National Park Service
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Rocky Mountain National Park
Continental Divide Research Learning Center

Cutthroat Trout Translocation Success

The Question: Do summer stream temperatures affect the success of translocated cutthroat trout in high elevation streams?

The investigators, Mark Coleman and Kurt Faush of Colorado State University, used a working hypothesis that successful translocations occurred in streams with warm summer temperature regimes whereas translocations to streams with cold summer temperature regimes were less successful. Abiotic (e.g., temperature) and biotic (e.g., predation) factors influence successful establishment of new cutthroat trout populations, and the abiotic factors may be more important in harsh environments such as those found in headwater streams in Rocky Mountain National Park. It is important to understand the interplay of these factors in such streams if the greenback cutthroat trout (*Onchorhynchus clarkii stomias*) recovery program is to be successful.

The Project: Measure temperatures over the growing season and assess trout fry density.

The biologists selected six headwater trout streams in north-central Colorado including two in Rocky Mountain National Park with varying temperature regimes. They monitored water temperatures year-round and totaled as Celsius degree-days (CDD) during the growing season (degree days are a measure of when conditions are warm enough for trout growth). They performed visual surveys of cutthroat fry and defined successful recruitment (equals translocation success) as survival to the start of winter. They counted and measured fry and estimated fry density and size at peak emergence for each study stream.

The Results: Cold headwater streams are unsuitable for cutthroat trout establishment.

In general cold thermal regimes, defined as those experiencing less than 800 CDD, were unsuitable for translocation efforts. Streams experiencing between 800 and 900 CDD experienced recruitment, that is survival of the young trout to winter, in some years, but not consistently. Streams with thermal regimes ranging from 900 to 1200 CDD exhibited the highest density and recruitment of cutthroat fry. This verifies the original premise that headwater streams with colder summer thermal regimes were unsuitable for translocation of cutthroat trout. Most of the impact of cold temperatures is manifested through size-dependent effects on survival. Data from lab studies implies that cutthroat fry need to reach a minimum total length of 30 to 35mm prior to onset of winter conditions to ensure their reaching winter. Combining the results from temperature and growth studies suggests that translocation success is unlikely in streams where the average water temperatures in July are less than 7.80C.

Spawning greenback cutthroat trout. Photo courtesy of Chris Kennedy, USFWS.

Overall fry counts were lower than expected and may have been underestimated because of the complexity of the habitat and the methods used. Based on previous laboratory studies, it would be expected that populations would quickly die out in the colder stream reaches. However, mitigating factors to this possibility include (1) nearness of warmer water reaches, (2) inherent longevity of high-elevation cutthroat trout populations, (3) presence of warmer microzones of water, and (4) discontinuity of temperatures along stream reaches .

These data in conjunction with supporting laboratory studies will provide managers with guidelines to use when selecting streams likely to be successful for future translocations of cutthroat trout.

This summary is based on published, peer-reviewed and/or unpublished reports available at the time of writing. It is not intended as a statement of park policy or as a definitive account of research results.
For more information on the park's research program, see www.nps.gov/romo
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