

TROUT FISHERY PUBLICATION REVIEWS

A review of catch-and-release angling mortality with implications for no-take reserves

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The Publication Review:

This publication covers a wide review of multiple species and locations around the world that have implications for the interpretation of Catch-and-Release (C&R) fishing activities. C&R fishing is growing as a proportion of total fishing in North America. The sport fishing industry encourages anglers to voluntarily release fish to expand recreational fishing. Within Alberta C&R is a staple of the East-Slopes trout fishery but may be inadequate to protect what is considered a declining sports fishery. Climate change has seen higher temperatures and lower river flows in recent years which has prompted Alberta fishery regulators to introduce a Time-of-Day Angling Restrictions (TOD) when thresholds of high temperatures and low river flows have been met. Although these angling restrictions have been widely accepted there is still debate over the impact of C&R handling techniques and if they are effective enough to protect the sport fishery when used correctly.

This publication could be considered too extensive to address the specifics of North America's C&R trout fisheries, but the discussion within the publication gives direction that should be considered in the interpretation of C&R and consideration of what research is needed to fill in the gaps. **It is not the intention of this review to present an opinion but rather to highlight the pertinent information that relates to the Alberta sport fishery.**

The Content:

In the meta-analysis, seven of 14 mortality factors were significant: hook location, natural bait, removing hooks from deeply hooked fish, J hooks, depth of capture, warm water temperatures, and extended playing and handling times. Some of these factors, such as depth and temperature, likely influence observed mortality differences among species. Within species, hooking location was the most important mortality factor. Fish hooked in critical locations (esophagus, gills, brain, stomach, and in some cases the eyes) invariably had increased. Factors shown in the literature to influence hooking location include the type of bait, terminal gear, and fishing technique.

Long handling and playing times increase physiological stress and are particularly detrimental when combined with high water temperatures. Handling out of the water stresses fish by depriving them of oxygen during the critical period immediately after heavy exertion and can lead to longer recovery times. Experienced anglers using good handling techniques may potentially reduce air exposure and improve survivorship, but in many cases, handling did not make a difference in mortality. Based on our analyses, angler education on proper handling and release techniques could potentially reduce C&R mortality. Handling practices to encourage include:

1. fishing actively and setting the hook as soon as possible,
2. avoid playing the fish for long periods,
3. use de-hooking tools,
4. leave fish in the water when removing hooks,
5. avoid touching gills and handling the soft underbelly of the fish, and
6. leaving the hook in deeply hooked fish

Barbless hooks had marginally less mortality than barbed hooks perhaps because they are easier to remove which reduces handling, air exposure, and injury. Fish size and hook size were not significant in the meta-analyses. Large hooks may be harder to swallow than small hooks but may cause greater tissue damage at the wound site. It has been speculated that the greater depth and gape of larger hooks may lead to deeper hook penetration and a greater risk of contact with critical organs.

Treble hooks: Too few studies were available to assess mortality associated with treble hooks. But treble hooks may cause less mortality than single hooks because they are more difficult to swallow but may cause more tissue damage at the hooking location. Treble hooks also may be more difficult for anglers to remove, resulting in detrimental increases in handling time and air exposure.

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Sub-lethal effects: We found almost no data on the sub-lethal effects of C&R fishing which can increase fish susceptibility to injury or mortality from predation, disease, and parasites. After the release and heavy exertion, fish may require a substantial recovery period during which they exhibit reduced fitness or altered behavior that makes them more susceptible to predation and disease. Also, we found that many studies estimated release mortality by releasing fish into pens immediately after capture. Such studies underestimate actual mortality by excluding predators during this vulnerable recovery period. Although predation by birds, fish, and marine mammals is commonly reported during capture or after release, this source of mortality has rarely been quantified.

Cumulative Mortality: A necessary consequence of greater use and more restrictive bag, trip, and size limits, and seasonal closures is an increased total number of C&R encounters and the risk of cumulative mortality. We found no studies of cumulative mortality from multiple C&R events for individual fish. This risk is especially important for long-lived species and populations subject to intense fishing pressure. Our cumulative mortality model (Figure 10) shows that total mortality rises rapidly in response to repeated releases based on the mortality probability per event. At high angling encounter rates, release mortality could approach certainty, especially for species with life spans lasting decades.

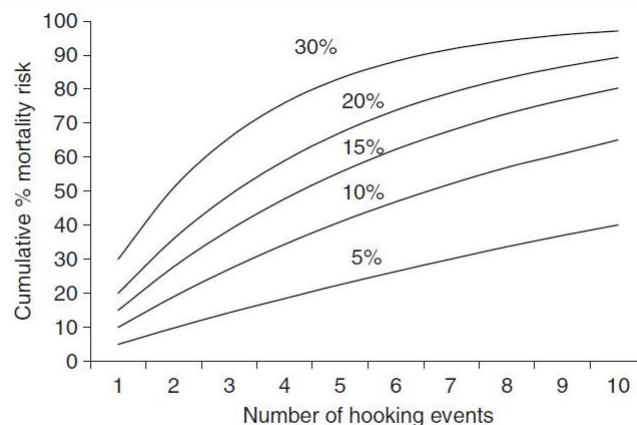


Figure 10. Predicted cumulative release mortality as a function of the number of release events and mean mortality per event.

Research needs: Further research is needed to better understand the impacts of C&R fishing. General needs are to:

1. Provide more accurate mortality estimates for different species, conditions, and fishing practices, including predation during capture and after release.
2. Improve technology to avoid injury and capture of unwanted individuals.
3. Develop better techniques to increase release survival.
4. Determine cryptic mortality from predation during capture and after release.
5. Assess angling encounter probabilities and the cumulative effects of multiple hookings, and
6. Evaluate sub-lethal effects on behavior, physical condition, growth, reproduction, and vulnerability to disease and parasites after release.

Reference:

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