Straying: what is it and how is it measured?

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Adult salmon and steelhead that do not return home to their natal stream to spawn are called “strays”. In general, strays are emigrants (or immigrants) that contribute to population connectivity and play an important role in the ecology and evolution of salmon and steelhead. As such, there is much interest in identifying and measuring strays and the rate of straying among populations. However, how straying is defined and measured depends upon the context in which it is evaluated. Two paradigms exist (Waples and Gaggiotti 2006; Lowe and Allendorf 2010). Under the ecological/demographic paradigm the questions relate to population growth, viability, harvest potential etc. and the interest is in measuring dispersal as the total number of immigrants or immigrant fraction (m). Under the evolutionary/genetic paradigm the questions relate to reproductive isolation, population evolution, fitness, etc. and the interest is in measuring gene flow as the effective number of migrants (Nem). Multiple methods can be employed to assess the ecological as well as evolutionary impacts of straying. In the case of *Oncorhynchus mykiss* in the Copper River, Alaska, genetic data showed that sympatric steelhead and resident rainbow trout are not reproductively isolated (are part of a single gene pool) but that geographically distinct but proximate spawning groups are reproductively isolated regardless of migratory type. In addition, the data provided evidence that fine-scale dispersal is biased in favor of resident rainbow trout. This study suggests the two migratory types may play different roles demographically and in the colonization and maintenance of inter- and intra-population genetic diversity.