Review of literature on catch-and-release mortality rates of trout

By Emily Giles, Brigham Young University-Idaho

Research has investigated how catch-and-release mortality rates depend on variables such as fishing method, terminal gear, water temperature, and hook locations. When taking into consideration all types of gear, current literature suggests that mean catch-and-release mortality rates are between 3 and 4.5% for rainbow trout caught in water temperatures <20ºC and between 8 and 16% for water temperatures ≥20ºC. The following is a list of the different variables along with mortality rates associated with the studies.

Different hardware types

- DuBois and Dubielzig (2004) conducted a study to assess short-term (48-h) hooking mortality, eye damage, jaw, injury, and capture efficiency of three species of wild stream trout caught on size-1 Mepps spinners having barbed or barbless treble or single hooks. The trout were caught on the mainstem of the Bois Brule River in Douglas County, Wisconsin. The mean length of landed rainbow trout was 157 mm TL (97-378 mm).

  o Short-term mortality averaged less than 4% for rainbow trout, and short-term mortality was not dependent on hook type.

- Nuhfer and Alexander (1992) studied brook trout captured at three sites in Montgomery County, Michigan in order to estimate the hooking mortality rates of trophy-sized brook trout caught on different hardware and hook types.

  o Mortality per capture event across five hardware lures was 4.3%.

- A meta-analysis by Schill and Scarpella (1997) compared hooking mortality rates of resident trout caught using barbed and barbless hooks.

- o For flies and lures combined, mean hooking mortality was 4.5% for barbed hooks and 4.2% for barbless hooks.

- Artificial baits and method of fishing were evaluated by Schisler and Bergersen (1996) to determine if active or passive angling with premolded, artificial scented baits resulted in the same mortalities as observed for traditional artificial flies and lures. The experiments took place at Gates Pond, a stream-fed pond in Rist Canyon near Fort Collins, Colorado. Gates Pond was stocked with 1200 hatchery-reared rainbow trout prior to the beginning of the experiments. Fish were landed using flies, artificial baits fished passively (ABP), and artificial baits fished actively (ABA).

  - o Mortality for fish caught using ABP averaged 32.1% ranging from 19 to 45% over five experiments performed at different water temperatures.

  - o For fish caught using ABA, mortality averaged 21.6% and ranged from 9% to 29%.

  - o Mortality for fish caught using flies averaged 3.9% and ranged from 1% to 14%.

  - o Fish caught on artificial baits were more likely to be hooked in critical areas and thus more likely to die.

  - o Across the five experiments, less than 5% of fish caught on flies were critically hooked.

  - o For ABA, the range was 19-59% with an average of 45.7%, and the range was 70-86% for ABP with an average of 78.3%.

Water Temperatures

- The effects of elevated water temperatures on mortality rates was evaluated by Boyd, Horton, Guy, and Leathe (2010) in a study of catch-and-release mortality of rainbow trout when daily

maximum water temperatures were cool (<20ºC), warm (20-22.9ºC), and hot (≥23ºC). The study took place at the Gallatin and Smith rivers.

- o Catch-and-release mortality of rainbow trout increased when daily maximum water temperature was higher than 20ºC.

- o In the Smith River, mortality in hot conditions ($N = 161$) was 9%, mortality in warm conditions ($N = 53$) was 8%, and mortality in cool conditions ($N = 57$) 0%.

- o In the Gallatin River, mortality was 16% in hot conditions ($N = 25$) and 0% in coold conditions ($N = 48$).

<u>Multiple catch-and-release events</u>

- To assess the effects of multiple catch-and-release events on growth and survival of rainbow trout, Pope, Wilde, and Knabe (2007) obtained rainbow trout from the Colorado Division of Wildlife Mt Shavano Fish Hatchery and placed them randomly into one of four aquaria at a density of approximately one fish per 15 L. The water temperature was maintained at 15-16ºC. They randomly assigned a handling treatment of one, two, or four times, and then randomly assigned whether to receive a hooking or a sham hooking (positive control) for each handling event. Location for hooking was randomly determined using a diagram. They found no difference in growth between the control group and the hooked rainbow trout.

  - o Survival rates of hooked and release rainbow trout hooked in the mouth were determined to be 96.99 ± 2.47%. However, the diagram used to randomly determine hooking location did not include sensitive areas such as the esophagus or the gills which would occur in regular fishing, and the study took place in a controlled environment instead of a natural environment.

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