



ENVIRONMENT

Flooding 101: Why the Boise River overflows its banks, and will again and again

By Rocky Barker

rbarker@idahostatesman.com

and Bill Manny

bmanny@idahostatesman.com

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Douglas Hardman, Ada County Emergency Management director, talks about expected inflows into the Boise River reservoir system as temperatures warm. (Wednesday, May 3, 2017) BY MCCLATCHY

Q: Temperatures warmed up this week. Will that make our flooding worse?

Not necessarily. A few days in the 80s may not dramatically change the relatively slow runoff [the cool mountains](#) have been sending into the Boise River's reservoir system. But with the possibility of a warmer and wetter May ahead, federal dam officials might have to take their releases into the river up [yet again to maintain a buffer in the reservoirs](#).

Q: What is considered flooding on the Boise River?

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By The Idaho Statesman Staff

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The U.S. Army Corps of Engineers says flooding begins when flows measured at Glenwood Bridge reach 7,000 cubic feet per second. We hit that in early March and the river is flowing at close to 9,000 cfs.

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Boise River flow = 8,800 cubic feet/second. One cubic ft of water = 7.48 gallons = 62.43 lbs. $8,800 \times 62.43 = 549,384$ lbs or 274.69 tons. pic.twitter.com/2lMFkx9wON

— USGS in Idaho (@USGS_Idaho) [April 25, 2017](#)

Q: How much water are we talking about?

We use two common measures. An acre-foot measures volume. That's how much water is needed to cover one acre of land with a foot of water. It's 325,851 gallons, or 43,560 cubic feet. The three Boise River reservoirs — Arrowrock, Anderson Ranch and Lucky Peak — hold a total 949,700 acre-feet, which would be 309 billion gallons.

Cubic feet per second measures the flow of liquids. So 1 cfs for one entire day moves 1.98 acre-feet of water. A 10,000 cfs flow out of Lucky Peak Dam would release almost 20,000 acre-feet of water from the reservoirs each day. But remember: Even as water is released from the dam, more is flowing into the reservoir system from the mountains.

We're talking tons of water. Literally.

The U.S. Geological Survey offers this illustration of the Boise River flowing at 8,800 cfs. One cubic foot of water is 7.48 gallons, which weighs 62.43 pounds. So 8,800 cubic feet times 62.43 pounds is 549,384 pounds — 274.69 tons — passing every second.

One way to envision it: Basketballs are smaller than a cubic foot in size. Imagine 9,000 or 10,000

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As recently as mid-February, the river was flowing at less than 400 cfs.

Latest [#Boise](#) River flow and stage from our Glenwood Bridge streamgage: 8,960 cfs, 11.31 ft (flood stage is 10.3 ft <https://t.co/KLvmmXqzpl> [pic.twitter.com/pec700jcth](https://t.co/pec700jcth) — USGS in Idaho (@USGS_Idaho) [May 3, 2017](#)

Q: Why isn't flooding reported in height?

Some people are accustomed to hearing flooding explained in terms of feet above flood level, but that's less common here. Flood level is measured [at the gauge](#) at Glenwood Bridge. There's a real measuring stick in the river [that serves as a reference point, not actual river depth](#). Flood level — that 7,000 cfs — is 10.3 feet. Today's flows of about 9,000 cfs at Glenwood measure about 11.3 feet. When the river runs at 1,200 cfs in summer, the height is 5.85 feet.

Why report [flood levels in terms of flow](#)? That's the way people have come to talk about the Boise River — whether it's what's released from Lucky Peak or how to judge the best summer tubing conditions.

Q: What are the chances we will have a serious flood?

Dam managers estimate there is a 1 percent chance any year that the river flows will rise to 16,600 cfs. Federal dam managers say, based on 20 years with conditions similar to 2017, [there is a 10 percent chance flows will exceed 10,000 cfs this year](#). Above 10,500 cfs we can expect to start seeing [flooding on roads and bridges at places like Eagle Road and ParkCenter Boulevard](#).

Q: How much warning will we get if that happens?

Short of a catastrophic event, we're likely to know about possible risks several days in advance [if a heat wave or serious rainstorm is in the forecast](#).

Q: How much water is in the reservoirs?

[The three-reservoir system was 69 percent full as of May 1](#): Anderson Ranch (413,100 acre-feet) was 88 percent full; Arrowrock (272,200 acre feet) 51 percent full; and Lucky Peak (264,400 acre feet) 59 percent full.

Q: Why not keep the reservoirs emptier?

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Remember, weather and climate can vary greatly. Even if managers cleared more available storage space in the reservoirs, surprise storms still could cause massive rainfall or snowmelt that overwhelms the system.

A place for floods to go: Boise Greenbelt, parks protect homes and businesses just like dams. We need more parks <https://t.co/TB6iZURrWX>

— Rocky Barker (@rockybarker) [April 19, 2017](#)

Q: When does mountain runoff begin?

Earlier than it used to. The evidence that the runoff timing has changed is based on flow gauges maintained by the USGS. One of the oldest is the gauge on the Middle Fork of the Boise River, installed near Twin Springs above Arrowrock Dam in 1912. It shows that runoff that used to begin in early April now starts in late March. Runoff that used to peak in late May or June now peaks in early May.

The past 30 years generally have been drier. With Idaho snowpack melting and peaking earlier, flows are even lower in the late summer and fall in the tributaries above reservoirs and in rivers without dams.

Q: Why not just have higher dikes and levees?

The same reason that building more dams won't stop all floods. The levees just push flood flows downstream, where they become someone else's problem. By blocking the river off from its floodplain, the entire ecosystem is changed. The cottonwoods that make Boise the City of Trees are sustained by flood flows that spread their seeds and provide them with silted soil.

Q: What's the worst modern flood on the Boise River?

[In 1943, more than 25,000 cfs flowed](#) through the city during a warm spell in April. There was a lot less development then.

Q: What's the worst since Lucky Peak was built in 1955?

[That flood came in 1983.](#) Dam managers were forced to raise flows to 9,500 cfs for several days.

This graph shows [#Boise](#) River streamflow since February 1 compares with 35-year

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On Jan. 3, 1997, a rain-on-snow storm and warm temperatures increased mountain snowmelt, sending 148,000 acre-feet of water into the reservoirs in a matter of days. As they expect to do this year, officials took the Boise River up to flood levels and kept it high into summer.

Had another 10,000 acre-feet come into the reservoirs behind the three dams in 1997, the dams would have filled and officials would have had to release the rest, causing a major flood. But weather conditions improved and disaster was averted.

Officials remind us that despite best efforts, [one of these years](#) forces will combine and the Boise River will see serious flooding again.

Good morning, [#Idaho](#)! Here are your real-time streamflow conditions for [#StarWarsDay](#) <https://t.co/qjM5KjwazR> [pic.twitter.com/sHgCqFs8Iu](https://t.co/sHgCqFs8Iu)

— USGS in Idaho (@USGS_Idaho) [May 4, 2017](#)

Q: What about before Boise developed along the river?

Boise historian [Merle Wells told the story of homesteader Isaac Coston](#), who reported that on July 4, 1862, all the land in the river bottoms “extending from bluff to bluff and from the present site of Boise westward to the canyon near the present site of Caldwell” was underwater.

Engineers estimate the river that summer ran at 100,000 cfs.

Q: Parks and paths are flooded. How can the city let that happen?

Much of that flooding you see is intentional. [Boise uses its parks and riverside paths as a natural floodway](#) to absorb water and prevent flooding downstream. Habitat, groundwater and wetlands benefit from this passive flood control, and [the Valley has developed a strong consensus on doing as much as possible to use undeveloped parts of the flood plain as floodways](#).

While all riverside parks provide this function to some degree, [Marianne Williams and Esther Simplot parks](#) were intentionally designed as flood buffers. Much of the area around and downstream from Veterans Memorial Park does the same.

The role the parks and natural areas play is important, because much of the broad, wide flood plain that once absorbed excess water is now filled with homes, offices, businesses, schools [and roads](#).

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Island already has been removed by crane before it could topple off its eroding berms. [The U.S. Army Corps had to step in with a massive, high-tech sandbagging job](#) to keep the river from redirecting into a gravel pit south of Eagle Island and potentially flooding the island. [Ada County](#) later installed [a \\$26,000 flood-prevention tube](#) in the same general vicinity. If enough erosion occurs, it can change the river channels.

Q: Why not just build more dams?

Given their cost and expense, not to mention the complicated environmental trade-offs, nobody realistically expects such ambitious dam-building to return. The U.S. Army Corps of Engineers has studied this issue for years, examining the long-considered Twin Springs site on the Middle Fork of the Boise River and multiple off-river reservoir sites. It ended up closely analyzing [raising the level of Arrowrock](#) to increase storage capacity, for flood control, irrigation and other water users. The agency concluded the proposal was not cost-effective.

Bill Manny: [208-377-6406](tel:208-377-6406), [@whmanny](https://twitter.com/whmanny)

Rocky Barker: [208-377-6484](tel:208-377-6484), [@RockyBarker](https://twitter.com/RockyBarker)

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BY ANNETTE CARY

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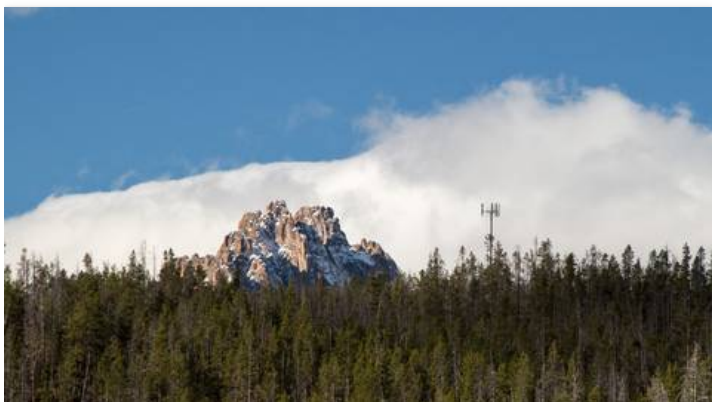
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