

Audio file

[Episode_4_Flood Proof.mp3](#)

Transcript

Music playing, instrumental - “When the Levee Breaks” by Memphis Minnie and Kansas Joe McCoy

00:00:26 Kimberly Inman

Have you ever felt a connection to a geological feature? Before you say, “No -That's odd,” think about where you live and how that setting influences the society living within it. Having lived most of my life along the Ohio River, my personal history is linked to the river's currents,

00:00:45 Kimberly Inman

turns, and banks that make me feel like I'm at

00:00:47 Kimberly Inman

home.

00:00:49 Kimberly Inman

I also associate that river with industry, recreation, danger, and an understanding of the history of this place that we call Portsmouth, Ohio.

00:01:01 Kimberly Inman

Welcome to Connecting Classrooms, a podcast for educators and their students that brings experts at Shawnee State University directly to your classroom. I am your host, Kimberly Inman, Dean of the College of Arts and Sciences at SSU.

00:01:15 Kimberly Inman

In this series, you will hear from my colleagues who love to share their passion for teaching and research. We seek to support teachers with supplemental resources for their lessons and to inspire their students to want to learn more.

00:01:31 Kimberly Inman

Next year, 2025, will mark the 75th anniversary of the completion and dedication of the Portsmouth - New Boston Flood Defense,

00:01:41 Kimberly Inman

more familiarly known as the Portsmouth Flood Wall. Five generations of Portsmouth residents, Boomers, Xers, Millennials, Gen Z, and now Generation Alpha have grown up, or, in the case of Alphas, are growing up with the flood wall. It's a familiar feature of our local landscape, and with the flood wall murals

00:02:00 Kimberly Inman

it's a point of civic pride.

00:02:03 Kimberly Inman

In this episode we connect with Doctor Kurt Shoemaker, professor of Geology at Shawnee State University. He's conducted research on volcanic systems in the northwestern United States and has studied the evolution of the Ohio River system during the Ice Age.

00:02:18 Kimberly Inman

More recently, his interests have turned toward the role of geologic setting and geologic phenomena in historical events.

00:02:25 Kimberly Inman

He is currently researching the history of flooding and flood defense at Portsmouth. Welcome, Doctor Shoemaker.

00:02:31 Kurt Shoemaker

Thank you, Doctor Inman. Before we get into it, I'd like to ask you a question. What do you picture if I describe a place as a walled city?

00:02:40 Kimberly Inman

Hmm.

00:02:41 Kimberly Inman

Like a medieval city fortress in Europe.

00:02:44 Kurt Shoemaker

Yeah, I think most people, Westerners, anyway, would probably say something like that. You tend not to think of Portsmouth as a walled city even when you're sitting in the middle of it. But the Portsmouth flood wall, all 8 miles

00:02:58 Kurt Shoemaker

of

00:02:58 Kurt Shoemaker

it -

00:02:59 Kurt Shoemaker

4 miles of concrete walls and four miles of earthen levees - really does make Portsmouth a walled city.

00:03:06 Kurt Shoemaker

Next question, why do you build a wall around a city?

00:03:09 Kimberly Inman

That's got to be for defense,

00:03:11 Kimberly Inman

right?

00:03:12 Kurt Shoemaker

Exactly! To defend against an existential threat. Except we aren't concerned with marauding Huns or Visigoths.

00:03:20 Kurt Shoemaker

The biggest threat to Portsmouth is flooding of the Ohio and Scioto Rivers.

00:03:25 Kimberly Inman

So how big of a flood would the flood wall protect us from?

00:03:30 Kurt Shoemaker

It would spare us from a 77 foot flood.

00:03:34 Kimberly Inman

So what does that mean? Water, 77 feet deep in the streets?

00:03:38 Kurt Shoemaker

Ohh no, that would be biblical. Let me put it this way. If there was water 77 feet deep on Front Street, because the surface of water is going to be level, the water would still be over 30 feet deep in the hilltop at Greenlawn Cemetery.

00:03:57 Kurt Shoemaker

No. So what we're talking about here is what's called flood stage. So the base of the Portsmouth flood gauge is at an elevation of about 469 feet. I think it's 469.01 feet above sea level.

00:04:13 Kurt Shoemaker

When the water in the Ohio at Portsmouth reaches 50 feet above that, so the surface is at an elevation of 519 feet above sea

00:04:21 Kurt Shoemaker

Level, the Ohio is considered to have reached flood stage. But even then there's not much to worry about. The elevation of Front Street is about 528 feet above sea level, for example, so if you go back to before we had a flood wall, it's not until you get to flood stages in the high 50s

00:04:42 Kurt Shoemaker

that most people in Portsmouth would have really had any concerns.

00:04:46 Kurt Shoemaker

And the current flood wall protects us to a flood stage of 77 feet, which is 3 feet higher than the flood Crest in 1937, which is the biggest flood on record at Portsmouth.

00:04:59 Kimberly Inman

So with the big flood wall, would you say Portsmouth is flood proof?

00:05:04 Kurt Shoemaker

Ah, so the the phrase flood proof.... In Portsmouth's history, quote-unquote, flood proof is funny in a a sad sort of way. Making the city flood proof would be ideal,

00:05:17 Kurt Shoemaker

right?

00:05:18 Kurt Shoemaker

I mean -

00:05:18 Kurt Shoemaker

Floods are extremely costly. The cost of the 1937 flood at Portsmouth was \$16,000,000, which is the equivalent of \$328 million today. And Portsmouth is in a vulnerable location, sitting on the banks of one of the biggest rivers in North America.

00:05:36 Kurt Shoemaker

at the confluence with one of its major tributaries. And so you want to protect the city from flooding, right?

00:05:42 Kurt Shoemaker

The earliest use of the phrase “flood proof” in Portsmouth that I found is in the *Portsmouth Daily Times* in 1897.

00:05:54 Kurt Shoemaker

This is after disastrous 61-foot floods in 1832, 1847,

00:06:00 Kurt Shoemaker

, and 1883, and then a 66-foot flood in 1884. And that 1884 flood was the highest water recorded in Portsmouth up to that point, and today is still the third worst flood in Portsmouth’s history.

00:06:17 Kurt Shoemaker

So, in February of 1897, the Ohio rose to 59 feet. Not the worst flood, but high enough to wet Front Street, 3rd Street, the area to the northwest of Tracy Park, and part of the North End.

00:06:32 Kurt Shoemaker

And a couple days after the crest of that flood, there's this tiny editorial snippet in the *Daily Times*. And it says, you know, if there was a levee on Robinson Avenue and a floodgate in the 3rd Street sewer, Portsmouth would be nearly “flood proof”.

00:06:50 Kurt Shoemaker

That's really, as far as I can tell, the beginning of a call for real systematic flood defenses at

00:06:58 Kurt Shoemaker

Portsmouth. But even then, what you see is that when the rivers would start to rise, they threw up these temporary earthen levees in strategic locations. They'd sandbag the sewers, and then, when the threat passed, they'd tear it all out.

00:07:14 Kurt Shoemaker

It's not until after back-to-back 61-foot floods in January and March of 1907 that J. I. Hudson, who was the City Engineer, brought a proposal to City Council for the construction of a 61-foot flood wall to protect downtown, and that flood wall

00:07:34 Kurt Shoemaker

was built in 1909.

00:07:39 Kimberly Inman

All right, so you just mentioned several 61-foot floods, and I'm right that the 1884 flood - that was 66 feet?

00:07:48 Kimberly Inman

But in 1909, they only build a 61-foot flood wall?

00:07:52 Kurt Shoemaker

Yeah, isn't that crazy?

00:07:54 Kimberly Inman

Yeah.

00:07:55 Kurt Shoemaker

It actually gets worse. That first flood wall, and you can still see parts of it along front St. down near Alexandria Point. And part of it peeks out from beneath the big earthen levee near Shawnee State.

00:08:08 Kurt Shoemaker

That flood wall wrapped around the far West End, and then it ran along Front Street to Chillicothe Street, where it turned north and half a block later just stopped.

00:08:19 Kurt Shoemaker

So there's actually a photograph of the old Portsmouth Daily Times building during the 1913 flood. The Times building stood roughly where Shawnee State's Natatorium is at the West End of campus, right by the foot of the Grant Bridge.

00:08:35 Kurt Shoemaker

So this picture was taken a couple days before the crest of the 1913 flood and you can see the river is just flowing around the end of the flood wall and into downtown. So even though that was a 61-foot flood wall,

00:08:50 Kurt Shoemaker

Boneyfiddle flooded before the river reached 61 feet. In a way it didn't really matter though, because in that flood the Ohio rose to almost 68 feet.

00:09:03 Kimberly Inman

OK, so then lesson learned. Did they build a better flood wall after that?

00:09:08 Kurt Shoemaker

Yes and no. They added another foot to the top of it and then gradually started extending it eastward. By 1915, it had reached Offnere Street.

00:09:23 Kurt Shoemaker

And by around 1930, it finally joined up with the earthen levees. The Norfolk and Western had built around the railroad yards. So, Portsmouth was protected against 62-foot floods.

00:09:36 Kimberly Inman

Wait, wait, wait, stop. There were already 2 floods on record that had gone several feet higher than that.

00:09:42 Kurt Shoemaker

Exactly.

00:09:44 Kimberly Inman

Weren't people worried?

00:09:46 Kurt Shoemaker

Maybe.

00:09:48 Kurt Shoemaker

Here's the thing, at that point, Portsmouth had the best flood wall on the Upper Ohio River, maybe on the entire Ohio River. It was better than Pittsburgh's and better than Cincinnati.

00:10:01 Kurt Shoemaker

And Portsmouth was very, very prosperous back then, despite it being the Great Depression. Portsmouth was doing OK. The flood wall provided a sense of security, especially in 1933, and then again in 1936 when the Ohio rose to within a few inches of the top of the flood wall.

00:10:23 Kurt Shoemaker

While Cincy and Pittsburgh tried to clean up flood damage, everybody in Portsmouth had remained safe and dry.

00:10:31 Kimberly Inman

All right, so 1936, just a few inches made the difference between safe and dry and flooded. At that point

00:10:41 Kimberly Inman

didn't anyone think

00:10:42 Kimberly Inman

the flood wall should be just a bit higher?

00:10:45 Kurt Shoemaker

If they did, I haven't seen it yet. On the other hand, I found this publication from

00:10:53 Kurt Shoemaker

Mid- to late –1936. It's unmarked, but I think it was printed by the Chamber of Commerce or maybe the Board of Trade. Some sort of civic booster organization. Anyway, there's a two-page spread in the middle of it. You've got a dramatic aerial photograph showing the flood wall holding back the '36 flood.

00:11:15 Kurt Shoemaker

And you got photos of people going about their business downtown, shopping and whatever. No cares at all, despite the fact that the river is lapping at the top of the wall and across the top of this it says in huge letters, "Portsmouth, the Protected City".

00:11:33 Kurt Shoemaker

I think that all contributed to this idea of a, quote-unquote, flood proof Portsmouth.

00:11:40 Kurt Shoemaker

Especially when you look at how other cities suffered. Heck - 1936 is actually the worst flood on record at Pittsburgh, and Portsmouth was completely spared.

00:11:51 Kimberly Inman

And then - the 1937 flood happened.

00:11:55 Kurt Shoemaker

And then the 1937 flood happened. Literally just a few months later.

00:12:00 Kurt Shoemaker

It was kind of a freak weather event. You had a high-pressure system channeling moist air from the Caribbean that collided with a dry polar air mass from the northwest and that created a stationary low-pressure trough positioned more or less directly above the entire Ohio Valley.

00:12:21 Kurt Shoemaker

It started raining the day after Christmas 1936 and basically rained for an entire

00:12:27 Kurt Shoemaker

month.

00:12:28 Kurt Shoemaker

Most locations in Scioto County received between 13 and 14 inches of rain in January.

00:12:35 Kimberly Inman

So how high was that 1937 flood at Portsmouth?

00:12:38 Kurt Shoemaker

The official mark is 74.23 feet. You can do

00:12:43 Kurt Shoemaker

the math.

00:12:46 Kimberly Inman

I can. Let's see. That's that's more than six feet higher than the 1913 flood and 12 feet higher than the old flood wall.

00:12:53 Kurt Shoemaker

Yeah.

00:12:54 Kurt Shoemaker

It was truly a worst case scenario. Uh 2/3 of the area of the city, everything except the hilltop, was underwater.

00:13:04 Kurt Shoemaker

Out of Portsmouth, 42,000 residents, 34,000 were refugees.

00:13:10 Kurt Shoemaker

Almost 8000 families were displaced from their homes.

00:13:14 Kurt Shoemaker

More than 600 of those homes were destroyed outright or had to be condemned.

00:13:19 Kurt Shoemaker

Every one of Portsmouth's manufacturing plants was flooded, as were almost all of its stores.

00:13:26 Kurt Shoemaker

Portsmouth suffered worse than any other city in Ohio.

00:13:30 Kimberly Inman

But Portsmouth recovered, right?

00:13:32 Kurt Shoemaker

Yes and no.

00:13:35 Kurt Shoemaker

Portsmouth cleaned up and went back to work, but some of the manufacturing plants didn't reopen and some that did reopen either closed down completely or packed up and moved elsewhere over the next few years.

00:13:47 Kurt Shoemaker

And when you look at the 1940 US Census,

00:13:51 Kurt Shoemaker

you see Portsmouth's population declines for the first time in the city's history.

00:13:56 Kurt Shoemaker

And the population has been declining ever since.

00:14:00 Kimberly Inman

So how is it that Portsmouth

00:14:02 Kimberly Inman

did get the big flood wall?

00:14:05 Kurt Shoemaker

Well, they say timing is everything. And the good graces of Uncle Sam helped too.

00:14:12 Kurt Shoemaker

In the 19th and the early 20th centuries, the feeling in Washington was that flood control was really a state issue.

00:14:20 Kurt Shoemaker

And the states often thought it was a local issue.

00:14:23 Kurt Shoemaker

But that attitude started to shift after a devastating flood on the lower Mississippi River in 1927.

00:14:31 Kurt Shoemaker

If you know the Led Zeppelin song that goes, "If it keeps on raining. the levee's

00:14:35 Kurt Shoemaker

gonna break?"

00:14:36 Kimberly Inman

Yeah.

00:14:37 Kurt Shoemaker

Yeah, that was originally a Blues song written by Memphis Minnie in 1929 about that Mississippi River flood.

00:14:47 Kurt Shoemaker

About 27,000 square miles were flooded for several months. Hundreds of people died and hundreds of thousands were left homeless, mainly poor African Americans.

00:15:02 Kurt Shoemaker

But it took a disaster of that magnitude for Washington to start thinking about flood control as a national problem.

00:15:11 Kurt Shoemaker

So finally, after that Mississippi River flood in 1927 and then the Ohio River floods in 1933 and 1936, Congress passed the Flood Control Act in 1936.

00:15:24 Kurt Shoemaker

So, in a nutshell, it was that piece of legislation, along with the fact that there was abundant federally subsidized labor thanks to all the public works programs of the New Deal that got our food well built. Still, it wasn't just a let's build it for the sake of building

00:15:43 Kurt Shoemaker

something project like some New Deal projects were. Portsmouth was still a strategic manufacturing center at that point, and one the feds thought was really worth protecting, especially since World War Two was right around the corner.

00:15:59 Kimberly Inman

All right, so let's circle back to an earlier question. With the big flood wall, is Portsmouth flood proof?

00:16:06 Kurt Shoemaker

Flood proof? Well, scientists don't deal in proof. That's a misconception. We deal in certainty. Proof is something absolute. Certainty is a measurable quantity. It can be very high. You can have tremendous confidence in it.

00:16:25 Kurt Shoemaker

But it doesn't have to be 100%.

00:16:28 Kurt Shoemaker

In fact, it's very hard to reach 100% certainty because it's almost impossible to identify all the variables and all the unknowns.

00:16:37 Kurt Shoemaker

But I think we can say with a high degree of certainty, 95%, maybe even 99% or more that our flood wall will protect us from future floods.

00:16:49 Kurt Shoemaker

Remember, it's three feet higher than the Crest of the '37 flood, but it's also not just our flood wall that protects us. There's a tremendous amount of flood control infrastructure all up and down the Ohio and its tributaries that's been built up over the last 75 years.

00:17:10 Kurt Shoemaker

Now.

00:17:11 Kurt Shoemaker

Could we have an 80-foot flood next year that comes over the top of the wall? Yes, it's possible, but the probability of it happening is extraordinarily small.

00:17:26 Kimberly Inman

Well-

00:17:28 Kimberly Inman

I, for one, will take comfort in that level of certainty as we sit here, what about 500 feet from that flood wall? Ohh well, thanks for sharing all this with us today. It's been really great learning about all this history and how geology has influenced how we live in Portsmouth.

00:17:47 Kimberly Inman

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00:18:07 Kimberly Inman

T.R. Beery.

00:18:11 Music Playing. "When the Levee Breaks" by Memphis Minnie and Kansas Joe Mccoy

Memphis Minnie

If it keeps on rainin', levee's going to break.

If it keeps on rainin', levee's going to break.

00:18:21 Memphis Minnie

And the water goin' come, I have no place to stay.

00:18:26 Memphis Minnie

Well, all last night, I sat on the levee and moaned.

Well, all last night, I sat on the levee and moaned.

00:18:37 Memphis Minnie

Thinkin' 'bout my baby and my happy home.