Resource Brief

National Park Service
U.S. Department of the Interior

Klamath I&M Network
Natural Resource Stewardship and Science

Vital Sign Update: 2021 Results for Streams Monitoring at Whiskeytown National Recreation Area

Importance

Spreading water and essential nutrients across the land and gracing the scenery, streams are key natural resources at Whiskeytown National Recreation Area. Because streams carry evidence of upstream and upslope disturbances, both natural and human-caused, we can examine their biological, physical, and chemical qualities to understand watershed health. Since 2011, we've been monitoring streams as a vital sign of the park's health to inform park managers about current conditions and any concerning changes. This brief describes how we measure the *biological* component of stream health—aquatic invertebrates—and our 2021 findings. **Note: results describe conditions 3 years after the 2018 Carr Fire.**

Why aquatic invertebrates (stream bugs)?

Many aquatic invertebrate species inhabit Whiskeytown's streams. Because each one requires different food sources and habitat, and tolerates different water chemistry, the species that show up in our samples tell us a lot about conditions in the stream. Furthermore, their habits and life history make them ideal for monitoring. They reproduce quickly, providing immediate evidence of changes happening in the stream that affect them. They remain close to their birthplace, tying their occurrence more closely to the immediate conditions around them. As a critical link in the food web, they can teach us about the condition of the primary producers they consume (algae or fallen leaf litter, for example) and predators (fish and amphibians) that eat them. They also tend to respond predictably to human-caused disturbances.



Using the "kick net" method to sample aquatic invertebrates at Boulder Creek in Whiskeytown. Submerging a long-handled, open net downstream of our feet, we kick the streambed to knock invertebrates loose, which then drift into our waiting net to be gathered in a bucket and identified.

What are multimetric indices?

To assess stream health, we calculate several multimetric indices based on the mix of invertebrate species in our samples. Each species or species group, with its unique characteristics, provides different information about water quality, such as the number of species in the sample that tolerate sediments, or the number of individuals that can't tolerate warm water. The unique mix of each sample translates into an overall measure of water quality, ranging from pristine to severely degraded. You can think of each index a little bit like the Dow Jones Industrial Average or NASDAQ, with each providing a slightly different picture of the stock market.

What are O/E scores?

One useful metric we calculate is the O/E score, or Observed/Expected Ratio of Taxa Loss. Simply put, it is the ratio of how many species of invertebrates we observed in a stream compared with how many species we'd expect to find in healthy conditions. The smaller the ratio (fewer species observed than expected), the more concerned we are about biodiversity loss in the stream.

Results and Future Monitoring

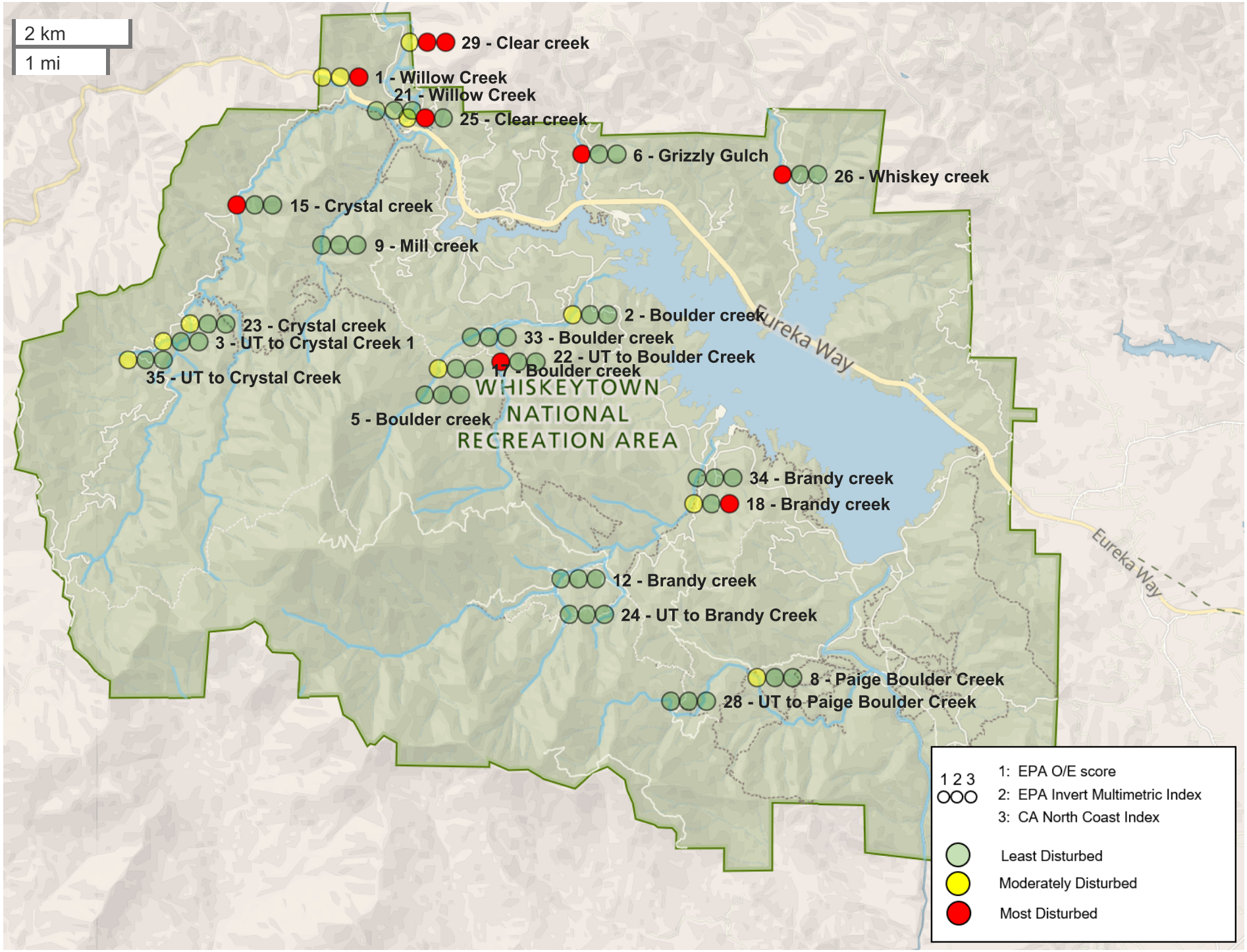
In Jun–Jul 2021, we sampled 22 stream sites at Whiskeytown that were originally scheduled for 2020 but delayed by the Covid-19 pandemic. View the map on the back for detailed results, **which reflect ongoing influences of the Carr Fire**. We'll sample Whiskeytown streams again in 2024.

More Information

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Project overview, reports, and protocol:
https://www.nps.gov/im/klmn/streams.htm

Datasets and all related publications:
https://irma.nps.gov/DataStore/Reference/Profile/2171797


2 km
1 mi
29 - Clear creek
1 - Willow Creek
21 - Willow Creek
25 - Clear creek
6 - Grizzly Gulch
26 - Whiskey creek
15 - Crystal creek
9 - Mill creek
2 - Boulder creek
23 - Crystal creek
33 - Boulder creek
3 - UT to Crystal Creek 1
22 - UT to Boulder Creek
17 - Boulder creek
35 - UT to Crystal Creek
WHISKEYTOWN
NATIONAL
RECREATION AREA
5 - Boulder creek
Eureka Way
34 - Brandy creek
18 - Brandy creek
Eureka Way
12 - Brandy creek
24 - UT to Brandy Creek
8 - Paige Boulder Creek
28 - UT to Paige Boulder Creek
1 2 3
1: EPA O/E score
2: EPA Invert Multimetric Index
3: CA North Coast Index
Least Disturbed
Moderately Disturbed
Most Disturbed