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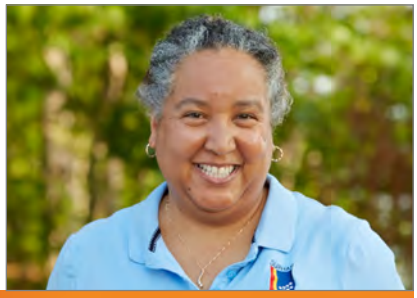


Michelle Woolfolk
City of Durham

Safeguarding the vitality of a regional reservoir

JMP® protects water supply in fast-growing river basin

Have you ever heard of a lake aging prematurely? Michelle Woolfolk has seen it happen.

Woolfolk is a Water Resources Engineer for the City of Durham, NC, and she's a guardian of Falls Lake. One of her responsibilities for the Stormwater Services Division is to prevent eutrophication, a form of water pollution that can occur when excessive fertilizers or other chemicals enter lakes and rivers, stimulating algae growth.

Decomposing algae robs the water of oxygen, sometimes suffocating fish and causing the lake to age too quickly.

Travis Marion, left, and Michelle Woolfolk collect water samples at Falls Lake.

Falls Lake is a reservoir located in the Neuse River Basin, one of the fastest-growing river basins in the United States. It provides the drinking water for about half a million people in the Research Triangle Park area, including Raleigh, the state capital. Falls Lake covers 12,500 acres across three counties and is surrounded by 25,500 acres of recreational area and wildlife habitat.

Woolfolk and her team monitor the temperature and levels of Falls Lake, and they generate a tremendous amount of data. JMP® statistical discovery software from SAS helps them gather, analyze, interpret and share it all.

The first step is to collect the data, which is the responsibility of Travis Marion, Assistant Project Manager of the Falls Lake Monitoring Study. He collects data from the lake each week and then documents the results.

"Each parameter we monitor has a threshold or limit," Marion says. "If a certain parameter is outside that standardized threshold or limit, I document it and send the results to Michelle."

JMP then comes in handy, for example, when the team is monitoring oxygen levels in the lake. When oxygen gets too low, algae is usually the culprit. An overabundance of algae results in high levels of chlorophyll A, which reduces light penetration. When the algae dies and decomposes, oxygen levels drop. That's bad news for the lake's fish.

Woolfolk, who keeps a steady eye on algae growth, is deluged with data. Routinely, 3,000 or more numbers lie behind a story that she can tell in one visual, easy-to-grasp JMP graph.

"Would you rather look at 3,000 numbers, or look at this one picture?" Woolfolk asks. "Personally, I'd rather look at the picture."

Protecting the fish

The water in Falls Lake warms up over the summer. But even when the top layers get quite warm, the bottom stays relatively cool.

Or at least that's true of the deeper areas of the lake. On the section of the lake that Woolfolk oversees, this layering shouldn't happen. That area is

"JMP allows people who aren't data savvy to engage."

Michelle Woolfolk
Water Resources Engineer, City of Durham, NC

shallow enough that sunlight can reach the bottom, so the water temperature should be relatively stable.

But sometimes this layering does happen in the shallower waters. And when it does, it's Woolfolk's job to determine why. Often, the culprit behind this separation of temperature is algae, which prevents sunlight from penetrating the surface to warm up the water below.

"This algae isn't at all dangerous to human health. It's going to make the lake look kind of gross when you're out there swimming or fishing, but it's not going to harm you," Woolfolk says. "But at some point, it's going to decompose and take oxygen out of the water, and our fish could be in trouble." (Figure 1)

When Woolfolk's graphs indicate high levels of phosphorus, she notifies officials in neighboring municipalities.

"I ask that they look at their records to see if something unusual might have happened. It could have been an issue with a wastewater plant, or with monitoring, or maybe there was a spill. I ask that they look into it to help determine where it's coming from."

Woolfolk must also keep a steady eye on the lake's water level. The US Army Corps of Engineers measures the depth and attempts to maintain it within a given range.

"You don't want it so high that if a tropical storm comes through dropping a ton of rain, there will be no capacity in the reservoir and it'll flood downstream," she explains. "But if it gets too low, the City of Raleigh starts to pay attention because it means their water supply is going down."

Again, Woolfolk uses JMP to view her findings, clearly and concisely.

Versatile and simple

Woolfolk finds that JMP offers a versatile toolkit that's extremely easy to use.

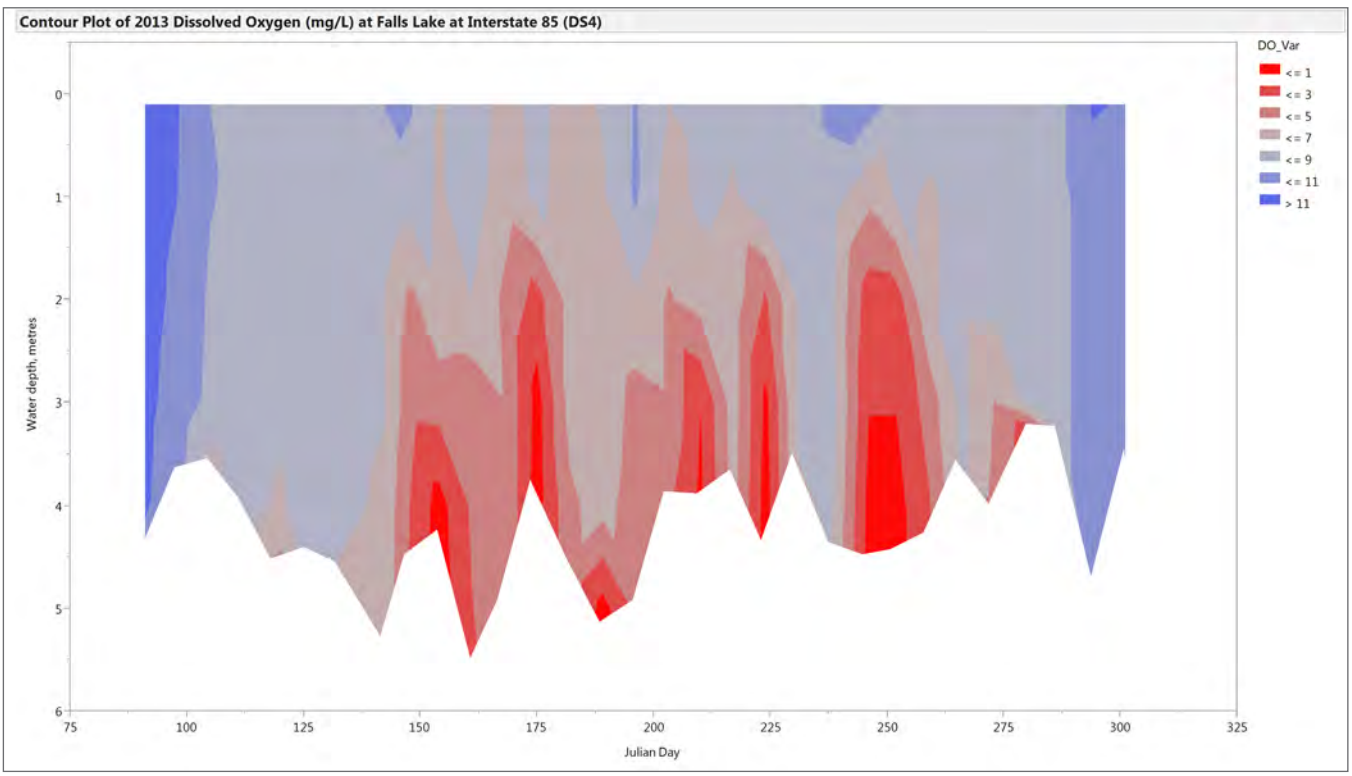


Figure 1. A JMP graph of oxygen levels at various water depths provides one gauge of the lake's health over time.

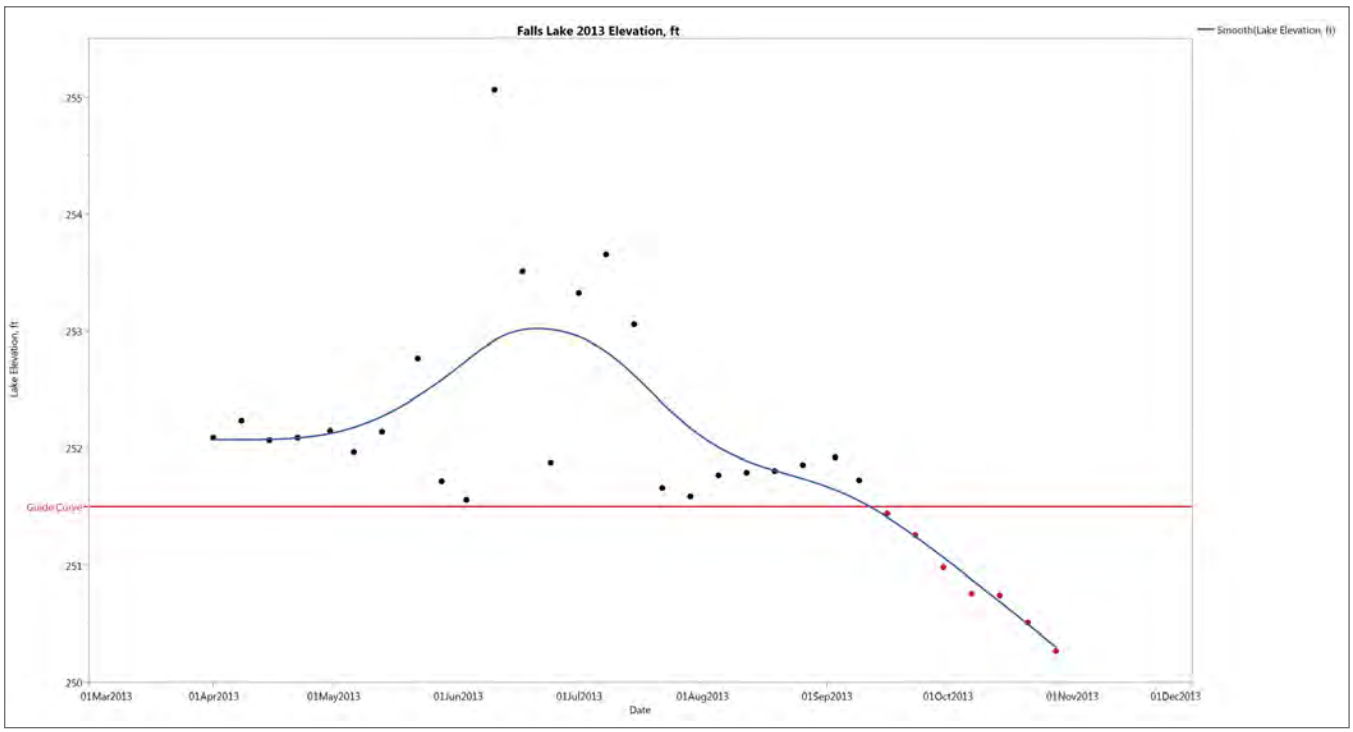


Figure 2. An example of dragging and dropping to explore data via the interactive Graph Builder platform.

CHALLENGE

To monitor the status of Falls Lake, the drinking-water source for half-a-million people in central North Carolina.

SOLUTION

JMP statistical discovery software from SAS produces clear perspectives of very large data sets.

RESULTS

Water quality engineers from the City of Durham gather and analyze data on the status of Falls Lake and share their findings in easy-to-interpret graphs.

"Not being a professional statistician," she says, "I go for things that are relatively simple but give me a lot of information."

Partitioning is one tool she has come to rely on. JMP offers a solid Partition platform that Woolfolk returns to regularly for answers to such questions as, "Is this what I hoped I would see? Or is it something else completely? And can I explain it?"

The Partition platform creates a set of groupings of X values that best predict a Y value by searching all possible groupings. It selects the optimal options from a large number of possibilities, thereby reducing large problems into digestible pieces.

"This work can get complicated," Woolfolk acknowledges, "but with partitioning tools in JMP, you can illustrate your findings very clearly."

A relatively new discovery for Woolfolk is the interactive Graph Builder platform in JMP that lets users quickly create and modify graphs.

"I started playing with it, and it seemed so easy," she says, "so I kept playing with it, and now I use it any time I have something I want to look at very quickly. You can drag and drop things, and constantly move things around until you get the graph that you want."

And sometimes, while exploring their data, JMP users discover something else that's worth saving. An example of that is a graph Woolfolk created of the lake's elevation. (Figure 2)

"I created that in about 15 seconds," she says. "I didn't have to build a new

graph and all the axes like I would have with Excel. I was just dragging and dropping. I love that about Graph Builder. It's just so fast and easy to see things."

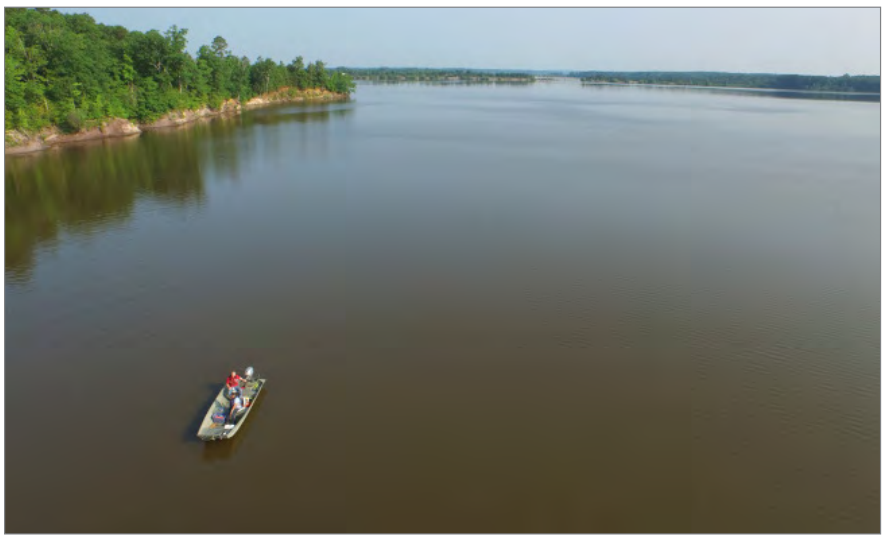
Diving deeper

Woolfolk looks forward to more data exploration with JMP. For example, she's eager to learn more about merging her data with maps.

"That's on my someday-soon to-do list – to merge our data analysis with a map presentation." That will allow her to make changes in real time, and thereby collaborate more easily and efficiently with colleagues.

JMP 12 offers some new features Woolfolk finds intriguing. Query Builder, for example, allows users to build custom prompts, sample databases and monitor queries in progress. And Recode cleans up messy data with a suite of powerful new tools.

"I was excited to hear about all the new tools for building data sets," Woolfolk says. "It takes a long time to get them just the way I want them. Having those tools will be really cool."



There's barely a ripple on Falls Lake as the boat returns from sampling.

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