



NOAA
FISHERIES

Stock Synthesis (SS) New Spatial Features

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Wish List

- Area-specific spawner-recruitment
- Area-specific M
- Area-specific growth

Status Quo – Spawner-Recruitment

- SSB by area is calculated and reported, but not used
- Global SSB produces global recruits
- Global recruits are **partitioned** among:
 - Sex and growth morphs
 - Settlement events (in year timing)
 - Areas
- **Partitioning** can be time-varying
 - Time-vary can be density-dependent
- BUT! Equilibrium calcs conditioned on a particular, non-dynamic partitioning

The Challenge: equilibrium per recruit calcs

- for (a=0;a<=3*nages;a++)
 - for (s=1;s<=nseas;s++)
 - for (g=1;g<=gmorph;g++)
 - for (p=1;p<=pop;p++)
 - If a,s,g,p meet conditions, insert Numbers to N@Age matrix using partition
 - Apply M and F
 - }
 - Do hermaphroditism
 - Do movement
 - }
 - Accumulate SSB by area and catch by fleet
 - **SSB in an area can depend on F in other areas**
 - **So partition cannot include a local SRR condition**
 - **Solution: Iterate so SSB by area from previous iteration can be used in partition**
 - **Code challenges?: minimal to do this loop; messy to create user I/O options for local vs global SRR**

Natural Mortality

- M is stored as: $\text{natM}(\text{seas}, \text{sex-morph}, \text{age})$
- No logical contradictions to area-specific M
- Easiest internal solution would be to extend sex-morph index to be sex-morph-area
- I/O options:
 - Make morph and area mutually exclusive
 - Bloat I/O with full input of all sex-morph-areas
 - Change to a design matrix approach (see later)

Growth

- Growth parms stored by: sex-morph
- Wt@age stored by: seas, sex-morph
- As fish move between areas, they retain morph identity, so retain size at age

Growth by Area Possibility

- Growth parms stored by: sex-area
- Wt@age stored by: seas, sex-area
- As fish move between areas, they combine with fish in destination area, so size-at-age by area will be weighted average of moving and staying fish
 - Will cause slow execution due to constant recalc of ALK and age-selectivity
- Gross approximation: keep size-at-age constant over time, so moving fish instantly assume size-at-age in destination area

Design Matrix

Morph	Sex	Area	M	Lmin	Lmax	K	etc. for all Mgparms	comment
1	1	1	1	1	1	1	1	first entity always uses the first set of parameters
1	2	1	1	1	1	2	1	males have unique K, rest same as first set
1	1	1	1	1	2	1	1	females in area 2 have different Lmax
1	2	1	1	1	3.2	2	1	males in area 2 are offset from females
-9999								end of list; all unlisted entities use first set of parameters
List of needed parameters:							int(max(column)) indicates number of parameters of each type that are needed	
M								
Lmin								
Lmax(1)								
Lmax(2)								
Lmax(3)-offset from Lmax(2)								
K(1)								
K(2)								
etc.								