

# 搶救“大”魚 Saving the “big” fish

Chih-Hao Hsieh  
*Institute of Oceanography, National Taiwan University.*

Separating the effects of environmental variability from the impacts of fishing on the dynamics of fish populations is essential for sound fisheries management. Using 50-year-long fish time series data, we regard fishing as a treatment effect in a long-term ecological experiment. We investigate fishing effects by comparing temporal and spatial dynamics of exploited fish species versus unexploited ones living in the same environment. Our spatial analyses indicate that exploited species show a clearer distributional shift in response to environmental change than unexploited species, even after accounting for life history and ecological traits, and phylogeny. The enhanced response (improved signal/noise ratio) to environmental change in exploited species may be a consequence of reduced spatial heterogeneity caused by fishery-induced age (size) truncation and the constriction of geographic distribution that accompanies fishing pressure. We also show clearly that fished populations tend to fluctuate more than unharvested stocks in time. The elevated temporal variability in the abundance of exploited fishes is caused by fishing-selective age-truncation effects. The age-truncated or juvenescent populations have increasingly unstable population dynamics due to changing demographic parameters such as intrinsic growth rates. This finding has implications for resource management as an empirical example of how selective harvesting can alter the basic dynamics of exploited fishes. Accumulating evidence indicate that age-truncation is widespread in the world commercial fisheries.