Abundance and demography via close-kin, from lethal- or non-lethal sampling of adults alone

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Abstract: Close-kin mark-recapture (CKMR) is a revolutionary tool for assessing absolute abundance, demographics, and spatial structure. It can avoid many difficulties of traditional mark-recapture, for example the expense of live-capture-and-release. The idea is to use "DNA profiling" to identify close relatives (e.g. parent-offspring pairs), then to apply mark-recapture principles to the number and pattern of relationships found. CKMR has been successfully used to estimate the absolute abundance of Southern Bluefin Tuna, but that situation is unusual (at least among fisheries) since known-age-juveniles as well as adults can be sampled. We have now generalized CKMR to a more common situation: capture of adults only. This talk shows how the precision of abundance and trend estimates is affected by study duration, availability of age data, lethal vs non-lethal sampling (where CKMR and conventional MR are combined), and of course sample size. We present two examples. The first uses non-lethal CKMR to dramatically improve the efficiency of a proposed mark-recapture study on blue whales. The second example concerns culling a species with basically no prior demographic information; can an excessive rate of culling be detected before it is too late, just from lethal samples collected during the cull?