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Concordance of Nuclear and Mitochondrial DNA Markers in Detecting a Founder Event in Lake Clark Sockeye Salmon

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ABSTRACT Genetic bottleneck effects can reduce genetic variation, persistence probability, and evolutionary potential of populations. Previous microsatellite analysis suggested a bottleneck associated with a common founding of sockeye salmon *Oncorhynchus nerka* populations of Lake Clark, Alaska, about 100 to 400 generations ago. The common founding event occurred after the last glacial recession and resulted in reduced allelic diversity and strong divergence of Lake Clark sockeye salmon relative to neighboring Six Mile Lake and Lake Iliamna populations. Here we used two additional genetic marker types (allozymes and mtDNA) to examine these patterns further. Allozyme and mtDNA results were congruent with the microsatellite data in suggesting a common founder event in Lake Clark sockeye salmon and confirmed the divergence of Lake Clark populations from neighboring Six Mile Lake and Lake Iliamna populations. The use of multiple marker types provided better understanding of the bottleneck in Lake Clark. For example, the Sucker Bay Lake population had an exceptionally severe reduction in allelic diversity at microsatellite loci, but not at mtDNA. This suggests that the reduced microsatellite variation in Sucker Bay Lake fish is due to consistently smaller effective population size than other Lake Clark populations, rather than a more acute or additional bottleneck since founding. Caution is urged in using reduced heterozygosity as a measure of genetic bottleneck effects because stochastic variance among loci resulted in an overall increase in allozyme heterozygosity within bottlenecked Lake Clark populations. However, heterozygosity excess, which assesses heterozygosity relative to allelic variation, detected genetic bottleneck effects in both allozyme and microsatellite loci.