

Population genomics in species conservation: Tools for the study of local adaptation and fisheries management in kokanee (*Oncorhynchus nerka*).

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Abstract

A longstanding goal in conservation biology is the preservation of an organism's ability to adapt to changing environments. Our knowledge of genes that influence local adaptation within non-model organisms is limited. With the emergence of population genomics, genome-wide associations between fitness-related traits and segregating variation can be detected within natural populations. The Okanagan Lake kokanee (*Oncorhynchus nerka*) present an ideal system for studying adaptive population divergence and exploring the utility of this information in conservation and management initiatives. Despite a dramatic decline in numbers, two sympatric reproductive ecotypes continue to exist in spawning adults. In previous studies, significant levels of population differentiation were detected between the two ecotypes. The genetic basis of these differences will be explored to identify gene regions that underlie adaptive divergence by way of genomic scans utilizing 40 EST-linked microsatellites and coalescent-based simulation approaches. The adaptive significance of detected outlier loci will be determined by performing comparative analyses with the wealth of web-based genomic resources available for salmonids. Detected outlier loci will be further explored as to their utility in genetics-based stock assessments of kokanee. Previous attempts have relied on frequency-based, mixed population analyses based on allelic variation at a very limited number of microsatellite loci that resulted in substantial error rates. The use of discrete characters in genetic classifications has the potential to more accurately assess the abundance of each ecotype and ultimately enhance kokanee stock assessments in Okanagan Lake. This study will be one of the first applications of population genomics within a species of conservation concern and will have direct implications for fisheries management and conservation.