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Subject: : Conservation

Topic: : More bad news

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Date: : 2013/10/16 12:48:11

URL:

From the National Wildlife Federation!

Fellow TU members and anglers- attached is a report prepared by the National Wildlife Federation that documents the impacts of climate change on fish and a National Geographic article that discusses how climate change is affecting those world famous western trout streams. Feel free to disseminate widely.

Ed

Climate Change Spells Trouble for Anglers

New science reveals threats to prize fishing streams in warming world.

An fisherman in Montana enjoying the river.

Photograph by Jeff Hornbaker, Corbis

Ben Jervey

for National Geographic

Published September 18, 2013

This month, anglers who flock to Montana in search of their own authentic A River Runs Through It experience are out of luck. On September 4, the Blackfoot River, centerpiece of Norman Maclean's beloved story (and its film adaptation that gave the entire fly-fishing industry a boost in the early 1990s), was closed to fishing by officials from Montana Fish, Wildlife, and Parks. They cited "an effort to protect fish from the stress of low stream flows." (The river has since been reopened to fishing, but drought conditions remain.)

Such river closures have become more common in recent years, in Montana and beyond. They've become necessary as coldwater fish populations struggle to deal with low flows and warmer waters, symptoms that scientists link to the rising global temperatures brought about by climate change.

Last year, for instance, stretches of the Madison, Gibbons, and Firehole Rivers—all prized fishing destinations in the Yellowstone region—were closed in August. Scientists and anglers are in agreement: Climate change is already impacting the sport of fishing, and it's likely to get a whole lot worse.

"We've seen huge shifts here in Montana," said Todd Tanner, a lifelong fisherman who spends 200 to 250 days a year on the water, and who has been living in Montana for over three decades..

"Over the last 20 or so years, we're seeing this litany of shifts in weather patterns, and with them, a steady degradation in many of our rivers," said Tanner. "It's directly related to the snow going early, then to warmer springs and summers."

A few years ago, Tanner started the nonprofit, nonpartisan advocacy organization Conservation Hawks, and he argues that fishermen are the best equipped to see firsthand the impacts of climate change. "You can't be out fishing for trout or bass around here and not notice the change," he said.

Swimming Upstream

A new report, published September 4 by the National Wildlife Federation (NWF)—one of the country's largest environmental groups—backs up the anecdotal evidence and explains the variety of threats that climate change poses. Besides the closures themselves—which are typically the result of droughts and earlier than normal melt of alpine snowpack—many rivers are simply getting warmer. According to the NWF report, half of the major American rivers surveyed in a 2010 study experienced "significant warming trends over the past 50 to 100 years."

Fish are sensitive to temperature, explained Jack Williams, a senior scientist with the conservation group Trout Unlimited and a co-author of the NWF report, who describes a massive geographical shift in fish species already underway. "Already, native trout have been pushed around," Williams wrote in an email.

"Non-native species are pushing up from downstream and have sent the native trout into the higher elevation streams," Williams explained. "Unfortunately, these streams are going to be hard hit as wildfire, drought, and increased storm intensities hit these isolated high-elevation areas hard." (See "Amid Drought, Explaining Colorado's Extreme Floods.")

"In the Southwest," said Williams, "the evidence is in your face each time you survey a stream." Small streams in New Mexico, home to Rio Grande cutthroat, Gila, and Apache trout, are particularly susceptible to temperature increases.

Making things even worse are the wildfires, which Williams says the Southwest is seeing "at scales that we have not seen before." Wildfires rip through trout habitat, and the increased runoff that results when the riparian areas burn eventually leads to siltation effects. "It's a killer one-two punch in these small streams," said Williams.

Across the country in New England, coldwater rivers and streams are similarly threatened. In July 2011, Eric Orff, then a New Hampshire fish and game commissioner, was stunned to find water temperatures of over 80 degrees Fahrenheit (27 degrees Celsius) in Indian Stream, "a wonderful, classic trout stream in prime fishing season." According to Orff, the waters were so warm that the trout left, heading for the colder, deeper pools in the Connecticut River.

"So here you are as far north as you can go in New Hampshire," said Orff, "literally looking into Canada, and you have a stream that was fatal to brook trout."

The warming trends are only getting worse. Doug Inkley, a senior scientist at the NWF, points to a study quoted in the group's report. "The science is telling us that in the lifespan of a child born today, 50 percent of the habitat suitable for coldwater species of fish will no longer be suitable for them."

Another study anticipates that brook trout, the official state fish of Virginia, will be gone from that state's rivers entirely by mid-century, due mostly to warmer and more oxygen-depleted streams. Williams co-authored yet another study that predicted a further 77 percent decline in brook trout habitat nationally by 2080, and a 58 percent loss for cutthroat.

#### Impacts Beyond Coldwater Species

It's not just coldwater species—the trout and salmon, for instance—that are struggling to adjust. In 2005, the first large-scale die-off of smallmouth bass was witnessed in the Susquehanna River. The culprit: a bacterial disease called columnaris that, according to Williams, "becomes a problem and highly contagious at warmer temperatures, and so is becoming a problem associated with climate change."

Since that first event, these summer die-offs have become the "new normal" in the Susquehanna, and outbreaks are being reported with increasing regularity all across the country.

Lake populations, too, are reeling in this new normal. Temperatures in the Great Lakes, where native species like lake trout, whitefish, walleye, catfish, and sturgeon are popular prey for sport and commercial fishermen, have increased nearly 5 degrees Fahrenheit (nearly 3 degrees Celsius) over the past three decades. Even if these temperate water species can deal with some warming, the higher temperatures bring another risk: an invasion of sea lamprey. (See "Busting 5 Myths About Water Levels on the Great Lakes.")

Lamprey survive by latching onto a host fish and sucking its blood. They also grow larger and lay more eggs in warmer waters. The bigger, hungrier parasites are already wreaking havoc on the fisheries of the Great Lakes, explains Inkley, and the invasive species is only going to be harder to control as waters continue to warm.

#### On Thin Ice

Warmer, shorter winters don't only mean earlier snowpack melt—which throws off the norms in the coldwater

streams in the West—they can also keep ice fishermen off the lake entirely. The obvious reason: If prized ice fishing lakes don't ever freeze to safe levels, or if they freeze later and thaw earlier, opportunities to drill a hole and drop a line become fewer and farther between.

Jason McKenzie's family has owned and operated Suds N' Soda, a convenience store and purveyor of fishing gear in Greenland, New Hampshire, for half a century. For the past few years, sales of ice fishing bait and equipment have been suffering. According to McKenzie, two-thirds of their ice fishing inventory went unsold in 2010, and sales have been way off in the years since.

"We've had to adjust our inventory since winter and ice fishing went away five years ago," McKenzie said. "We just can't count on a New Hampshire winter to provide us with ice fishing business like we used to."

#### Angling: An Industry at Risk

All of these impacts of climate change—the warmer streams and earlier melts; the droughts, floods, and wildfires and the bacterial disease and invasive species—add up to a lot fewer opportunities for anglers to cast a line. And that means that the business of fishing is also taking a hit.

Craig Mathews runs Blue Ribbon Flies out of West Yellowstone, Montana. He's also something of a legend in fly-fishing and environmental circles, winning Fly Rod and Reel's Angler of the Year Award in 2005 and co-founding 1% for the Planet with Patagonia's Yvon Chouinard in 2001. Mathews says that the past several years have been rough on the area's rivers, and that the changes definitely impact his business.

"Last year we were off close to 5 percent in sales," he said, noting that he doesn't expect things to get better in the future. "When you look at the projected trends in warming, the science is telling us that we'll lose as much as 50 percent of coldwater habitats," said Mathews. "It's unimaginable what could possibly happen to the fly-fishing business."

The NWF report does the math: By 2030, the number of days that anglers will fish is projected to decline by more than one million days every year. By the end of the century, it's over six million days. That would translate to a roughly \$6.4 billion loss for the fishing industry annually.

Mathews and other anglers in the Yellowstone region were lucky this year. "We've been blessed with a little more moisture," Mathews said, and his outfit has actually seen a bit of benefit from the climate-driven misfortune of others. "As a result of fires in Sun Valley and smoke in Jackson and closures in other parts of Montana, we saw a spike in our business as people tried to escape those parts."

Not that Mathews is thrilled about the situation. "This year, it benefited us. But certainly it's benefiting no one in the long run."

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