



WEDNESDAY, JULY 17, 2019 | SUMMER WEEKLY EDITION | DAILYIOWAN.COM | 50¢

SPECIAL EDITION

TROUBLED WATERS

DAILY IOWAN JOURNALIST
RYAN ADAMS KAYAKED THE
329-MILE IOWA RIVER AND
SAW FIRSTHAND THE
EFFECTS OF RISING
NITRATE LEVELS.

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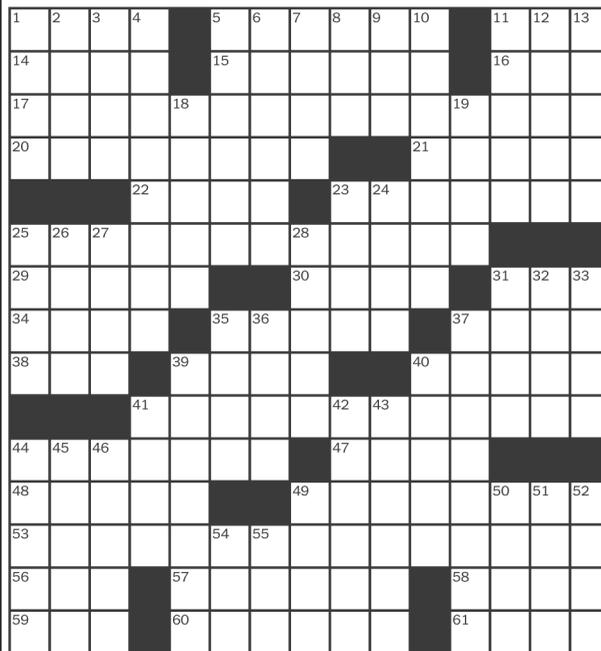
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The New York Times Crossword

Edited by Will Shortz

No. 0612



Across

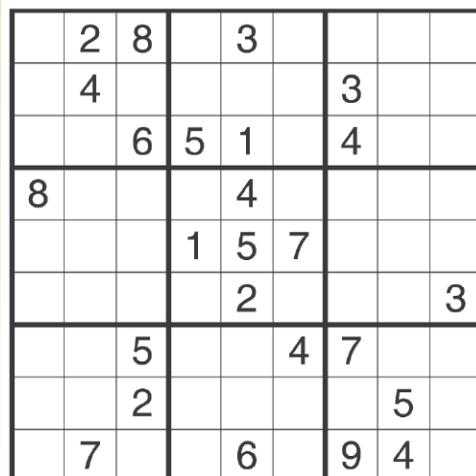
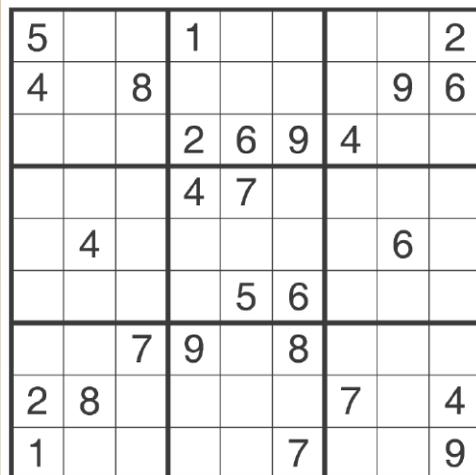
- 1 Getting close
- 5 Having obligations
- 11 Antiquated
- 14 Making a crossing, maybe
- 15 Not so savvy about the ways of the world
- 16 Top of an outfit, for short?
- 17 1938 Alfred Hitchcock mystery
- 20 Air
- 21 Well-padded coat
- 22 Fictional Charles
- 23 Assert openly
- 25 1999 Garry Marshall comedy
- 29 They can be dangerous when split
- 30 Cabin-building items
- 31 Bussing on a bus, e.g., for short
- 34 Scandalous suffix
- 35 Conveyances on and off base
- 37 Silent type
- 38 "___ sells seashells ..."
- 39 List for the forward-thinking
- 40 Like some oil and remarks
- 41 1933 James Whale sci-fi horror film, with "The"
- 44 Dutch master who painted "Girl Reading a Letter at an Open Window"
- 47 Czech or Pole
- 48 Self-evident truth

- 49 Appealing to lascivious desires
- 53 Amoral... as suggested by 17-, 25- and 41-Across?
- 56 "Rocks"
- 57 Mathematician John who discovered logarithms
- 58 Stationery shade
- 59 The shakes, for short
- 60 Former friend
- 61 Clog or pump

Down

- 1 Light amount?
- 2 Eponym of the world's largest tennis stadium
- 3 Part of a film archive
- 4 August, e.g., but not May or June
- 5 One of the Gandhis
- 6 Contradict
- 7 Cruddy joint
- 8 Adán's mate in la Biblia
- 9 Jerry's partner in the frozen food aisle
- 10 Camera stabilizers
- 11 Shade in a desert landscape
- 12 Relatives of shallots
- 13 Crepes in Indian cuisine
- 18 Asserts openly
- 19 On base
- 23 Top hat, to a magician
- 24 Fixes wrongly?
- 25 Uses for worn-out T-shirts
- 26 Geographical entity with six straight sides
- 27 Reminder to oneself, perhaps
- 28 Grace word
- 31 Coveted, as a position
- 32 "Anti-art" art movement
- 33 "Preach!"
- 35 Don't you believe it!
- 36 Title meaning "commander"
- 37 Cracks
- 39 Sea creature resembling a flower
- 40 Santa ____, Calif.
- 41 "Don't worry, everything's fine"
- 42 Country that, according to its tourist bureau, has the highest number of museums per capita
- 43 Not sharp
- 44 Not yet expired, say
- 45 Spot-on
- 46 Chops finely
- 49 Dr. ___
- 50 Make a lasting impression
- 51 Builder of the Domus Aurea
- 52 Faithful
- 54 Copier option
- 55 Help in filing, maybe

PUZZLE SOLUTIONS ON PAGE 20



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Bret Adams/The Daily Iowan

Daily Iowan photojournalist Ryan Adams paddles along the bank of the Iowa River north of Oakville near the confluence with the Mississippi River on June 15.



In mid-January, I pieced together a pitch for a project at *The Daily Iowan* that would eventually become the story you are about to read. I am passionate about the natural beauty of Iowa and the conservation issues it faces, and I wanted to work with a subject matter close to my home state's identity. I began with the concept of water quality and formulated that into a journey that would take me down the Iowa River. The river, the sixth-longest in the state, passes along the campus at the University of Iowa and produces a major source of outflow of water to the Mississippi River. The trip would be a solo expedition, taken by kayak. I would camp along the river over the span of 20 days, truly getting as close to the river as possible.

After the approval of the project, months were spent preparing for the expedition, as well as planning what content I would need and how to present it. Everything down to the last packet of oatmeal was prepared, and I eagerly awaited the beginning of my journey.

On the night of May 19, I lay in a bedroom in my grandparents' house north of Iowa Falls, trying to get some sleep. It was the night before the expedition began, and I soon realized what a monumental task lay ahead of me. I knew the preparations had been made to the best of my ability, but there were inevitable unknowns ahead of me. Yet, the river had to be traveled.

What I couldn't prepare for was the river's impact on me.

A JOURNEY INTO A RIVER'S ENVIRONMENT

Daily Iowan journalist Ryan Adams took a monthlong journey down the sixth-longest river in Iowa to learn about the quality of its water.



Ryan Adams/The Daily Iowan

A vintage car protects the riverbank along the Iowa River east of Dows on May 23. The use of discarded automotive bodies is one of several practices used to reduce bank erosion along the river. The car is one of several lined along the water.

BY RYAN ADAMS
ryan-adams@uiowa.edu

I held tightly to the rope draped across my shoulder. On the other end of the rope was nearly 100 pounds worth of gear strapped to my kayak, meant to aid me in my 20-day trip from the northernmost tip of the Iowa River in Crystal Lake to the southernmost in Oakville. I had already traveled 11 days, and was exhausted from a day's worth of paddling. It was 6

p.m. and I was tired and hungry. Dinner would consist of tea and mashed potatoes cooked on my Jetboil.

But dinner was a small concern compared to what was really driving me to make this expedition. The fact is that as an Iowan, I recognize the issue of water quality has become increasingly politicized, as Iowa remains the leading contributor to

nitrate pollution in the Gulf of Mexico. Iowa's farm runoff is di-

of the hypoxic zone in the gulf.

I embarked on an expedition of the 329-mile Iowa River on May 20 to research nitrate levels — an indicator of water quality — in the waterway. I started my journey in the small stream that is the beginning of the Iowa River, near Crystal Lake, Iowa. Throughout

the next month, I would paddle, photograph, test, and live on the water.

After conducting 104 nitrate tests of the Iowa River and adjoining tributaries, I found the nitrate levels consistently exceeded recommended limits, sometimes going 10 times over the recommended limit. These high levels can be attributed to the flooding that started in March and occurred throughout May and June, because stormwater can carry a

'Throughout the next month, I would paddle, photograph, test, and live on the water.'

— Ryan Adams

large amount of nitrogen and phosphorus pollutants, according to the EPA.

Late in the afternoon during a particularly warm day, over 150 miles into my trip, I pulled my 14-foot kayak through the waterlogged timber that was supposed to be my campsite for the evening. Every step was met with difficulty as my sandals sunk into the muddy ground under the two feet of floodwater filling the forest.

Around me were maple and ash trees, their leaves shielding much of the wilderness management area north of Chelsea, Iowa, from my sight. The bottom of each tree emerged from the murky water, where other low-lying vegetation, of which I hoped was not poi-

son ivy, covered the forest floor.

As daylight ran out, everything around me was submerged while I looked for a safe place to set up camp for the night. I heard owls hooting, the quiet hum of crickets chirping in the meadow, and deer moving through the tall grass around me. I began to navigate back onto the river once again, in hopes that I would find a piece

data along the river. I found nitrate levels to be between 25-100 mg/L on most parts of the river. To put these findings into perspective, the EPA recommends 10mg/L as a cap for human consumption of water. Anything above might prove harmful to humans, as it affects the blood's ability to carry oxygen.

The Environmental Working Group reports that even though the EPA recommends 10 mg as a nitrate limit, in order for there to be no adverse health effects, 0.14 mg is considered a safer amount.

Like most nights on the river, I sat in my two-person backpacking tent, looking through content I

'If I wanted to understand the current condition of Iowa's waterways, I had to see it, feel it, smell it, hear it, and taste it...'

— Ryan Adams

of dry land to sleep for the night — otherwise, I might end up on the flooded water in the dark.

These nights did not discourage me from collecting



Adams holds a test strip up to approximate the levels of nitrate north of Iowa Falls on May 25. The estimated level of this test was 75 mg/L.



Ryan Adams/The Daily Iowan
Daily Iowan photojournalist Ryan Adams' breakfast awaits preparation north of Alden on the morning of May 25. Adams' breakfast for each day of the expedition consisted of 3 packets of instant oatmeal and a cup of coffee.

collected from the day. The shelter I managed to find was two miles downstream from where I had failed to find shelter before. Dusk had come, and a fog covered the field 100 feet from the riverbank. The setting sun left an orange-purple glow that illuminated the landscape.

This is what I was hoping for when I set out on my trip. The only way I saw fit to tell this story was by getting my hands dirty and my paddles wet. Exploration and curiosity were values I obtained from a childhood playing in the dense timber and stream that bordered our home.

They are also what motivated me to undertake this journey. If I wanted to understand the current condition of Iowa's waterways, I had to see it, feel it, smell it, hear it, and taste it — though after seeing

the water, I decided it might be safe to hold off on the taste test.

...
Iowa's land fuels its agriculture industry. Approximately 3.2 million humans live in the state's borders, but the 23 million hogs, 4 million cattle, and 60 million chickens involved in Iowa's livestock industry outweigh the human population 27 times over, according to the Iowa Agriculture Literacy Foundation.

Livestock creates nutrient-rich manure, which aids in the growing of crops. Iowa produces more than 3 billion bushels annually between corn and soybeans alone. However, with such massive amounts of waste produced by the livestock population, some of the nutrients, like phosphorus and nitrogen, find their way into tilling systems

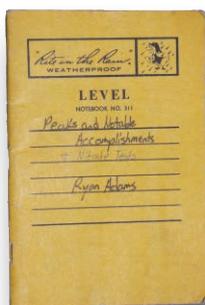
and into our waterways.

Because of recent record rainfall in Iowa, a high concentration of farm runoff has found its way into major channels such as the Cedar and Iowa Rivers, where they eventually flow into the Missouri or Mississippi Rivers. These rivers eventually feed into the Gulf of Mexico.

Once in the Gulf, the nitrates that once promoted healthy crops then deplete oxygen levels in water, creating a "dead zone." Filled with the nutrients from other states, the zone is inhabitable to aquatic life, and this year it is

Iowa Population by species

- Humans: 3.2 million
- Hogs: 23 million
- Cattle: 4 million
- Chickens: 60 million



THE GEAR

JOURNALIST RYAN ADAMS PACKED NEARLY 100 POUNDS OF CAMERA GEAR AND LIVING SUPPLIES INTO HIS KAYAK FOR HIS EXPEDITION ON THE IOWA RIVER. HERE IS A HANDFUL OF THE ITEMS HE BROUGHT.



Ryan Adams/The Daily Iowan

A bald eagle spreads its wings on the banks of the Iowa River on May 13. Bald eagles commonly build nests near bodies of water, making easier to access such prey as fish.

predicted to cover an area the size of Massachusetts, according to the National Oceanic and Atmospheric Administration.

The idea was that I would use my boat to travel down the Iowa River while collecting water-quality tests of nitrate, snapping pictures, shooting video, and interviewing Iowans along the way.

Balancing the tasks at hand on the expedition was sometimes easier said than done. One of the first nitrate tests I needed to take was supposed to come from one of the upper branches of the river.

However, as I was caught up in capturing the natural beauty around my boat, I missed the test site. This led to a half-mile paddle upstream. All the strength in my upper body transferred itself into my oars as I fought the swift current. A half-hour later, I arrived, exhausted, ready to test the water.

As my journey pro-

gressed, testing the river became a familiar routine. The tube containing my test strips came out of its pouch on my life jacket, the lid opened with a thump, and out came a small plastic strip with two pads on one end. I leaned over the side of the boat, dipped the pads in the water for a second, and then shook it off as I brought it out of the water.

My right wrist turned upward, allowing me to note the second hand. I had 60 seconds to wait while the chemicals reacted. The strip was marked with the test number, and I took a picture of the strip along with an estimate of the levels.

All data, including the latitude and longitude of each testing location, I entered into a yellow, waterproof journal I had once hoped to purpose as a mountain-climbing log-book.

Sitting in the tent, I began to question myself.

I had some whispers of doubt. I knew I had made it halfway through the 329 miles of river I needed to navigate, but all I could think of was real potatoes and a real bed.

I had to remind myself that I needed to keep going through the fatigue I faced, because the curiosity propelled me to continue to discover the river. Up until this point, I had faced physical and mental strain, but never felt the task at hand was more than I could handle. Now, more than 150 miles into the journey, I wrestled with feelings of uncertainty. However, I decided to continue on. I knew I had to complete the expedition regardless of the hardships I faced, because there were uncertainties ahead that still needed to be explored.

...

Every farm and field I saw buried under the river's flow opened my eyes more and more to the

sheer amount of flooding on the river. The river was above normal levels during the entire expedition, and nutrients from surrounding fields made their way into the waterway during that time. For example, a river gauge based at the Coralville Reservoir usually hovers around 685 feet deep; the section had increased to more than 700 feet when I passed through it.

Water depth is only one tool used to measure the conditions in the state's network of streams. State agencies and researchers are interested in data that indicate the health of the rivers.

Chris Jones, a research engineer with the University of Iowa's IIHR — Hydroscience and Engineering, monitors 60 real-time sensors in Iowa's stream network. Current research at IIHR indicates that tiling is increasing in the state.

Tiling is a common farming practice used to

drain excess water from fields. A culvert, or drain pipe, system lies in the low point of the field, allowing a path for water to exit. Typically the water enters a nearby waterway.

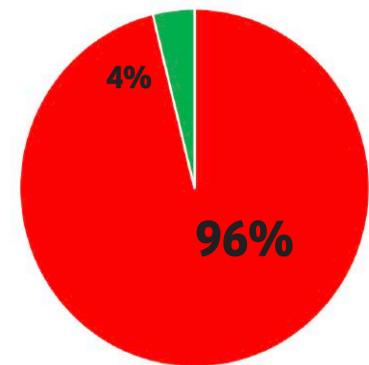
Tiling soil makes farmland vulnerable to farm runoff and increases the flow of whichever body of water the tiling drains into. Increased streamflow increases erosion in a watershed and creates more

rapid flooding.

One IIHR watershed study saw an increase of 12,000 miles of new tiling systems. However, Jones said, the issue remains.

"If we did nothing, would it get a whole lot worse?" Jones said. "I think the answer to that is no. But, I think we do as a society want better water quality, and we do want our drinking water utilities to have robust and

Water Drinking Quality along the Iowa River



■ Unsafe ■ Safe Source: Daily Iowan Data

96 percent of water tested by journalist Ryan Adams was found to be above the EPA-recommended 10 mg/L.

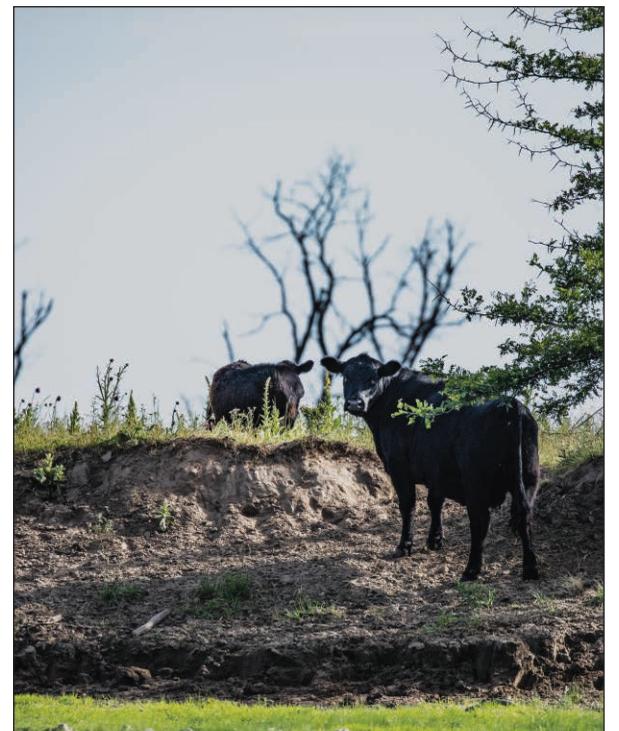
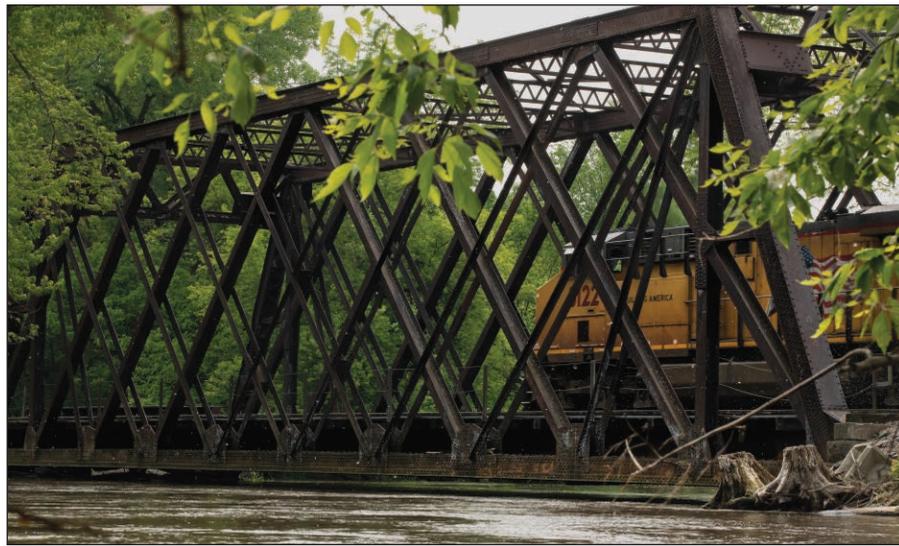
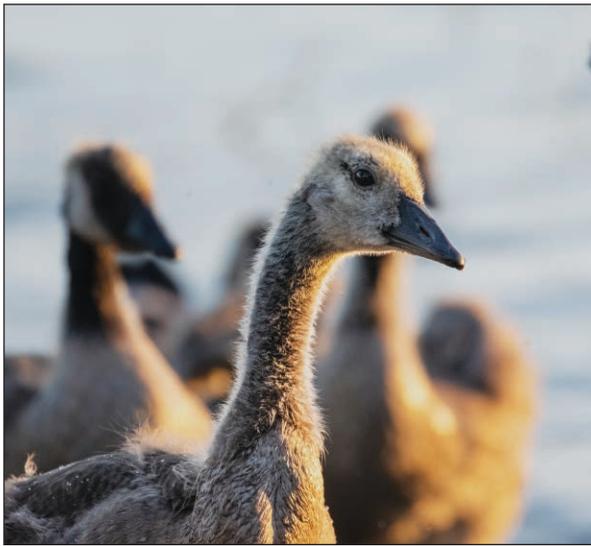


Ryan Adams/The Daily Iowan

The confluence of the Iowa River and the Mississippi River near New Boston, Illinois, on June 15, 2019. The spot indicates the end of the 329-mile Iowa River.



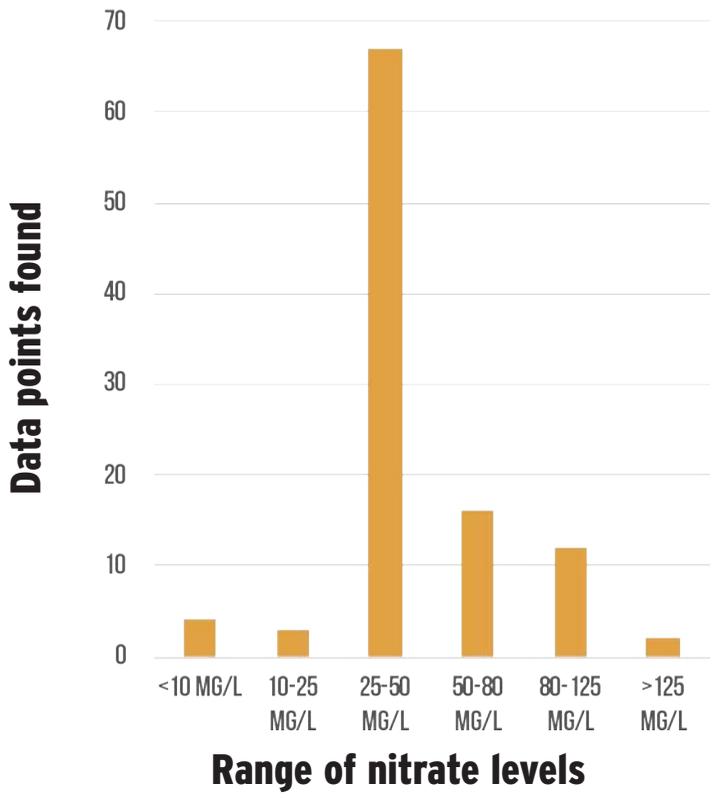
TOP LEFT: The limestone bluffs in Iowa Falls are seen in detail on May 25. The bluffs in the area are home to Cliff swallows and the rare Cliff pigeon. **TOP RIGHT:** Water from the Iowa River stands in the edge of a farm field north of Belmond on May 22. Many fields near the riverbank experienced flooding during the 27-period in which *Daily Iowan* Photojournalist Ryan Adams was on the river. **CENTER LEFT:** A gosling pauses from feeding on vegetation near the Coralville Reservoir's shore on June 10. **BOTTOM LEFT:** An old barn marked by the brand of Palisade Dairy sits above the riverbank on the Iowa River north of Iowa Falls. Palisade Holding Co. has operated in the Iowa Falls area for 31 years. **CENTER RIGHT:** A freight train crosses a railroad bridge in the Meskwaki-Sac Settlement south of Marshalltown on the Iowa River on May 31. *Daily Iowan* Photojournalist Ryan Adams portaged over the bridge considering the less-than 1 foot of clearance between the bridge and the river. **BOTTOM RIGHT:** Cows stand along the Iowa River as they graze south of Riverside on June 13. According to the Iowa Beef Industry Council, Iowa ranks eighth in terms of number of cattle and calves. (Ryan Adams/The Daily Iowan)





Nitrate levels in the Iowa River

Data collected by journalist Ryan Adams shows nitrate levels found along the Iowa River range from less than 10 mg/L to more than 125 mg/L



THE IOWA RIVER

AND RISING NITRATE LEVELS

See all 104 nitrate level tests on dailyiowan.com

The EPA's recommended limit of nitrate in drinking water is **10 mg/L**.

Flooding and record rainfall in Iowa contributed to much higher nitrate levels found by *Daily Iowan* journalist Ryan Adams during a monthlong kayak expedition down the Iowa River.





Ryan Adams/The Daily Iowan

Farmer Dick Sloan points to a section of his cornfield near Rowley on June 18. Sloan implements cover crops, prairie land, and no-till practices to reduce nutrient runoff and soil erosion in his fields.

clean sources of water.”

The amount of fertilizer input into fields can affect water quality as well. In many places I passed through, the water was murky with sediment, possibly worse because of erosion from flooding.

Iowa State University publishes a list of recommended fertilizer inputs for fields each year. Because these recommendations are made on a voluntary basis, farmers can choose how much fertilizer they apply to fields each year.

Farmers around Iowa have had to adapt to the increase in annual precipitation, increased length between rainfall, and more intense rainfall, according to a study the U.S. Agriculture Department conducted using data in nine Midwestern states from 2011 to 2015. The report recommended farmers add a diversity

of erosion-management tools such as wetlands and cover crops.

One farmer, Dick Sloan of Rowley, Iowa, participated in the USDA and ISU collaborative report and continues to implement nutrient- and erosion-reduction systems. Sloan farms roughly 700 acres in northeast Iowa. Embedded among the field are rows of wetlands, buffer strips, and cover crops.

Sloan’s lips turned up in a half-smile as he walked across his fields. He walked along the rows of corn with a spring in his step, excitedly explaining all the practices he had implemented over the years.

“When I started out, I had corn, hogs, and soybeans, and you feed the corn and soybeans to the pigs, and you use the nutrients from the pig manure ... and raise more corn and soybeans, and it

struck me as odd,” Sloan said. “That’s a good little system, and it is on small-scale levels, but then there’s a lot missing — the diversity, the potential for adding more diversity.”

The same programs that help farmers such as Sloan



‘I will say that it’s ironic that ever since we passed the bill, the party that did nothing has complained about this being too little.’

— Ken Rozenboom, R-Oskaloosa

are funded through state and private sources.

Iowa Gov. Kim Reynolds signed a bill in January 2018 — the first bill she signed upon taking office — that allo-



Reynolds



Ryan Adams/The Daily Iowan

Cody Atkinson of Marengo holds two hulled catfish he caught on June 1. Atkinson had to forgo his normal fishing destinations downstream because access was blocked off.

cated \$282 million to water-quality initiatives over the course of 12 years.

Reynolds’ office did not respond to requests for comment from *The Daily Iowan*.

The Nutrient Reduction Strategy, developed

prevent farm runoff.

Iowa Sen. Ken Rozenboom, R-Oskaloosa, the chair of the Natural Resources and Environment



Committee, said the water-quality bill Reynolds signed was a monumental step in addressing the issue, because there was nothing else like it before.

“I will say that it’s ironic that ever since we passed the bill, the party that did nothing has complained about this being too little,” said Rozenboom, referring to his Democratic opposition. “When they were in control, there was no water-quality bill.”



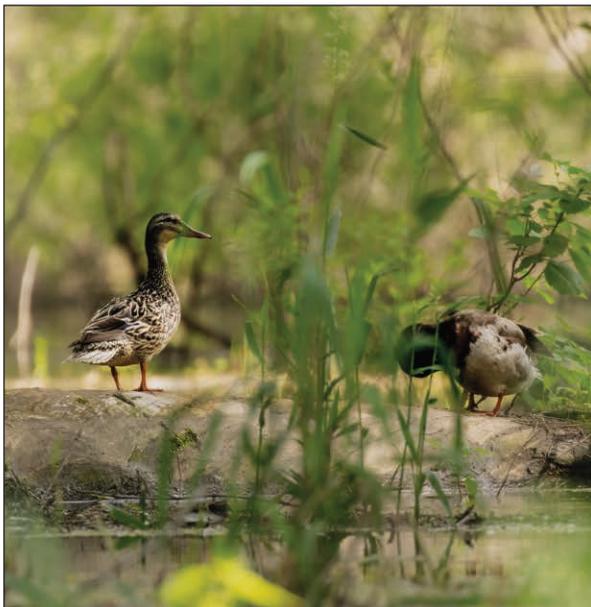
Grassley in a conference call with reporters

that former EPA Administrator Gina McCarthy, the head during the Obama administration, made statements during a 2013 visit to Iowa that summarized the effectiveness of the Nutrient Reduction Strategy.

“She was asked at that time if she thought the way that Iowa’s doing it [Nutrient Reduction Strategy] would meet the federal requirements,” Grassley said. “... the fact that she thought that not only would Iowa’s plan satisfy the federal law, but it might be an example for other states to do as well.”

Five years after the launch of the Nutrient Reduction Strategy, a UI study released in 2018 showed that Iowa’s contribution of nitrate pollution in the Gulf of Mexico has spiked by 47 percent in recent years.

The study was based on a five-year running of



TOP LEFT: A pair of deer stand along the riverbank of the Iowa River north of Iowa City on June 11. **TOP RIGHT:** Vintage vehicles lay embedded into the riverbank of the Iowa River south of Riverside on June 13. In efforts to reduce riverbank erosion, vehicles are sometimes placed on the shore. **TOP CENTER LEFT:** A tadpole breaches a bubble to take a breath at Arney Bend Wildlife Area on May 29. **BOTTOM CENTER LEFT:** A drainage pipe stands on the bank of the Iowa River's west branch on May 20. This pipe is one of several drainage solutions for excess water in Iowa farmlands and communities. **CENTER:** A bald eagle perches in a tree next to the Iowa River north of Middle Amana on June 3. **BOTTOM LEFT:** A pair of ducks stand on a log in a tributary of the Iowa River north of Iowa City on June 11. **CENTER RIGHT:** Iowa farmer Dick Sloan is seen driving near his 700-acre farm near Rowley on June 18. Sloan utilizes several conservation practices on his farm including cover crops, strips of prairie grass, and no-till practices. **BOTTOM RIGHT:** A monarch butterfly floats through a meadow at Arney Bend Wildlife Area north of Marshalltown on May 29. The 203-acre conservation area was established in 1980. (Ryan Adams/The Daily Iowan)



Ryan Adams/The Daily Iowan

Former Clarion art teacher and wrestling coach Jack Britton stands with his dog Razor near the Iowa River bank at Pikes Timber on May 22. Britton has spent most of his life along and on rivers in Iowa, including the Mississippi River, near which he grew up. Britton was in the area looking for morels.



Ryan Adams/The Daily Iowan

A couch and bench sit in the floodwater along the south Obank of the Iowa River downstream of Marshalltown, Iowa, on May 31.

annual totals, but Rozenboom said that because nitrate levels are so sensitive, these studies need to be done during at least a 50-year period to accurately portray the condition of the river.

“Common sense should tell people that we don’t do a lot of things that we did two generations ago,” Rozenboom said. “And that has impacted water quality — not for the worse but for the better.”

When there’s a spike in nutrients in water, the water’s clarity decreases and sedimentation increases, changing the ecosystem of the waterways. Sediment-tolerable species are more likely to thrive,

while clear-water species struggle. Increases of nitrogen and phosphorous also promote algae, which have caused issues in other Midwest communities, especially those along Lake Erie, where bacteria-inducing algae had left communities without drinkable water.

Critics of the bill Reynolds signed say that \$282 million is not enough to address the issue of water quality.

Sen. Joe Bolkcom, D-Iowa City, community education director at the Center for Global & Regional Environmental Research, said Republican leaders in the Iowa Statehouse will not raise taxes to invest more money in addressing water quality.

“I think without a change in the General Assembly and the leadership of the General Assembly, we’re going to continue to have kind of a tepid, insufficient effort around soil conservation and water quality,” Bolkcom said.

Because Iowa has endured massive rainfall this year, it’s even more important to address how Iowans can limit the amount of farm runoff.

“... I can see many, many examples of bonehead farming practices and poor farming practices that result in significant erosion and water pollution because of the way

the ground is farmed,” Bolkcom said. “If we’re not even able to take care of ... basic water quality and soil erosion issues through volunteering means, something more has to give here.”

•••

The Iowa River transforms throughout its length. The beginnings are straight and narrow channels running through the farmland of north-central Iowa. From East Twin Lake Wildlife Complex on, the river begins to wind and widen, until it becomes wider than Kinnick Stadium’s football field.

Some of the unique features along the river banks include limestone bluffs in Iowa Falls, the expansive Hawkeye Wildlife Management Area north of Iowa City, and vegetated islands that inhabit the channel after the confluence with the Cedar River.

Jones said it is easy to

ing up others’ minds to implement the practices.

While watching a breeze blow through the infant corn plants in his field, Sloan said, “What we do need is more people trying, and I think that’s the main thing.”

Evidence of flooding followed my boat and me throughout the entire journey. I paddled over a seemingly endless, completely submerged gravel road, I felt the pull of the river as it managed the overflow of water underneath the boat, and I saw the evident force of the water as I passed a crumpled canoe wrapped around a log.

I went to the river for answers, and while I did learn from the people I spoke with, the flooding I experienced, and the tests I conducted, the resounding answer I found came from the river itself: Water quality isn’t a simple issue to approach. It’s like the river — ever-changing course, rising and lowering.

Like the river, the issue is complex.

The nutrient levels may be high, and flooding may increasingly

affect Iowa, but if anyone can come together and create change, it’s the people of this state.

It’s the farmer in the field, enthusiastically explaining new conservation practices, the angler describing a lifelong relationship to a particular fishing hole along the river, the friends enjoying a weekend getaway as they paddle down the river that gives me hope.

‘What we do need is more people trying, and I think that’s the main thing.’

— Dick Sloan, farmer in Rowley, Iowa

become pessimistic about the state of water quality in Iowa’s waterways, but there are solutions to the problem, such as diversifying crop rotation.

Sloan is one of the farmers implementing diversified practices, allowing him to better understand how to efficiently grow crops while reducing nutrient loads. The Rowley farmer said he believes the issue is a matter of open-



While this piece provides my experience, it is not the end of the project. During the expedition, I spent time capturing the journey on camera, with the goal of a film documenting my experience in ways written words cannot express. The project continues, and I look forward to completing the film in the fall.

EPILOGUE

Ryan Adams/The Daily Iowan

A cornfield on the right side of the picture is affected by standing water from rainfall on May 20. To the left side of the picture, the rocky bank of the cornfield meets the Iowa River.

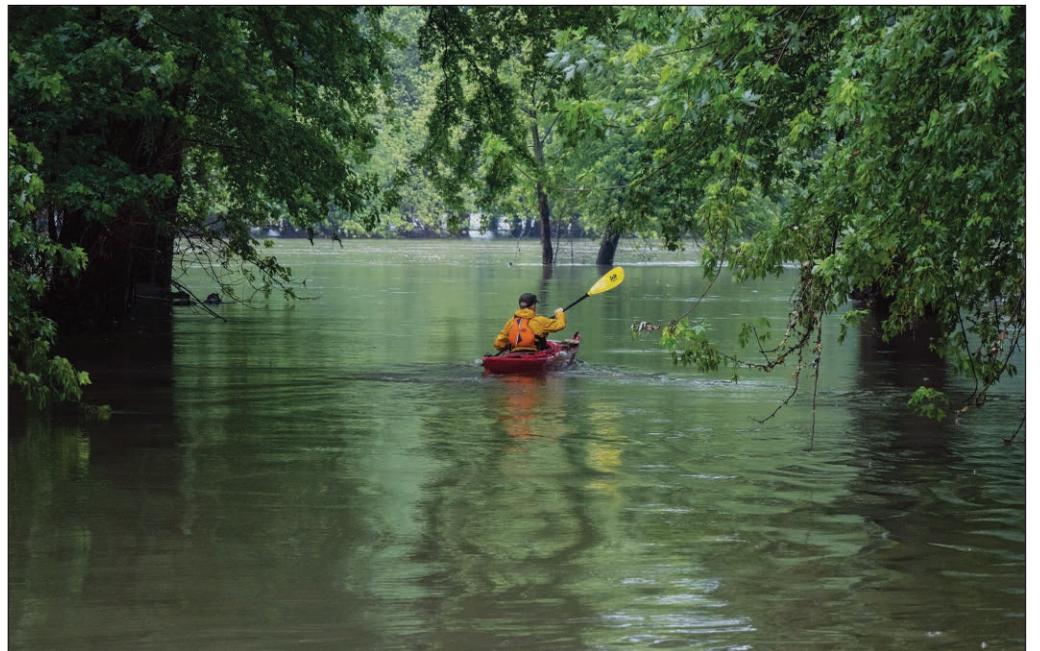
Looking back on the time I spent on the water, I sometimes find it hard to believe that I accomplished what I set out to do. Through the hardship and adversity, I persisted, knowing that I wanted to tell this story. For me, this project was an indication of whether I was passionate enough to endure hardship in the outdoors to cover the issues needed to be talked about. Oddly enough, I began to crave the wind in my face, the waves fighting to push

over my boat, the nights spent inside my tent listening to driving rain. Everything that pushed against me made me push back even harder.

I can only say that the river revealed itself in ways that impacted me to my core. It felt like the river held secrets, and it did everything to keep me from seeing what they were. Little by little, I peeled back the layers, and I felt I was experiencing the water in a way most people will never encounter. I found companionship in the wildlife that call

the river their home. I felt joy as the morning light touched my face. The more I paddled, the more in tune I became with the river and land around me.

While this piece provides my experience, it is not the end of the project. During the expedition, I spent time capturing the journey on camera, with the goal of a film documenting my experience in ways written words cannot express. The project continues, and I look forward to completing the film in the fall.



Bret Adams/ The Daily Iowan

New interactive database displays private-well contaminants in Iowa

Researchers at the University of Iowa and Iowa Geological Survey developed an interactive database that displays about 100,000 private wells across Iowa to inform well-drillers and homeowners of geology and water contaminants.

BY JULIA SHANAHAN
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The Iowa Well Forecasting System, an interactive database of private wells across Iowa, informs property owners and well-drillers about the geology and water contaminants in a state in which agricultural runoff greatly affects Iowa's waterways.

This interactive database was created in a partnership between the University of Iowa Hydroinformatics Lab, the Center for Health Effects and Environmental Contamina-

tion, and the Iowa Geological Survey. The database displays a map of Iowa and pinpoints thousands of private wells. Along with that, the database shows what nutrient levels are in a given well.

"Our system connects 100,000 wells and analyzes all the combinations in the well in the area you selected, and that will give you an estimate of the geology of the aquifer levels and depth of the aquifer," said Ibrahim Demir, a UI assistant professor of civil/environmental engineering and a researcher

at the environmental-contamination center. "It will do that in seconds by analyzing millions of combinations."

Before the database, if people wanted to drill a well, they likely contacted the IGS and asked the agency to do calculations about how deep to drill to get to a certain aquifer.

UI Professor David Cwiertny, research engineer at the Hydroinformatics Lab, said the IGS approached him and the center looking for a way to make the information more accessible. It takes the

IGS days to come up with those kinds of calculations for well-drillers, he noted.

"[The project] seemed like a great opportunity, because if we have all this data, we should be able to use that data to inform," Cwiertny said.

Approximately 60 percent of Iowans use groundwater. This includes the roughly 300,000 Iowans who use private wells as their primary water source, according to the center. In an April study from the Iowa Environmental Council, unsafe levels of nitrate, coliform

'It shouldn't cause [homeowners] to immediately lose faith in their water supply, but it should hopefully motivate them to want to get the well tested.'

— David Cwiertny, UI research engineer

bacteria, and fecal coliform bacteria were found in thousands of wells, most notably in rural areas.

That can be attributed to agriculture runoff into Iowa's waterways, which also affects groundwater. The Environmental Protection Agency recommends water supplies to have a nitrate limit of 10mg/L; however, some water in Iowa exceeds that limit.

Russell Tell, a private-well coordinator at the Iowa Department of Natural Resources, said he's aware of the many private wells that are at risk in the state, and those wells can have a negative effect on other private wells on surrounding properties.

"Risk can happen in any part of the state," Tell said. "I think largely it will be due to land-use activities in the area, but it is not limited to that."

Cwiertny said there were concerns voiced early about the map affecting property values, because it allows a user to locate a specific homeowner and look at what the water quality is on that property and the property around it. But, he said, that

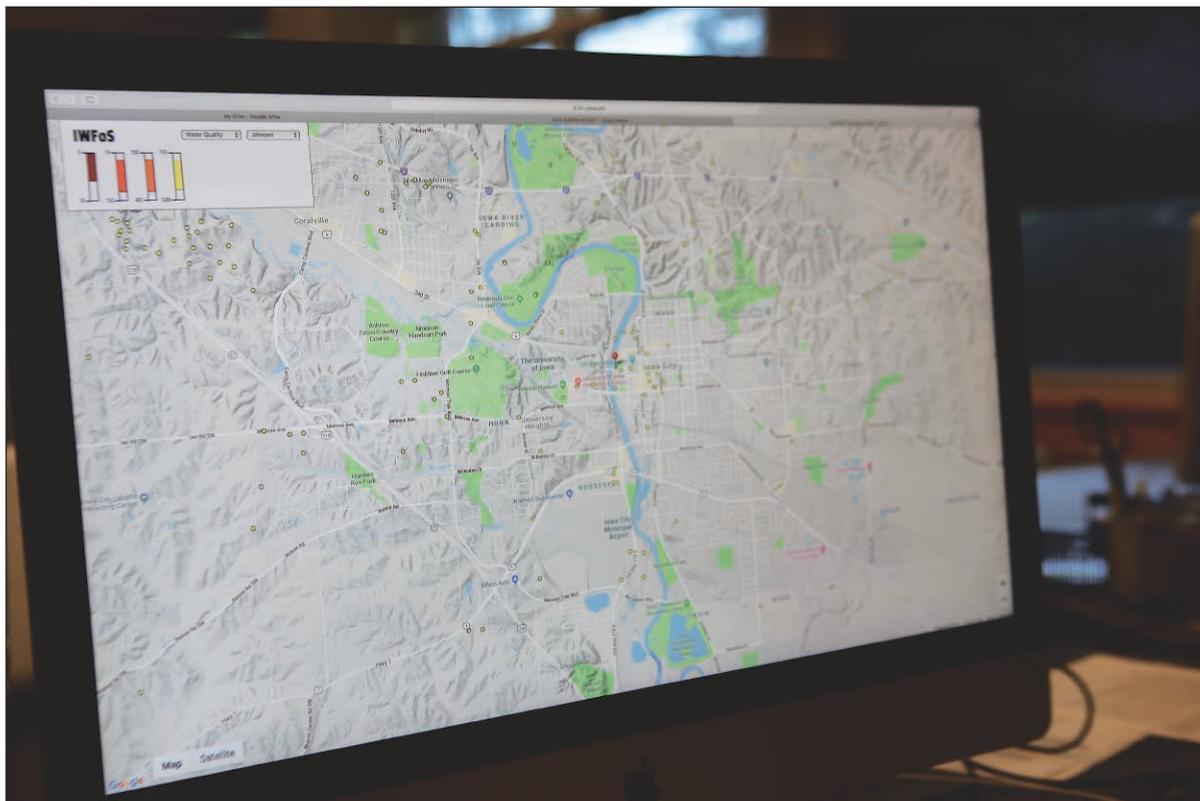
information is already given to real-estate agents.

"It shouldn't cause [homeowners] to immediately lose faith in their water supply, but it should hopefully motivate them to want to get the well tested and know that, OK, we've had a history in this area of, say, nitrate problems, so I can take advantage of the Grant County programs where a lot of this data comes from," Cwiertny said.

Iowa offers some homeowners a subsidized testing program, but there is no state law that requires private wells to be tested yearly. The programs are available in 98 of the 99 Iowa counties, and the tests cost around \$20-\$25 out-of-pocket, according to the UI State Hygienic Laboratory.

Tell said there are a lot of older wells in the state that property managers should consider abandoning.

"Essentially, it's the well owners' responsibility to identify the needs and to conform to protect the well," Tell said. "[The DNR is] here as a technical resource to decide what needs to be done."



Emily Wangen/The Daily Iowan

The Iowa Well Forecasting System, a web-platform used to access information regarding well geology and water quality, is seen on July 12.

Opinions

COLUMN

Lawns aren't worth their watery price tag

The water needed to sustain America's pretty green grass is an irresponsible use of one of our most precious resources.



ELIJAH HELTON
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My least favorite chore in high school was mowing the lawn. In the dead heat of July, I'd cut the grass at least twice, if not thrice, a week. All that time pushing and sweating and meticulously painting straight lines in my yard got me thinking, "Is all of this worth it?"

Of course, that whiny teenager wasn't primarily concerned with the water-supply ramifications of a green front yard, but the question still stands: Are lawns worth all the water

we use to maintain them? At the current levels, not even close.

According to the Environmental Protection Agency, the average American family uses roughly 48 gallons of water a day for watering. What's more is that about half of that water is considered wasted, from over-watering, leaks, and other environmental factors. And that's the nationwide average. In parts of the country with a hotter and drier climate, the amount of water used outside could be doubled and account for over half of all water used by a household in a day.

All of this is to keep some grass near our houses looking green and desirable. And unless you keep a cow or two in your front yard — something I'm sure

the homeowners' associations would look down upon — the short green crop doesn't serve much of a purpose besides looking pretty.

This wouldn't be that big of a problem if grass wasn't the most widely planted thing in the country. That's right, the grass in your and practically everyone else's yard takes up more than three times the area of any other irrigated crop in the United States, according to a NASA study.

So we have something taking up more space than corn or soybeans or wheat — and we can't eat it. Not only are we wasting water, but in order to grow one of those sought-after American-suburbia lawns, we have to use tons of fertilizers and pesticides.



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That brings us back to my least favorite chore. Because we are, in fact, growing something, we have to harvest it — or in this case, cut it down and either throw it away or just let it sit there. Almost all of us use a gas-powered mower, which isn't helping our carbon-emission crisis. My high-school self was wrong about most things, but he was right to question the cost of a lawn maintenance.

But let's not be teenagers who complain all day and do nothing to fix it. What can be done to fix this?

For one, we could stop caring so much. But just letting the grass grow and die doesn't seem like the most savory solution (and home-

owner associations won't be happy either). What can be done is other uses for our green yards. Gardens, especially the ones that grow something edible, would be a much better use of land. So would planting more trees, which are generally better at sequestering the carbon emitted by

mowing whatever wasteful lawn remains.

Whatever we decide to do, being more aware of our water use is essential, especially in a time in which we are incessantly reminded that our natural resources are not limitless. And as a bonus, we'll make our lists of chores a little less exhausting.

GUEST OPINION

Iowans deserve clean waterways

Disruption of natural waterways threatens Iowa's future.

When I am near water, my soul quiets. The sound, the feel of it against my feet bring rejuvenation.

I look for reasons to be near it, to play with my three sons in it. We even live on property with a creek running through it. But now, I have more than 10,000 reasons to avoid it.

Animal confinements are ruining the quality of our

water. They close beaches and make it more expensive to drink. The people of Iowa, especially our children, are owed clean, safe waterways. This is something that can be accomplished with stricter rules against factory-farm pollution and a moratorium on more confinements.

When I am near water, I was to be at rest, not anxious

about what harms may be lurking unseen.

Since the Iowa Legislature won't protect our water, we had to file a lawsuit against the state. For this reason, I support Iowa CCI and FWW's case against the state of Iowa to clean up our waterways.

— **Kim Stephens**
Nevada, Iowa, resident

WATER-USE & LAND-USE STATISTICS

- The average American family uses **320 gallons of water** a day.
- **30 to 60 percent** of that water is used outdoors, depending on the regional climate.
- **More than half** of outdoor water is used to water plants, primarily turf grass.

(Source: Environmental Protection Agency)

- Turf grass covers **more than 63,000 square miles** in the U.S.
- That's **more than three times the area** of any other irrigated crop.
- Or put another way, that's **larger than the entire state of Iowa**.

(Source: NASA)

Men on Boats ripples through history

Go for a thrilling ride down the Colorado River with *Men on Boats*, a play performing at Riverside Theater through July 28.

BY LAUREN ARZBAECHER
lauren-arzbaecher@uiowa.edu

Going over a waterfall in a rowboat. Trying not to fall to one's death off a cliff. Fighting off a rattlesnake with a coffee pot. All this adventure and more can be found in *Men on Boats*, a production being performed at the Riverside Theater through July 28.

Written by Jaclyn Backhaus, the play follows the 1869 journey of John Wesley Powell and a group of explorers in their expedition to survey the country along the Colorado River and the then-unknown (by white settlers) Grand Canyon. Backhaus drew information for the play from Powell's meticulous journals of the

expedition, which were later collected into the book *The Exploration of the Colorado River and Its Canyons* in 1895.

The play is set soon after the Civil War and examines many themes central to the American experience. Explorers set out to see the wonders of the natural world but encountered obstacles in nature, among each other, and with the native population who already inhabited the land. Adam Knight, the producing artistic director at Riverside, said the show looks at history through an entirely new lens.

"Part of the American mythos is the idea of discovery, and it plays into a lot of our history, for good and for bad," Knight said. "This play embraces that dichotomy.

It embraces the contradiction of what makes America, America."

Full of excitement and grit, characters face extreme obstacles and grapple with doubts around exploration into the unknown. Putting a river and the Grand Canyon on stage is a nearly impossible task, which led the show to use various theatrical techniques to portray a similar sense of grandeur. Jessica Link, who portrays Powell in the production, said the show was quite physical.

"We did some days where we just worked on movement," she said. "We worked all of the scenes where they are actually in the boats, on the river, truly traversing this waterway and these canyons. It's the most phys-



Emily Wangen/The Daily Iowan

Lauren Galliard, Karle Meyers, and Jo Jordan perform during the final dress rehearsal of *Men on Boats* on July 3 at Riverside Theater.

ical play I think I've ever done, and we've all got the bruises and badges of honor to show it."

Obscured by the title of the play, one of the production's most striking aspects is that the cast entirely comprises individuals who are, in fact, not men. The casting choice is embedded in the fabric of *Men on Boats*, and Backhaus decided the casting at the show's inception.

"The cast is made up of 10 individuals who are either female-identifying or nonbinary," Link said. "It's really fantastic to be able to step into the world as a man

sees it and play it that way without pretending to be a man, because we are not doing that. We are embodying the spirit of these men on this incredible journey that women were not allowed to take at the time."

to deliver a fun experience, which also acknowledged the hilariously depressing pointlessness of the men's trek down the river."

A truly engaging production, *Men on Boats* transports the audience back in time while simultaneously putting a modern spin on a tale that explores the possibilities of the human spirit.

While I was initially uninterested by the title, when the play presented

a historical retelling with men entirely absent from said boats, I was intrigued," said University of Iowa senior Sarah Poultney. "This is just one part of a play that used its casting, lovable characters, and witty quips

to deliver a fun experience, which also acknowledged the hilariously depressing pointlessness of the men's trek down the river."

A truly engaging production, *Men on Boats* transports the audience back in time while simultaneously putting a modern spin on a tale that explores the possibilities of the human spirit.



Emily Wangen/The Daily Iowan

Lauren Galliard and Jessica Link perform during the final dress rehearsal of *Men on Boats* on July 3 at the Riverside Theater.

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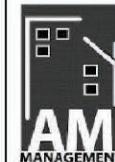
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