**Tracy Research Technical Report Abstract**

***Volume 29***  
Portz, D.E., C.M. Woodley, J.J. Cech, Jr., and C.R. Liston. 2005. *Effects of Short-Term Holding of Fishes: A Synthesis and Review*. Tracy Fish Collection Facility Studies. Volume 29. U. S. Bureau of Reclamation, Mid-Pacific Region and Denver Technical Service Center. 85 pp.

Collecting, handling, sorting, holding, and transportation in aquaculture, stocking programs, fish salvage, and commercial and sport fisheries can be stressful to the affected fishes. Stress-related effects of short-term holding are influenced by water quality, confinement density, holding container design, and agonistic and predationassociated behaviors. These effects can be manifested as suppressed immune systems, decreased growth, poor swimming performance, loss of reproductive capacity, or death. Holding tolerance may depend upon the species, life stage, genetic background or strain, previous exposure to stress, and behavior of the held fish. Temperature, dissolved oxygen, salinity, carbon dioxide, pH, alkalinity, hardness, ammonia and nitrite are the most common water quality parameters affecting physiological stress. High fish densities and holding container designs may also compromise survival and immune function by affecting water quality and aggressive fish interactions. Lastly, fishes held for relatively short durations are influenced by agonistic behaviors associated with competition, cannibalism, predation, and nascent dominance hierarchies. This synthesis summarizes literature concerning the effects of short-term holding on the condition of fishes and provides a review to assist researchers and managers in working towards implementing improvements for fish collection, holding, and transport, especially at fish salvage facilities in the South Delta, California.