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The Molecular Mechanisms of Fisheries-Induced Evolution

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Large shifts in phenotypic traits have been observed in exploited fish populations, which have not always fully recovered despite fishing has been ceased. Fisheries-induced evolution (FIE) can explain these potentially slowly reversible changes. However, detecting signals of FIE and its reversibility has proven difficult. We study the molecular mechanisms of FIE by sequencing the transcriptome of experimental fish (wild-origin zebrafish, *Danio rerio*) that have been harvested size selectively for five generations and then maintained under no-harvesting for six generations. We studied 1) what are the molecular mechanisms underlying FIE, 2) does intensive size-selective harvesting affect gene expression variation, and 3) how do the experimentally exploited fish populations respond to the cessation of harvesting. Our results show that five generations of size selection induced substantial changes in gene expression. We further show that size-selective harvesting generally reduced gene expression variation. Harvest-induced changes in gene expression were eroded after cessation of size-selective harvesting but the genetic convergence following the cessation of harvesting was limited. Similarly, gene expression variation and sequence-level variation did not rebound back to the initial levels.