

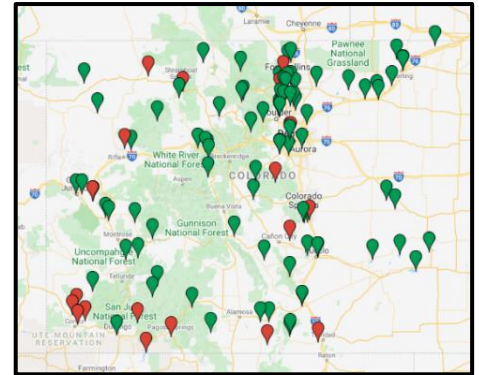
Managing Mercury in Sport Fish



TRIPLOID WALLEYE BIOACCUMULATE LESS MERCURY

Mercury and Colorado Sport Fish

According to the U.S. Food and Drug Administration, fish are part of a healthy diet, providing lean protein, healthy omega-3 fatty acids, iron, and more vitamin B₁₂ and vitamin D than any other food. Although fish are an excellent source of protein, integration of mercury into lake and stream food webs results in traces of mercury being present in fish, sometimes at levels that present health concerns to people who consume fish regularly. Because mercury levels increase as you move up the food chain (i.e., ‘bioaccumulate’), concentrations are highest in top predators such as walleye. Through monitoring and research, both the Colorado Department of Public Health and Environment and Colorado Parks and Wildlife (CPW) work to help anglers maximize the benefits of consuming fish while protecting themselves and their families from mercury in the environment.



Map of Colorado showing waters with a current fish consumption advisory (red balloons) versus those without (green). Interactive map accessible here: <https://cdphe.colorado.gov/water-quality/clean-water/rivers-lakes-and-streams/fish-consumption>

How does mercury get here?

Mercury is released into the atmosphere through a variety of natural (e.g., forest fires) and human-caused (e.g., burning fossil fuels) pathways. Mercury can then disperse far from its source before being deposited into lakes and streams, making it difficult to control. While national and global actions to reduce mercury pollution are essential, strategies at the local scale are needed to protect the health of Colorado’s anglers. A recent study on Narraguinnep Reservoir (southwest Colorado) conducted by CPW and researchers from Colorado State University found that ‘triploid’ walleye (have a third set of chromosomes and cannot reproduce naturally) stocked by CPW had **22-24%** lower mercury concentrations on average than their naturally-reproducing ‘diploid’ counterparts (have a normal number of chromosomes). This study revealed that stocking triploid fish alone or in tandem with other mitigation strategies can lead to safer fish for anglers to eat.



Using gill nets to capture and test triploid and diploid walleye in Narraguinnep Reservoir for mercury levels.

Why do triploid walleye bioaccumulate less mercury?

The answer begins with how and why triploid walleye are produced by CPW. Every spring CPW collects eggs from wild populations of walleye to raise in the hatchery and stock fry into reservoirs that support high angling pressure. Some of these eggs are specially treated to produce triploids. Triploidy is induced by placing fertilized eggs into a hydrostatic pressure chamber for a defined period (see images to right). As a result, the fry that hatch retain an extra set of chromosomes, rendering them incapable of naturally-reproducing over their lifespan. Because triploid walleye are sterile, they can be stocked to support sport fisheries in strategic locations where natural reproduction is not wanted. As this new research discovered, the inability of triploid walleye to reproduce also affects their mercury levels. Spawning is energetically costly, particularly for female fish that need to develop eggs. As a result, diploid walleye need to eat more food to grow and successfully spawn every year when compared to triploid walleye. Since most (>95%) of the mercury present in predatory fish comes from their prey, eating less food to grow the same amount means triploid fish are exposed to less mercury, and have lower mercury concentrations.



Sequence of images depicting the process of collecting, fertilizing, treating and hatching triploid walleye eggs for stocking into key Colorado reservoirs.

Associated Publications:

Farrell, C.J., B.M Johnson, A.G. Hansen, and C.A. Myrick. *In press*. Induced triploidy reduces mercury bioaccumulation in a piscivorous fish. *Canadian Journal of Fisheries and Aquatic Sciences*.