Freshwater flow influences on river plumes and the distribution and abundance of small-pelagic fish on the South African coast

Lamberth, S.J.[1,4], Coetzee JC[1], Lamont T[2], Merkel D.[1], van der Lingen C[1], van Niekerk L.[3,5]
1. Department of Agriculture, Forestry and Fisheries, Private Bag x9087, Cape Town, 8000, South Africa
2. Department of Environment Affairs, Oceans and Coasts, Cape Town, 8000 South Africa
3. Council for Scientific and Industrial Research, PO Box 320 Stellenbosch 7600, South Africa
4. South African Institute for Aquatic Biodiversity, Private Bag 1015, Grahamstown 6140 South Africa
5. Nelson Mandela University, Port Elizabeth

Anchovy, sardine and round herring are the backbone of the small-pelagic purse-seine fishery on the South African coast with catches at 400 – 600,000 tons per annum. High mobility, short life-spans, and feeding at lower trophic levels are life-history characteristics that make small pelagic fish sensitive to environmental influences and extremely variable in their abundance, distribution and recruitment. South African populations of anchovy and sardine are monitored by means of hydro-acoustic surveys conducted annually since 1984. Two main assessment surveys are conducted each year, including a summer spawner biomass survey which estimates the total size of the stock and a recruit survey in winter which estimates the number of fish that recruit to the population. In addition to the long-known association with upwelling cells, high densities of anchovy juveniles also appear to be associated with the river plumes of the larger catchments on the west and east coast. This is probably due mainly to the refuge offered by these turbid plumes, productivity fronts being of lesser importance in this upwelling dominated region. Nonetheless, high densities of anchovy persist in the plumes during years of low upwelling whilst much less or absent elsewhere. There also exists a positive relationship between river flow and anchovy density (lagged) within the vicinity of the larger catchments. Furthermore, given the generally strong relationship between recruitment and end-of-the-year spawner biomass it could also be expected that river flow, plume size and its influence on juvenile fish density may be another useful predictor of spawner biomass.