just like the surface. As the hypolimnion flattens out, its water rushes downward (**D** in figure). But the wind is still blowing, so there's more cold water on the way! If the wind keeps blowing, there will be multiple waves formed underwater. These internal waves are longer than surface waves and can be 30 feet or more tall (**E** in figure). When the wind stops blowing, the internal seiche waves will eventually stop too.

It's a weird world of waves and it gets even weirder when you start adding in things like the Coriolis force, (the effect caused by the rotation of the earth). But let's not go there, my head starts to spin just thinking about it.

Internal Seiches are caused by the wind blowing the warmer surface water to one end of the lake. The colder water of the hypolimnion then moves around to get out of the way.



LMVP Data Cited in Journal

In a recent article about plankton in Bull Shoals Lake, authors John Havel and Kristen Pattinson cite LMVP data from 1998. This is significant for a couple of reasons. First, it shows that *people are using the data you collect*. Second, it shows that *the data you collect are well regarded*.

The article is titled "Spatial Distribution and Seasonal Dynamics of Plankton in a Terminal Multiple-Series Reservoir" and appears in the March 2004 volume of *Lake and Reservoir Management.* The article deals with patterns of algae and zooplankton in Bull Shoals Lake and cites data collected at LMVP sites 1 and 2.

At a recent water monitoring conference in Chattanooga, several volunteer monitoring coordinators were lamenting that their data were not being used or that they were struggling with having their data regarded as "legitimate". One scientist addressed this concern by saying that "the only way to legitimize volunteer data to the scientific community is to publish in a peer-reviewed, scientific journal". We published an article in 1998 comparing LMVP data to professionally collected data and it showed that the two are quite similar. Perhaps that is why in the Havel and Pattinson article there is no caveat attached to the reference saying "this is *only* volunteer data". In fact, the authors treat the volunteer data no differently than they do the "professional" data.

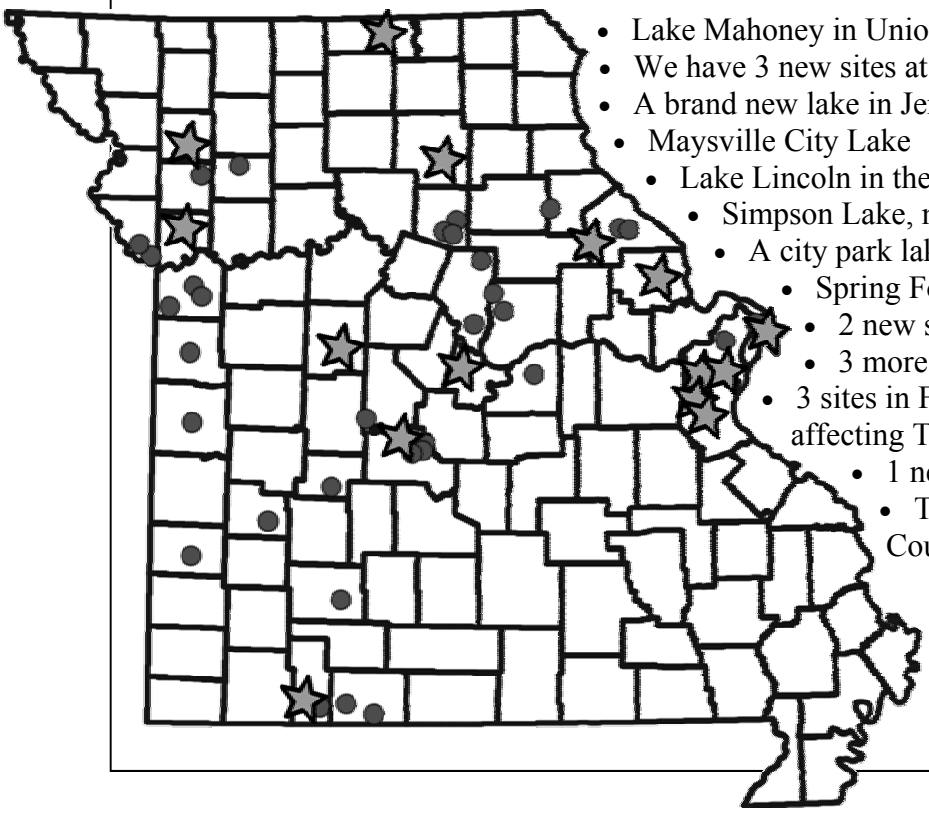
Lake Chesterfield is GONE

According to an AP story, Lake Chesterfield in suburban St. Louis disappeared down a sinkhole. Apparently the sinkhole opened up under the lake and drained all of its 23 acres in just a few days. The lake was built in the 1980s and has about 60 homes along its shoreline, just a fraction of the 670 residences in the subdivision. Since the lake is private property, residents will have to pay the bill to fix it.

New Lakes/Sites for 2004

Here is a list of the public lakes and sites added so far in 2004:

- Lake Mahoney in Unionville is back
- We have 3 new sites at Lake of the Ozarks
- A brand new lake in Jennings, near St. Louis
- Maysville City Lake
- Lake Lincoln in the Cuivre River State Park
- Simpson Lake, near St. Louis
- A city park lake in Eureka
- Spring Fork Lake in Sedalia
- 2 new sites on Long Branch
- 3 more sites on Smithville
- 3 sites in Flat Creek to check out some issues affecting Table Rock Lake
- 1 new site on Binder Lake
- Tri City Lake in northern Boone County



The map on the left shows the LMVP lakes involved in 2004. Stars represent new lakes or lakes with new sites.