

Friends of the North Fork and White Rivers Member News



VOLUME 1, ISSUE 3

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White River

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WELCOME NEW MEMBERS

Jack Kettler, Leawood, Kansas
Devin Abbe, Mountain Home, AR
Sarah Moss, Mountain Home, AR
Rick Rahiza, Collierville, TN
Keith Sherman, Kansas City, MO

"Maybe what I love most about rivers is how they blend together toward some mystic whole we imagine. Confluence is a lovely word, a word that implies sharing, getting along, making new space from disparate parts."

*Ken Hada
The White River –
A Confluence of Brush & Quill*

President's Message

NORFORK LAKE WATERSHED 500 & 1000 YEAR RAIN EVENTS

We have heard the statement "we all live down stream" and the present conditions of Norfork Lake and the Norfork tailwaters are a vivid example of this.

You may remember the spring floods of late April and early May in south central Missouri and north central Arkansas. This flood event, which has been labeled 500 and 1000 year rain events, covered the majority of the northern Norfork Lake watershed. From Ava to West Plains, Missouri, hundreds of millions and perhaps billions of gallons of water along with millions of tons of sediment washed into the lake. Bridges, homes and cabins on the upper North Fork of the White River along with hundreds of trees were washed away with much of the debris and sediment washed 30 to 40 river miles downstream into Norfork Lake.

The Missouri Department of Conservation, Arkansas Game and Fish Commission, The Corps of Engineers, along with many volunteer groups and individuals worked to pull trees, building debris, propane and hot water tanks from the river and lake. As hard as it was to pull the large floating debris from the water, it was impossible to remove the sediment and organic material washed into the lake.

The lake level rose from pool level of about 554 feet above sea level to above flood stage of about 580+ within 24 hours. The flood gates on the Norfork dam were open for many days releasing warm sediment-filled water into the Norfork tail waters. As the sediment in the lake settles down through the lake water column the organic material decays and continues downstream as the water is released at the bottom of the dam.

What is happening now in Norfork Lake and the tail waters? Why have hundreds and perhaps thousands of striped bass died in the lake? Why are the tail waters; the 4.0 miles of river from the dam to the confluence with the White River; which are normally very clear, now dirty brown and stink with the rotten egg smell of hydrogen sulfide gas (H₂S)?

What has happened to dissolved oxygen (DO) in the lake and tail waters and how does DO and H₂S impact the health of its inhabitants?

This newsletter will provide more information about the relationship between Norfork watershed, Norfork Lake and the Norfork tail waters.

Please join Friends of the Rivers in our efforts through education and cooperation to protect and preserve our rivers and watersheds for future generations.

Thank you.

Steve Blumreich, President
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FACTS ABOUT NORFORK LAKE & TAILWATERS

- Norfolk Lake watershed experienced 500 and 1000 year rain events in April 2017 according to the National Weather Service
- Millions of tons of sediment washed into the lake and into the tailwaters below the dam
- Historically low dissolved oxygen (DO) in the lake resulted in record Striped Bass kill in August and September
- Low DO in the tailwaters impacts the health and well being of the trout
- High levels of hydrogen sulfide gas produce the rotten egg smell near the dam
- The high, fast moving water has changed the tailwaters bank and bed

According to Nathan Recktenwald Fisheries Management Biologist Missouri Department of Conservation Ozark Regional Office, West Plains, MO, "the trout population in the upper North Fork of the White River usually survives and recovers from these high water events, however the devastation to the river bank and homes and cabins along the bank is unprecedented. Bridges were washed out and 25 to 30 homes and cabins were washed away or suffered significant water or structural damage. Thousands of trees along the bank were damaged or washed away."

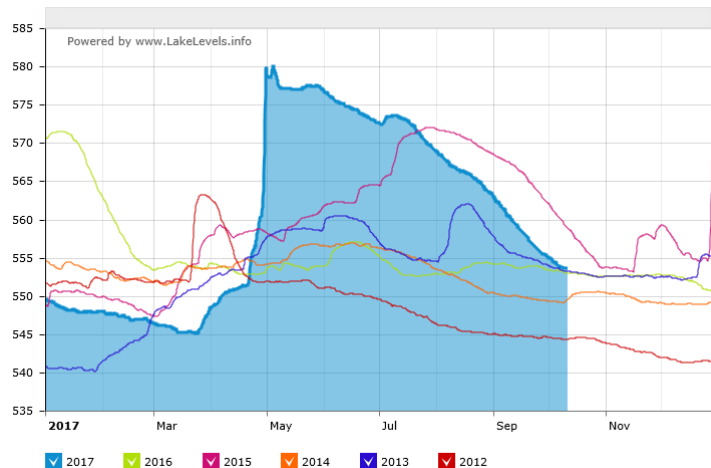
UPPER NORTH FORK OF THE WHITE RIVER

According to US Army Corps of Engineers (COE) Norfolk Lake's watershed covers approximately 1,800 square miles. The watershed is primarily in Ozark and western Howell and southern Douglas counties in Missouri and northern Baxter and eastern Fulton, northwestern IZard counties in Arkansas.

<https://www.google.com/maps/@36.5526807,-92.2879472,13z?hl=en>

It was the watershed area in Missouri that, according to the National Weather Service experienced the 500 and 1000 year rain events April 28 and 29, 2017 which resulted in the

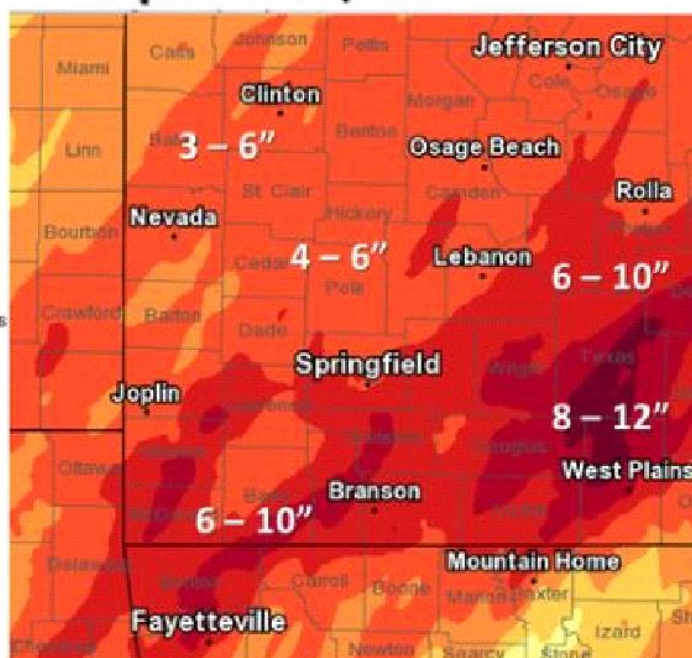
devastation to the upper North Fork of the Whiter River.



According to the NWS rainfalls of 8" to 12" were recorded over much of the area in the two day period.



Storm Total Rainfall April 28-30, 2017



National Weather Service
Springfield, Missouri

Areas that got 10-12 inches are considered to be in a 1,000-year flood event. (Photo: National Weather Service)

Many of the trees, homes and cabins including their contents were washed many miles down lake into Arkansas.
Photos courtesy of Nathan Recktenwald



NORFORK LAKE

Norfolk Lake covers approximately 22,000 acres at pool level of 550 feet above sea level with more than 510 miles of shoreline and was formed when the North Fork of the White River was dammed in the 1940s. At 550 lake level Norfolk Lake contains approximately 1,983,000 acre feet of water. One acre foot of water is approximately 325,850 gallons which means there are approximately 646 billion gallons of water in the lake when the lake is at pool level of 550ft.

The lake is an impounded river so water is moving continuously down lake, through the dam and approximately 4.0 miles downstream to its confluence with the White River.

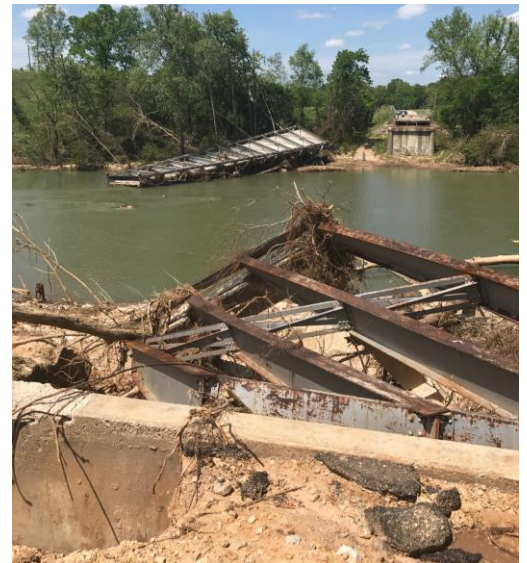
It carries the sediment down lake and downstream so the high rain event years like 2017 results in more nutrients and decaying organic matter in the water.



Highway CC – Hammond Bridge

James Bridge

There has been a marked increase in the number of high water events in the past 10 years according to Seth Bemis, owner and operator of Tracy Marina who has owned the marina for 22 years. From 1995 to 2006 there were a couple of minor high water events; however since 2006 there have been “hundred year” events in 2008, 2011, 2015 and now the extraordinary event this past spring. The lake level rose over 25 feet in 24 hours.



“I am hopeful this is not a continuing trend. Our business, along with many of Norfolk Lake’s marina and campground business, was significantly impacted in May and June due to the high water and debris floating in the lake. The lake is just now getting back to normal pool level and water clarity is improving.”

NORFORK LAKE FISHERY AND DISSOLVED OXYGEN (DO)

(Information provided by Jeremy Risley, Arkansas Game and Fish Commission District 2 Fisheries Supervisor)

[For More information on DO](#) click the link.

The recent high water events are more than have occurred over the previous 55 years dating back to impoundment (1945; high water years: 1957, 1973, 1985, and 1990). These high water events have both beneficial and negative effects on the fisheries and lake users. The majority of the sport and prey fish in the lake benefit greatly from these events. Benefits include an increase in the forage base, which leads to increased fish growth. Also, the flooded terrestrial vegetation protects the young predator and prey species which increases survival. Thus, high water events lead to high numbers of predator and prey species in the lake for several years after the event has occurred. While high water can be beneficial, it makes access to the lake difficult due to facilities and infrastructure being underwater. The limited access combined with difficult fishing hampers angler enthusiasm to fish the lake. Decreased use of the lake by anglers and boaters (who are impacted by reduced access, dirty water and floating debris) eventually impacts the local economy.

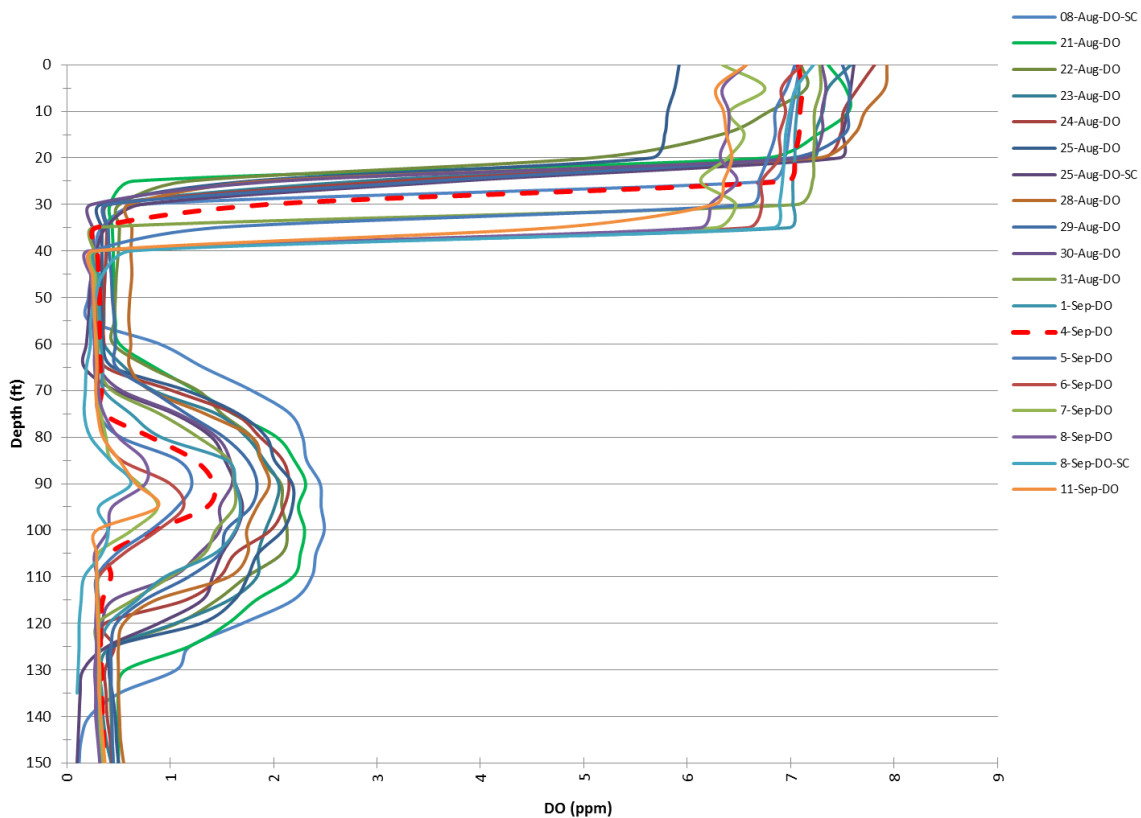


Figure 1: Dissolved oxygen readings collected at the Norfolk Lake day from August 21st to September 11th. The red dashed line represents the first reading after the majority of Striped Bass started dying.

Note: We realize this is a difficult graph to interrupt but there isn't an easier way to describe this information.

There is one popular sport fish species, Striped Bass, which can be negatively impacted by high water in Norfolk Lake.

Annually in mid to late summer, adult Striped Bass (age-3 and older; usually 20 inches and greater in size) seek the deep water near the Norfolk Lake Dam. This area of the lake provides a thermal refuge of cool, oxygenated water which protects these Striped Bass from the high-temperature surface water. Usually located at depths of 80 to 110 feet, the refuge typically has around 2 to 3 parts per million (ppm) dissolved oxygen (DO) and tolerable water temperatures. The comfort of this refuge actually takes precedence over feeding for these Striped Bass. However, it is sandwich between two layers of water with virtually no DO. During high water years, there is an increase in release outflows at the dam. This is necessary to evacuate water from the flood pool. The high release rate causes the thermal refuge that is inhabited by the Striped Bass to erode and eventually disappear. This leads to a decline in DO resulting in a Striped Bass kill. High water Striped Bass kills have previously been documented in 2002, 2004, 2011, and 2015.

Starting in 2015, daily weekday DO and temperature data was collected from the buoy line at Norfolk Lake Dam during high water years. This data was collected at five feet intervals from the surface to 150 feet. This allowed AGFC to monitor the thermal refuge that the Striped Bass inhabited. This year, we collected the daily readings from Monday, August 21st through Monday, September 11th. See attached graph (Figure 1) showing DO only. You can see over time, the refuge layer at 80 to 110 feet collapsed. After collecting the data, we would look for dead and dying Striped Bass. Overall, we collected a total of 663 Striped Bass ranging in size from 19.5 to 42.9 inches (average: 26.9 inches; Figure 2). Looking at the daily number of Striped Bass collected (Figure 3) and listening to angler reports, the majority of the Striped Bass kill occurred late Saturday, Sept. 3rd through Sunday, Sept. 4th (Labor Day weekend). Looking at Figure 1, the DO likely fell quickly below 1.5 ppm in the thermal refuge around that time which resulted in increased mortality. Ironically, most of the previous kills have happened on or around Labor Day weekend too.

How does this year's kill compared to the previous kills? As stated above, this year, we collected 663 Striped Bass. In the previous four kills (2002, 2004, 2011, and 2015), an average of 104 Striped Bass (range: 25-282 fish) were counted by AGFC staff. However, during the 2015 and 2017 kills, we spent weeks on the lake collecting fish, whereas during the 2002, 2004, and 2011 kills, the biologists spent one day per kill. Differences in effort among kills make it difficult to compare them. We felt this year's kill was substantial but we've been told that the previous kills were much larger by some of the guides, who were on the lake during all the kills.

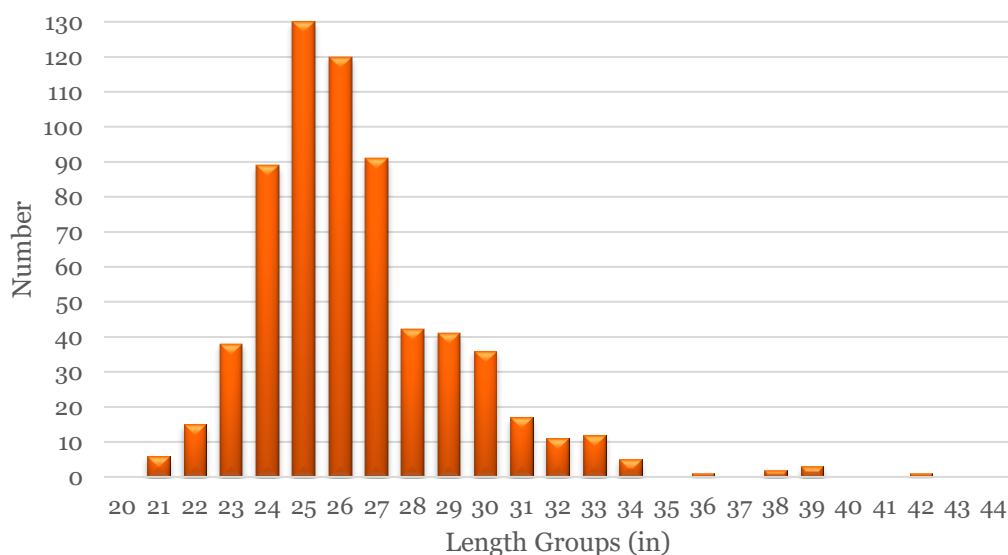


Figure 2: Number of Striped Bass collected per inch length group during the 2017 kill

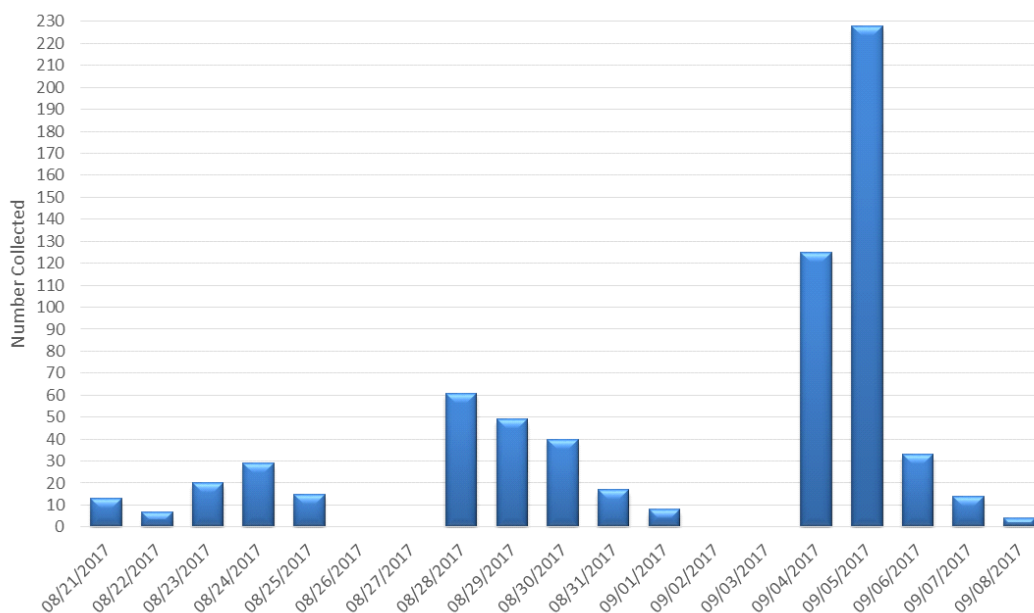


Figure 3: Number of Striped Bass collected daily during the 2017 kill

So where do we go from here? We know that not all of the Striped Bass in the lake were impacted by these kills. Anglers are still catching Striped Bass in the lake. In fact, it is likely only a minority of fish is impacted or we would not have any fish left older than three years old. We also took the opportunity to remove otoliths (ear bones) from most of the dead Striped Bass. We are able to age these fish and have a better understanding of Striped Bass growth in the Lake. As we move forward, we will continue to monitor the population and stock 154,000 fingerlings annually into the lake. With all that being said, the Striped Bass population will bounce back like it always does after these kills.

NORFORK TAILWATERS CONFLUENCE WITH THE WHITE RIVER AT NORFORK

Remember the 664 billion gallons of water in the lake at pool level of 550 plus hundreds of millions or perhaps billions of additional water during the flood plus all of the organic mater washed into the lake? What impact does that have on the Norfolk Tailwaters and the tailwaters fishery? Why is there a strong rotten egg, hydrogen sulfide gas (H₂S) smell below the dam and is it harmful to trout?

The dark brown color of the tailwaters and the rotten egg smell near the dam are caused by the decaying organic matter in the lake.

Mike Jirka, a retired medical laboratory technologist who now volunteers at the Norfolk National Fish Hatchery monitoring the lake inlets at the hatchery is concerned about the low DO and high H₂S gas in the lake water. Mike monitors the performance of the hatchery aerators to insure the trout are getting enough oxygen to keep the fish healthy. The turbulence created in the aerators add DO to the water and also allows the H₂S gas to diffuse out of the water which helps keep the hatchery fish healthy.

Mike adds “the H₂S gas in the water flowing in the tailwaters will harm the fish if they are exposed to it in high levels for extended periods of time, however the gas diffuses quickly from the water as it moves down stream.”



This aerial photograph of the Norfolk tailwaters flowing into the White River at the town of Norfolk shows the dramatic difference in water color of the Norfolk tailwaters due to the sediment from the spring floods.



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NORFORK TAILWATERS, DISSOLVED OXYGEN (DO), H2S AND TROUT HEALTH

(Information provided by Christy Graham, Arkansas Game and Fish Commission Trout Management Program Supervisor)

The high water that we experienced in the spring has impacted the fisheries below the dam through high flows and low dissolved oxygen. In general, high flows have the potential to affect trout in several ways in Arkansas tailwaters. One way is by affecting reproductive success of brown trout. Although reproductive success of trout is typically low in most of our fisheries, high flows, such as we saw with releases through the turbines and flood gates, can scour redds (spawning beds) that have been constructed. Fluctuating flows that are typical below hydroelectric power dams can also have a negative effect. Redds built along channel margins during higher water can become de-watered when generation is shut-off and the water recedes. Finally, high flows after the trout fry have emerged from the gravel can displace a large number of fry downstream or contribute to a higher rate of mortality for these fish. Thankfully, the majority of high flow events (e.g., spillway releases) occurred early this year, before brown trout spawning occurs. Typically, brown trout in Arkansas tailwaters spawn in the fall and early winter, so this year's high water should not affect the fall spawn.

Flow can also impact the hydrology of the river, both by depositing gravel in new areas and causing erosion along the banks. As many anglers may have noticed, gravel has been deposited in many areas along Norfolk tailwaters which has made navigation in low water tough in some areas. AGFC will be working with the COE to determine whether there are any areas that can be improved for boat anglers on the tailwater. Additionally, AGFC's Trout Habitat Program will work to assess any areas along the river that have significantly eroded as a result of the flood and determine whether they can undergo bank stabilization efforts to restore and protect those areas.

Turbidity associated with bank erosion, or more specifically, the sediment being carried by the water, can also negatively impact spawning if it settles into the gravel and smothers the incubating eggs. As all rivers and streams carry some sediment load, we think moderate short-term turbidity events may have a minimal impact. Excessively heavy sediment loads added to the river (say from poor land use practices) are usually a bigger problem.

Dissolved oxygen is crucial to not only adult survival & condition, but especially to embryo development. The state standard for dissolved oxygen in Norfolk tailwater is 6 ppm, but the levels this fall are among the lowest that we have seen, and have the potential to go even lower. We are closely monitoring dissolved oxygen for any adverse impacts on the trout populations below Norfolk Dam. The vents on the generators at Norfolk were blocked open on June 16th, which provided improvements in DO in the tailwater. As we have moved further into this season, the COE has begun to restrict generator capacity which has also provided some improvements. So far, we have had no signs of stressed or dead trout, but anglers may be noticing that captured fish are stressed upon release. That is not unheard of when DO decreases in the tailwaters. We urge everyone to be aware of fish handling and try to reduce stress during capture as much as possible, especially if you plan to release the fish.

IMPACT ON BUSINESS ON THE NORFORK TAILWATERS

The following information was provided by Jim Smith, owner of [River Ridge Inn](#), located on the Norfolk tailwaters just up from the confluence with the Whiter River.

There was one big difference between the releases of water from the flood pools this year compared to previous high water years. The U.S. Corp of Engineers did an admirable job controlling the level in the lakes and river system considering how fast the lake level rose. Flooding was held to a minimum along the Norfolk tail-waters.

These high water years impact River Ridge Inn's business. In 2008-2009, the business was off over 30% with 2009 being the worst year. We cater to fly fishermen and fly fishermen prefer to wade. There was no wading for nearly 6 months in 2009 and there has been very little wading from May of 2017 until October 2017. The reduction in reservations was not as severe as in 2009, but it has been significant.

The high, fast turbulent water has changed the contour of the Norfolk tailwaters significantly this year. "In early Sept when the water level was off during the day for a few days, I walked out into the river expecting a smooth bottom with nothing but gravel spanning the entire cross section of the river. The third step into the river from the bank on the River Ridge Inn side of the river.....woooaah I nearly went over the waders.

The high flow had followed the runs that the AGFC had created years ago after another high water event. It actually washed out the gravel that hid the large rocks where sculpin and crayfish used to make their homes. I had to find a different approach to get to the large shoal that was partially formed in 2008, but greatly expanded with this last flood. The shoal must have doubled in size, but, now there was a 6' drop-off running along the edge and to the downstream side of the shoal. Where had all the gravel gone? It doesn't matter; the fact is that the river now had character, structure, homes for food and a hang out for trout. The back side of the island, that the AGFC had "dredged", had now filled in slightly, but was still open and had fishable water flowing through it. Up stream, at the top of the 2nd island, gravel had settled that was washed down stream from the high water. What used to have great structure was now a smooth, even depth bottom. Much similar to what was found in 2008. Above that area and up toward the Ackerman Access, the river bottom had changed, but some of it appeared desirable and other areas that were once productive had changed for the worse. Again, gravel washed down from upstream, coming from collapsed banks and filled in much of this section. The good news is that there were pockets of deeper water and they held trout. Most important, it appeared that food sources could and would develop there.

It would appear the river has settled down and has accepted the direction of flow from the contouring done by the AGFC some 4 years ago. Two runs, both with good flow, a shoal that directs the flow and an open channel along the back side of the 1st island remained as designed. According to Jim "no matter what you do to this river, given time, and with help from our AGFC it will come back. You can't keep a good river down."

FRIENDS "ON" THE RIVERS

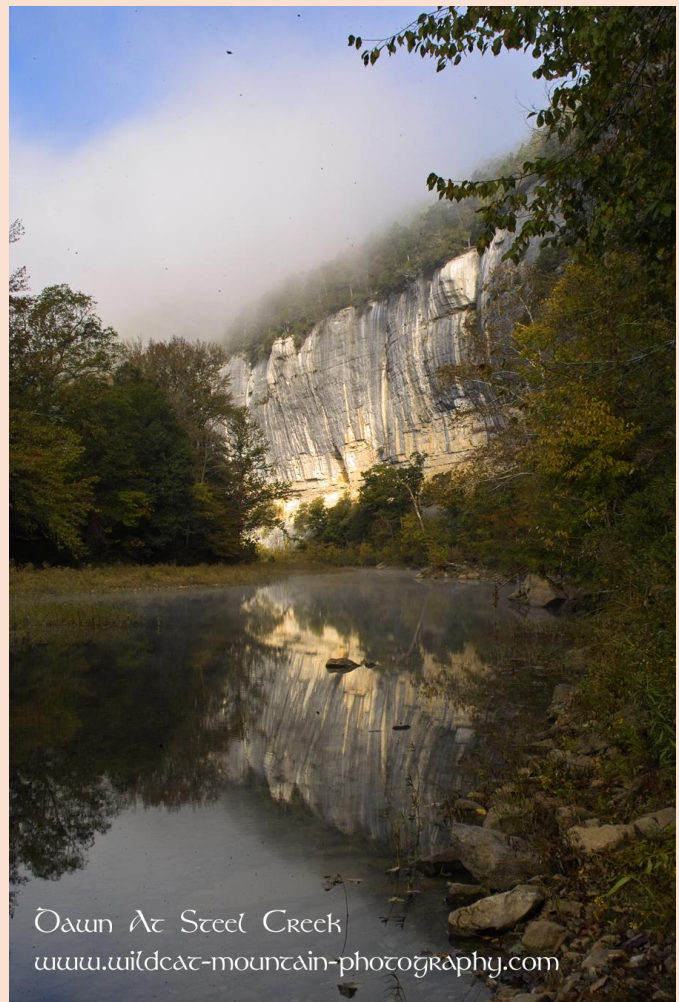
Ed Alexander

wildcat-mountain-photography.com

I'm standing in front of a large contingent of fly fishermen about to make a major gaffe: I'm about to tell them I'm not a fisherman. I forge ahead with this admission, but, being fishermen, they are possessed of abundant patience, so they merely chuckle and settle in to watch the slide show I've come to present. Having acknowledged this major character flaw, I can still say, with equal conviction, that the White River is as important to me as the next person, fisherman or no.

My father, Harold E. Alexander, was nationally known in conservation for his work in saving the Buffalo and Cache Rivers, along with many other accomplishments. He was named Conservationist of the Year several times, received a Presidential Commendation, and is enshrined in the Outdoor Hall of Fame. Although I spent my career in music, growing up with his influence left a lasting impression. I love to hike, backpack, kayak, mountain bike, and participate in any activity that puts me outdoors. My profession these days, nature photography, is a direct result of my upbringing as well.

Although I'm not a fisherman, the White River still plays a significant role in my life. Indeed, it's the first thing I see when I wake up. Our home overlooks four miles of the River, and I, like countless others, marvel at its incredible beauty on a daily basis. As the seasons change, and the light varies from hour to hour, the White River and its surrounding valley present an ever-changing vista. This natural beauty is a wonder to residents and the thousands of visitors that it attracts.



Dawn At Steel Creek
www.wildcat-mountain-photography.com

Although its views can be awe-inspiring, there's no better way to enjoy the White than at river level. Sitting in my kayak, with the coolness of the water easing the heat of the summer, with the rising mists providing a feeling of mystery I feel a connection to the White. From this vantage point it seems to be alive; a living, breathing thing. The clear water pushes me forward, gently moving me toward my destination.

But the White, like all rivers, is a collection of the rivers and streams that feed it. The Buffalo, Crooked Creek, Piney Creek, Livingston Creek, Sylamore Creek, and many others, all join the White River, each adding to its majesty. And like the White, each has its own offering of scenic beauty and wilderness. As an avid hiker and backpacker, I've tramped many of the trails along these tributaries, camped many nights comforted by their river music. Never does a campfire feel better, or a sleeping bag cozier than on a river bank.

Photography, a hobby that began in my youth, has become my profession in retirement. The White River and its tributaries, with their surrounding wilderness, provide an endless array of subjects for my camera. I truly love to "haunt" a location; to visit it many times in different seasons and times of day. The White River never fails me in my quest for a new and exciting scene to record. The search for new images has led me on fascinating adventures throughout the River valley. Through this medium, I can share with others the natural beauty of the White River, and the emotions that it stirs within me. I've been lucky enough to have photos placed in offices, hospitals, galleries, and homes from California to New York. Each of these images displays the incredible beauty that we are surrounded by and hopefully allow visitors to take back a bit of river beauty along with their memories.

I rarely look out over the River valley without thinking of the history of the White. I think of the settlers that fought to make a home on its banks. I think of the centuries it existed before me, and of those it will exist far after I'm gone. In a world of change, rivers provide us with a much needed sense of stability and comfort. As my father so clearly saw, each of us that use the White River, or any natural resource, bear a responsibility to protect it for future generations. To this end, Friends of the White and Norfolk Rivers provides a means to contribute to the preservation of a valuable, priceless environment. For our friends, for our children, for visitors to our area, and, yes-- for those fly fishermen.



FRIENDS "ON" THE RIVERS

NORTH ARKANSAS FLY FISHERS



North Arkansas Fly Fishers (NAFF) was established in 1983 to promote fly fishing and fly tying and currently has in excess of 400 members.

Each year NAFF provides tying classes open to the public for beginner and intermediate level tiers, a fly fishing class for a Mountain Home home-school group and sponsors a two-day event, free to the public, featuring a nationally known fly fishing expert. NAFF also provides expert fly fishers for youth fishing on Dry Run Creek which runs next to the Norfolk National Fish Hatchery. NAFF members not only teach kids fly fishing techniques on Dry Run Creek but also show them what species of trout are in the creek along with natural bugs in the water the trout eat (see pictures).

NAFF's major annual event is its Sowbug Roundup which celebrated its 20th anniversary in March of 2017. The Sowbug Roundup which is open to the public featured 124 tiers from across the nation and around the world demonstrating tying techniques. The three day Sowbug event includes various seminars on fly fishing, casting and fly tying instruction and demonstrations, and the opportunity to watch and talk to some of the best fly tiers and fishers in the world.

Funds raised from Sowbug Roundup allows NAFF to educate fly fishers of all ages, support conservation projects and fund a \$12,000 per year scholarship program for students majoring in fisheries or related fields.

In addition, past NAFF contributions have included \$5,000 to Dry Run Creek renovation, \$1,500 to raceway diffusers at Norfolk National Fish Hatchery to improve the health of hatchery fish, constructed steps at Roundhouse Shoals 2013 and provide fly fishing related books and videos to the Baxter County Library.

NAFF recently donated a pavilion to the City of Mountain Home which was erected at McCabe Park. The park, located just off of highway 62-412 west of Mountain Home, has several ponds stocked with a variety of fish for residents to enjoy.

NAFF also provided new signage (see photo) that outline fishing regulations on Dry Run Creek which is restricted to youth under the age of 16 and mobility impaired adults.



According to Ken Sickels, President of NAFF, "we have a dedicated membership base which works with other organizations such as Trout Unlimited, Whiter River Chapter, Friends of the Norfolk National Fish Hatchery, Arkansas Game and Fish and Friends of the North Fork and White Rivers to expand and improve the sport of fly fishing and also raise awareness of the importance of healthy waters to the sport of fly fishing. NAFF believes working with these groups, public outreach and sharing the fun of fly fishing will help preserve and expand this sport for future generations".

