



Strontium isotopes and trace elements in fish otoliths reveal individually variable movement patterns in diadromous fish.

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Strontium isotope ratios in fish ear bones, or otoliths, can be used to reveal novel information about fish migratory patterns across salinity gradients and within freshwater systems. Patterns of migration and habitat use in diadromous fishes can be highly variable among individuals. Most investigations into diadromous movement patterns have been restricted to populations in regulated rivers, and little information exists for those in unregulated catchments. We assessed movements of migratory barramundi *Lates calcarifer* (Bloch) in two large unregulated rivers in northern Australia using both elemental (Sr/Ba) and isotope ($^{87}\text{Sr}/^{86}\text{Sr}$) ratios in otoliths quantified with laser ablation ICP-MS. Chemical life history profiles indicated significant individual variation in habitat use, particularly among chemically distinct fresh water habitats within a catchment. A global zoning algorithm was used to quantify distinct changes in chemical signatures across profiles. This algorithm identified between 2 and 6 distinct chemical habitats in individual profiles, indicating variable movement among habitats. Profiles of $^{87}\text{Sr}/^{86}\text{Sr}$ ratios were notably distinct among individuals, with highly radiogenic values recorded in some otoliths. This variation suggested that fish made full use of habitats across the entire catchment basin. Our results suggest that unrestricted movement among fresh water habitats is an important component of diadromous life histories for populations in unregulated systems.