Catches of anchovy and sardine relative to their availability

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Background

A document tabled by Birdlife SA for discussion by the Small Pelagic Scientific Working Group (FISHERIES/2011/SWG-PEL/62) in September 2011 argues that the lack of spatial management in the current management approach leaves areas at risk of local depletion of fish. Consequently, Birdlife SA proposes that the TAC and catch of anchovy and sardine should be apportioned according to the biomass at a local (stratum) level.

To investigate this concern, we extracted anchovy and sardine catch data and biomass data for the areas that coincide with the November survey strata (see Figure 1) and calculated the proportion of the catch and biomass that falls within each of the strata. Furthermore, as the Small Pelagic Scientific Working Group is also considering a 2-stock operating model with a “west stock” for the area to the west of Cape Agulhas and an “east stock” for the area to the east of Cape Agulhas, proportions for these larger regions were also calculated.

Results

In the area to the west of Cape Agulhas, the proportion of sardine catches are consistently higher than the proportion of sardine biomass in that area, whereas the proportion of sardine catches taken in the area to the east of Cape Agulhas is consistently lower than the proportion of biomass available in that area. The same applies for anchovy, although hardly any catches of anchovy are made to the east of Cape Agulhas (Figure 2).

The annual proportion of anchovy catches taken in each of the strata on the west coast (strata A and B) is relatively high compared to the proportion of biomass in those strata during the previous November (Figure 3). The proportion of anchovy catches taken in the other three strata (C, D and E) is low compared to the proportion of the biomass measured in these each previous November.

The proportion of sardine catches taken in the area to the north of Cape Columbine (Stratum A) in the mid 90s was high relative to the proportion of biomass in that area but has subsequently declined with little biomass of catches in that area in recent years. The proportion of catches taken in Stratum B each year (between Cape Columbine and Cape Point which incorporates the area surrounding Robben and Dassen Islands) is large relative to the proportion of biomass available in that area.

In the area between Cape Point and Cape Agulhas (which incorporates Dyer Island) the proportion of biomass available in that area was high during the 90s but dropped off between 2001 and 2008 as a

consequence of the rapidly increasing biomass in the area to the east of Cape Agulhas. Catch proportions were generally lower in the 90s, but increased between 2001 and 2008.

The proportion of sardine catches in the area between Cape Agulhas and Mossel Bay (Stratum D) increased from 2004 onwards whereas the proportion of biomass in that area is variable over the past decade but on average higher than during the 80s.

The proportion of sardine catches taken in stratum E (East of Mossel Bay and mainly off Port Elizabeth) has been low throughout most of the past 20 years whereas the proportion of the sardine biomass in this area has been high for most of the period, particularly between 2000 and 2009.

Discussion

The anchovy fishery is mainly a recruit fishery targeting southward migrating recruits on the West Coast. It has been suggested that local west coast depletion of anchovy during the recruit run is therefore unlikely and a previous analyses (the so-called river model) suggested that the anchovy fishery on the west coast reduced the amount of anchovy available to breeding penguins on West Coast islands by 20% at most. Comparing the proportion of catch to the proportion of November estimated biomass in West Coast strata for anchovy therefore does not make much sense – similarly, the recruit index per stratum is also not a good indicator for the availability of anchovy in a particular stratum as it only reflects anchovy availability there at the time of the survey. November estimates of anchovy biomass, could potentially be used as indicators of anchovy availability east of Cape Point as anchovy catches there are spread out across all months of the year and often reflect catches of larger adult anchovy as opposed to recruits on the west coast.

The proportion of sardine caught in west coast strata relative to the biomass measured there is relatively high (although variable) and suggests that proportion of catches in particularly stratum C since the early 2000s has been much higher than the proportion of available biomass in that area. The increase in some years of the proportion of sardine catch taken in stratum D reflects the increasing biomass in that area as a consequence of the eastward expansion in the sardine biomass. The availability of sardine off the Port Elizabeth area seems high relative to the catches taken there for most years.

The strata boundaries used in the November survey design are not natural boundaries reflecting “breaks” in the distribution of fish. Movement across these boundaries are highly probable and as such, considering these strata as management units where catch is taken relative to available biomass is likely not feasible given the available data. Considering larger management units (such as that proposed in the 2-stock operating model) in which the strata are grouped into a west and east region is probably the smallest resolution that current data allows for. Based on the proportion of catches and biomass of anchovy, to the west and east of Cape Agulhas no need for such spatial management of TAC seems necessary whereas the opposite is true for sardine where the proportion of catches in the western area is consistently higher.

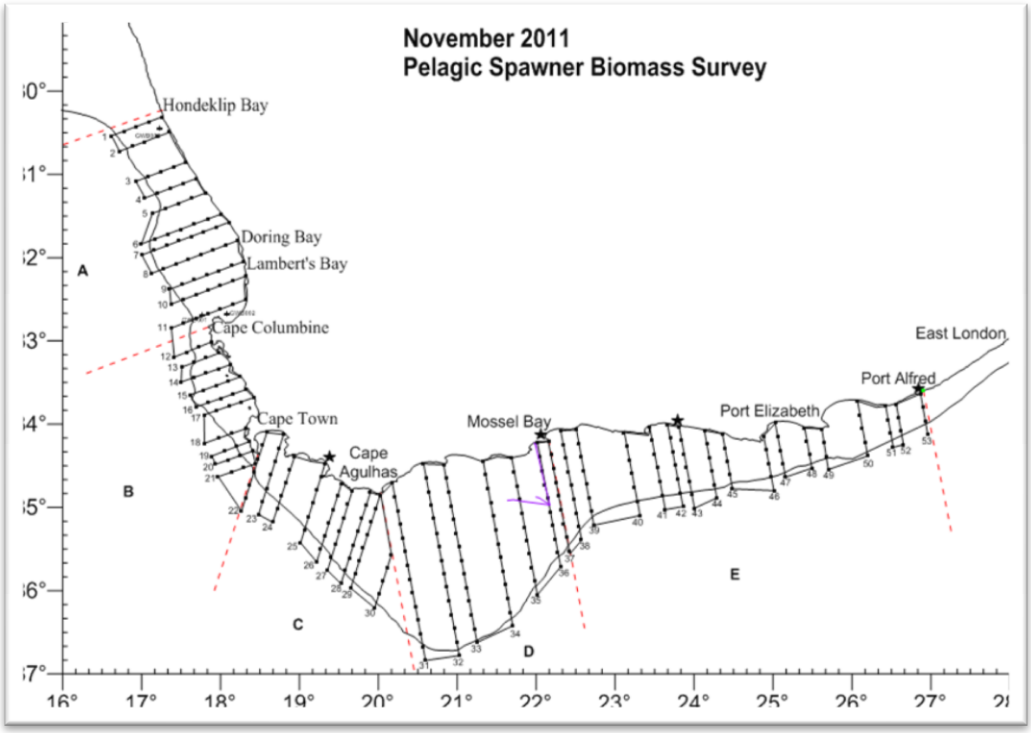

Figure 1. November survey design showing the geographical location of strata as used in the proportions.

Figure 2. The proportion of sardine catches and biomass in the area to the west (left top panel) and to the east of Cape Agulhas (right top panel). The proportion of anchovy catches and biomass in the area to the west (left bottom panel) and east of Cape Agulhas (right bottom panel).

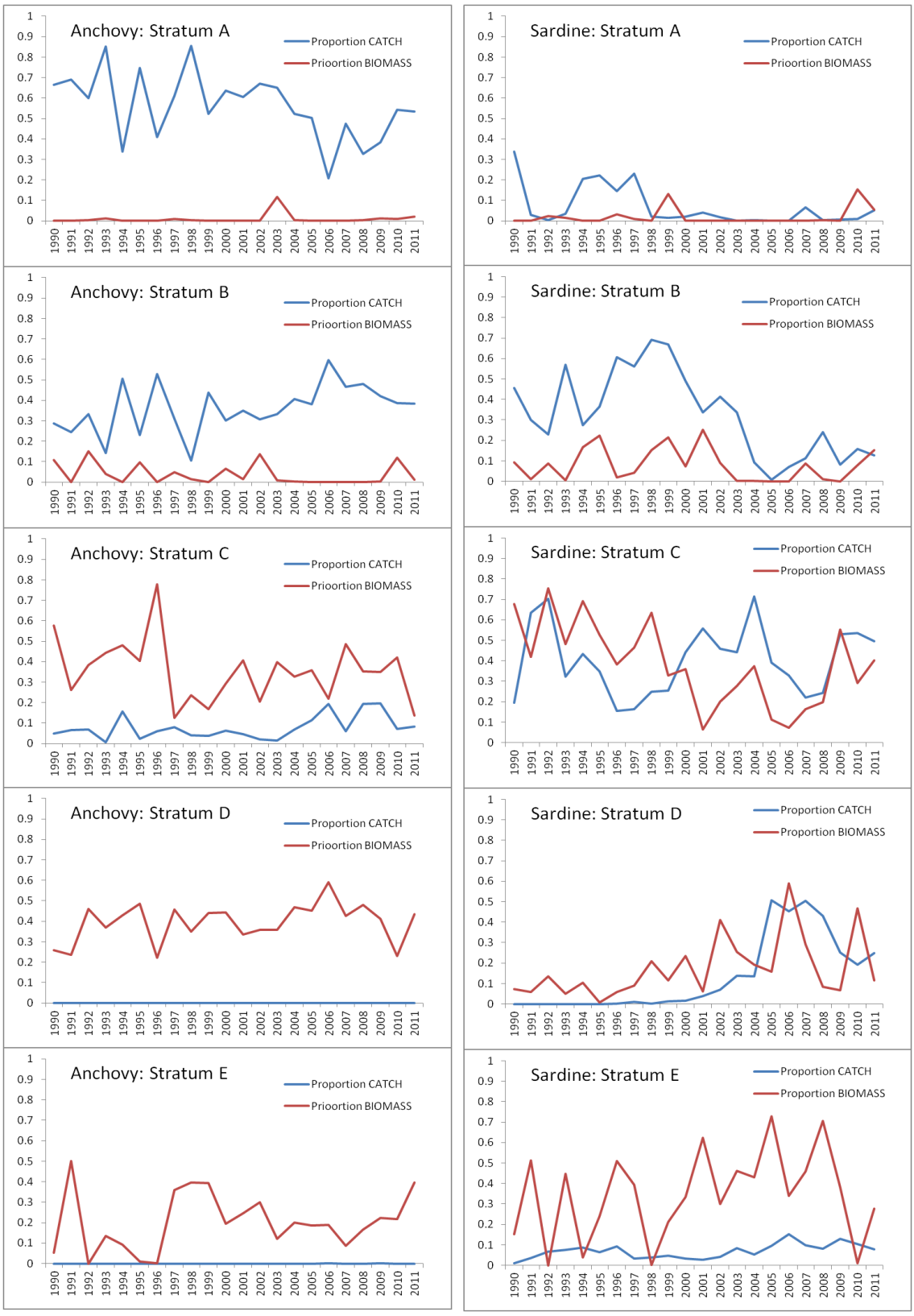

Figure 3. Catch and biomass as a proportion of total catch and total biomass (in November for Year y-1) for anchovy (left) and sardine (right) within each of the November survey stratum areas.