Use of a no-adult migration model with one-way egg and larval migration in MSE's

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25 November 2019

The following class of models is defined for *M. paradoxus* in the Benguela system:

Definitions;

I.   **Components:** The Namibian component (II) are hakes found in Namibian territorial waters, the South African component (I) are hakes found in South African territorial waters.

II.   **Spawning biomass and spawning potentials:** Component I and II spawning biomasses are a linear combination of component I and II spawning potentials, spawning biomass I = a Potential I + (1-b) Potential II, and spawning biomass II = (1-a) Potential I + b Potential II. These give rise to component I and II pre-migration recruitment levels via standard non-linear stock and recruitment functions (e.g. Ricker, or Beverton-Holt).

III.   **Catches:** Hake caught in South African waters are derived from component I hake, and hake caught in Namibian waters are derived from component II hake.

IV.   **Migration of post-recruits**: Age-dependent post-recruitment annual migration occurs A(I to II) and A(II to I).

V.   **Migration of pre-recruits**: Pre-recruit annual migration occurs B(I to II) and B(II to I).

<u>**Model X**</u>
1. No sharing of spawning potentials: a=0 and b=1
2. No post-recruit migration: A(I to II) = A(II to I) = 0
3. Pre-recruit migration one-way only: B(I to II) non-zero; B(II to I) = 0 (Geopop suggests juvenile migration from South Africa to Namibia only)

<u>**Proposal**</u>

a) Model X is consistent with the genetics, and is 'demographically' plausible given large distances involved and the apparent low energy and relatively sedentary nature of post-recruit and adult hakes. That is, genetic interchange is via egg and larval migration.

b) The proposal for MSE's is to consider a set of notional values for B(I to II), say, between 0.05 and 0.2.

c) If the panel feels that this is not consistent with genetics, then admit some level of migration of eggs and larvae from north to south, i.e. B(II to I) non-zero at a low level, say, 2-5%.