Improving Translocation Success of Threatened Trout

Based on the research of Amy L. Harig and Kurt D. Fausch
Department of Fishery and Wildlife Biology, CSU (kurtf@cnr.colostate.edu)

Protection of endangered and threatened fish sometimes requires *translocating* specific strains to new habitats. This term refers to the stocking of a watershed with a particular fish species or subspecies, with the goal of creating a self-sustaining population. Although this is a standard practice in protecting aquatic species, it has often been unsuccessful. For example, Harig and Fausch (2002) found only 38% of 37 early attempts to establish populations of greenback cutthroat trout (Colorado's state fish) were successful and only 46% of 28 attempts to reestablish Rio Grande cutthroat trout were successful. Therefore, fisheries managers are seeking ways to improve success translocation and prevent species from becoming further endangered or going extinct.

Harig and Fausch's research attempted to address this problem by comparing habitat features in Colorado streams where translocations of these native cutthroat trout were successful, versus those where they were marginal or unsuccessful. Their findings have relevance to both practitioners and policymakers.

Harig and Fausch measured characteristics of habitats at two levels:

- Basin Level: Broad-scale features such as watershed area and elevation may control whether translocations can establish populations.
- Stream Level: Fine-scale features such as stream width, numbers of pools, habitat complexity, and water temperature may control success of translocations.

Their findings show that translocations of native cutthroat trout were most successful in wider streams with warmer summer water temperatures (most were too cold) and more deep pools. Secondarily, at the basin level, translocations were most successful in larger watersheds than smaller ones. These findings have the following implication for broader decision-making:

1. Not all watersheds are of equal habitat quality for rare or threatened native cutthroat trout. Some may be particularly capable of sustaining trout populations.

2. Resources are needed to conduct analysis of possible translocation sites, especially at the stream level for which surveys are labor intensive because streams are remote.

3. Policy decisions that affect land use may risk degrading watersheds that are of particularly high quality for translocating native cutthroat trout.

4. Policy decisions that decrease the total available stream and watershed area for translocated or historical populations of native trout may affect the long-term viability of these populations.

The work of Harig and Fausch is also valuable for managers and policymakers making decisions about historical populations of rare or threatened cutthroat trout, because it indicates what features of the habitat must be maintained to ensure continued success of these fishes. This work may also be applicable to other native trout species.

Harig and Fausch studied 27 watersheds in Colorado and New Mexico where water managers translocated greenback and Rio Grande cutthroat trout. They determined the success of each translocation by counting fish in pools (their preferred habitat), throughout the entire stream segment inhabited (1-20 km). They measured characteristics of stream habitat to determine which best explained this translocation success, and developed models at the stream and basin levels to predict success of future translocations.

Stream-level habitat characteristics they measured included:

- Stream length;
- Pool width;
- Number of deep pools;
- Presence of clean gravel needed for trout spawning;
- Physical habitat structure; and
- Water temperature.

Basin-level habitat characteristics they measured included:

- Watershed area;
- Channel length;
- Stream slope;
- Latitude; and
- Elevation.

Harig and Fausch found the model most capable of predicting translocation success was based on the combination of summer temperature, pool width, and the number of deep pools, all stream-level habitat variables. These features are important because:

- Cold summer water temperatures can delay trout spawning and egg incubation, and reduce growth of fry needed to ensure overwinter survival;
- Larger streams are more capable of supporting larger populations, because they have more heterogeneous habitats that meet the diverse needs of different age classes of trout, and;
- Larger populations are more capable of withstanding floods and other un-predictable environmental conditions.

The researchers also found watershed area to be useful as an initial 'coarse filter' to predict to success of a translocation attempt. This feature is important because:

- Larger watersheds are more likely to include lower-elevation habitats that provide summer temperatures warm enough for successful cutthroat trout reproduction and fry growth; and
- Streams in larger watersheds are more likely to have the input of logs and boulders necessary to create pools with complex physical structure, found to be beneficial to translocation success.

The study on translocated trout has some limitations. First, it focuses on only two subspecies of cutthroat trout, the greenback and Rio Grande cutthroat trout. This may limit its applicability to other cutthroat subspecies in regions of the western U.S. Second, the use of a true experimental design (i.e., randomly choosing streams with different habitat characteristics and translocating trout) would increase the ability of the study to establish clear cause and effect.

Based on: Harig, Amy L. and Kurt D. Fausch. 2002. Minimum habitat requirements for establishing translocated cutthroat trout populations. *Ecological Applications*, 12(2): 535-551.