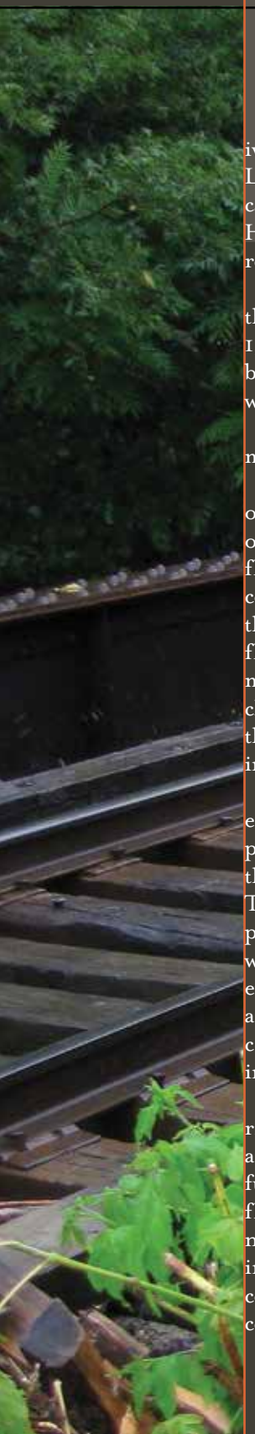
CLIMATE CHANGE AND TROUT FISHING

THE AFTER FLOOD



BY KEITH CURLEY AND MARK TAYLOR

ive years ago Tropical Storms Irene and Lee pummeled the Eastern U.S., causing catastrophic flooding throughout the region. Homes and lives were lost, with the death toll reaching 59 between the two storms.

Construction teams scurried to address the damage. In Vermont alone, more than 1,000 culverts failed and more than 500 bridges were damaged. Thirteen communities were isolated.

Trout fishing was the last thing on people's minds.

As we look back on Irene and Lee, however, one of the most striking lessons is that many of the actions that benefit trout habitat—floodplain reconnection, restoring channel complexity, bridge and culvert upgrades—are the same that help communities prepare for floods and effectively respond in their aftermath. The converse is also true: Dredging and channelizing rivers, and installing culverts that are too small, harms trout habitat and increases flood risks.

Tropical Storms Irene and Lee are emphatic examples of an increasing trend in intense precipitation events in the Northeast, something climate models predict will continue. The U.S. Global Change Research Program projects that in the Northeast, "river flooding will pose a growing challenge to the region's environmental, social, and economic systems," and that "Infrastructure will be increasingly compromised by climate-related hazards, including… intense precipitation events."

We will never be able to eliminate flood risks. But the more we can learn from Irene and Lee, the better prepared we will be for future challenges. Increasing our focus on flood resiliency through expanding partnerships, improving policies and increasing on-the-ground efforts will help make communities safer, save money and advance coldwater fisheries conservation.

Wallingford, Vermont

THE RESPONSE TO IRENE

Rich Kirn, a fisheries program manager with the Vermont Fish and Wildlife Department, saw first-hand the devastation from Irene, both from the storm and from ill-advised repair efforts.

"It was a horrible storm," Kirn said. "There were people's homes and roads washed out. There were public safety issues that had to be addressed.

"But after a week or two there was work that was being done way above and beyond those needs."

In some cases, work crews manned bulldozers and excavators to channelize streams, incorrectly thinking that such reshaping of channels would reduce the risk of flood damage in the future.

Boulders and large trees were pulled from streams due to a misguided perception that clearing obstacles would improve flows during high water events.

Washed out culverts were hurriedly replaced with similarly undersized structures that fragment stream habitat and are vulnerable to failure during future high water events.

"You couldn't drive down the road in Vermont without seeing a big yellow machine in the river every mile or so," Kirn said. "In many cases they did more harm [than good]. As far as stability of rivers and trying to protect infrastructure, it was found that a lot of the practices were actually detrimental."

In Vermont, at least 77 miles of rivers and streams were dredged and channelized.

The work often had devastating impacts on coldwater resources, including trout populations.

Catastrophic flooding can deplete fish populations, but streams typically recover naturally within a few years. Activities such as dredging, however, can permanently alter a stream's ecology, eliminating trout populations altogether in some cases.

The days and weeks following Irene were difficult for Kirn and his fellow fish biologists.

"We spend our careers trying to protect these habitats," he said. "In one flood event a lot of us saw our career's work essentially going down the tubes."

That didn't mean they gave up.

LEARNING FROM OUR MISTAKES

In Vermont and elsewhere Irene and Lee provided an effective, if painful, teaching moment.

"We decided, 'Let's go out and document this so, at the least, we can show what's happening on the ground and get some attention for the issue," Kirn noted.

That documentation included not only plenty of "after" photos, but also data.

In cases where there was storm damage but no major "repair" efforts, Kirn and his colleagues found that trout numbers were depleted after the flooding.

"But the populations bounced back pretty rapidly over time," he noted. "In areas that were significantly altered or

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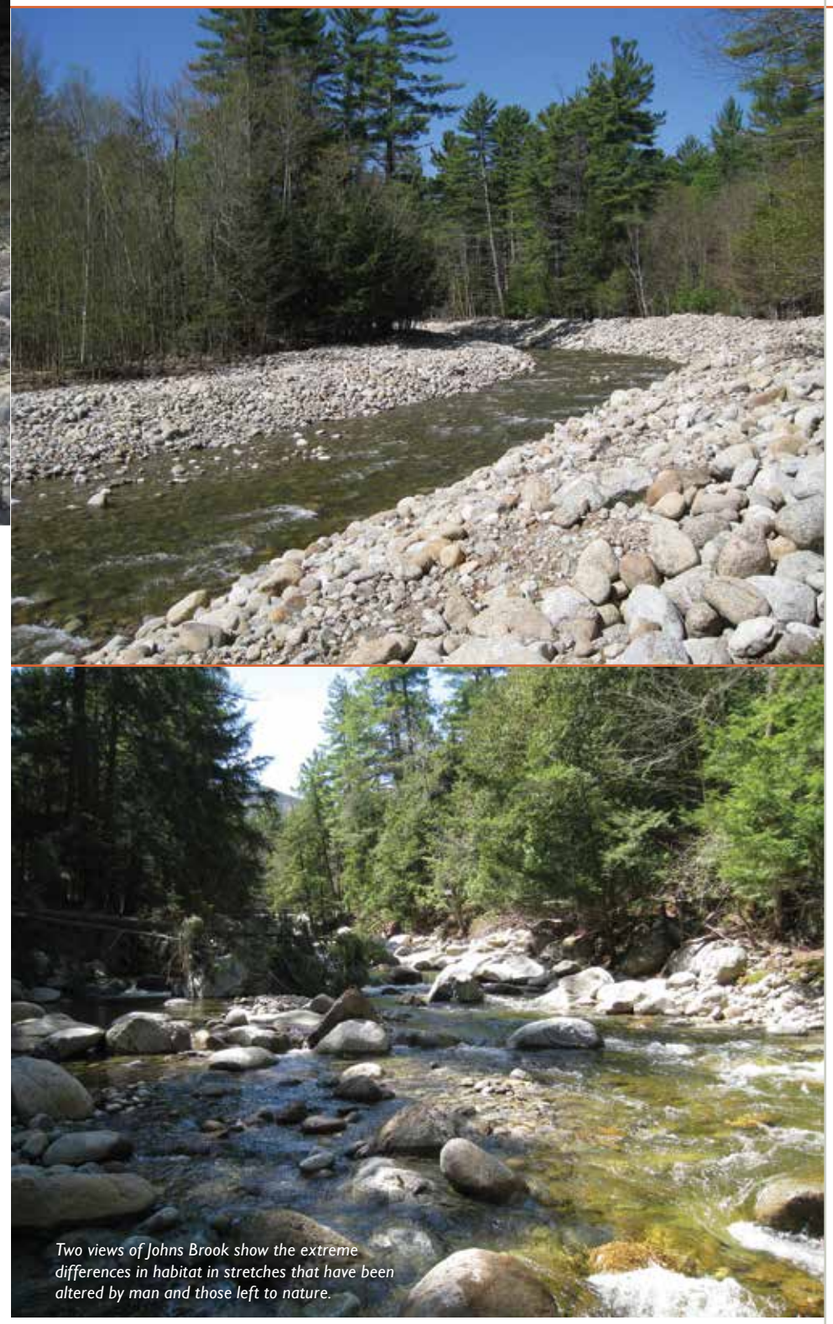

Two views of Johns Brook show the extreme differences in habitat in stretches that have been altered by man and those left to nature.

homogenized, anybody can look at them and see that they aren't going to hold a diverse fish population.

"But we did go back and document it just to make more clear that it was the cause and effect."

There are several reasons for such reactions to flooding emergencies.

During states of emergency, governors may suspend permitting requirements, reducing important checks and balances required before any work that alters streams.

In many cases, dredging and channelization as a response is ingrained from prior experience.

Finally, crews simply lack the training and awareness for approaching the situations differently.

"We used to have an old school mentality," said Art Merrill, a longtime town supervisor in Colchester, N.Y. "We'd gut out our streams, try to make them flow easier, and get them away from infrastructure." Now, however, momentum is shifting in the right direction.

PREPARING FOR THE FUTURE

Repair work is gradually helping to address some of the damage created in the wake of Irene and Lee.

Importantly, state and local officials are learning new approaches, embarking on training and awareness programs, and improving emergency response programs to promote best management practices.

"We've learned those methods don't hold up," Merrill said of the old approach. "Now we know that making the streams healthier is in our best interest and helps maintain infrastructure. When we enter the stream

now, we do it in the best way possible to maintain the ecology."

Vermont Fish and Wildlife has implemented a new training program for state and municipal transportation crews. The approach is to help people understand the big picture, not to simply tell them about the right and wrong approaches.

"We were telling them 'do this' or 'don't do that,' but we haven't really provided them with an understanding of why things occur," Kirn said. "Now we're teaching them about river dynamics, morphology and habitat."

Several hundred people have already participated in the two-day training programs.

In New York, the Department of Environmental Conservation has put together a training program and a guide for workers: "Guidelines for Post-flood Stream Construction: What to do and not do after a major storm."

TU staff throughout the region have been collaborating with federal and state agencies, and local municipalities, to assist with stream restoration projects, education and awareness.

One focus is to help local authorities understand that proper stream crossing construction not only can benefit fish and other aquatic creatures, but is a smart long-term financial investment.

For example, sometimes the initial response to replacing a failed culvert is to rebuild a similar, undersized structure. Sometimes policies actually provide incentives for re-installing undersized structures through easier permitting or disaster funding programs that only pay for the replacement of the original culvert. Other times, the initial expense is too much for a local community to bear.

However, replacing a culvert with a properly sized bridge or culvert that allows for "aquatic organism passage" can save money in the long run because it will be more flood resilient and less prone to failure.

In Vermont, U.S. Forest Service fisheries biologist Dan McKinley said talking about money tends to get community leaders' attention.

The U.S. Forest Service has been a leader in designing and constructing road-stream crossings using the "Stream Simulation" design approach, which is not only good for the ecology of the stream, but is also more resilient to flooding. After Irene, when working with communities in and around the Green Mountain and White Mountain national forests, McKinley was able to point to recently upgraded stream crossings that had withstood Irene-related flooding.

"People who weren't so interested in fish were jumping on board because of the good financial and economic reasons behind [improved] crossings," McKinley said.

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Culvert upgrades are not only better for stream ecology but the crossings are more resilient to flooding.

Little Schoharie Creek

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READY FOR CHANGES AHEAD

New York's Little Schoharie Creek provides a stark example of the perils of improper response in the wake of flooding.

Prior to Tropical Storm Irene, Little Schoharie was a healthy, productive trout stream and spawning nursery. After the storm, $5.4 million was spent dredging 5.8 miles of the stream. Once dredged, Little Schoharie Creek cut deeper into its streambed, prompting a project initially budgeted at $12.1 million that grew to exceed $20 million to fix the damage, while experts agree that appropriate emergency measures would have cost only $1.5 million using recommended actions. No one wants to make these unaffordable mistakes again.

Since Irene and Lee, some states and counties have improved standards for road-stream crossings, developed training programs on proper ways to respond to flooding and established new guidelines for instream work.

TU has reconnected hundreds of miles of habitat through culvert upgrades, also making those culverts more resilient to future flooding, and has assessed thousands more culverts to prioritize future projects.

Dr. John Braico, a TU Board of Trustees member and a resident of Queensbury, N.Y., traveled the Northeast extensively photographing examples of poor restoration attempts after the storms. Since, he has been involved in restoration work on streams similar to the Little Schoharie Creek, and has seen progress made in many flood-impacted regions elsewhere.

"It was frustrating to see so many examples of once-productive trout streams reduced to what were, for all intents and purposes, drainage ditches," Braico said. "Yet it's been encouraging to see the progress made on repairing some of that damage across New York, as well as improvements in the understanding and the process of preparing for future high-water events. "Still, we have a long way to go."

By applying the lessons of Irene and Lee and working at the intersection of coldwater habitat needs and flood resiliency, we can help our communities and our rivers and streams cope with the coming changes.