

**MOVEMENT PATTERNS OF RED STEENBRAS *PETRUS RUPESTRIS* TAGGED AND RELEASED IN THE TSITSIKAMMA NATIONAL PARK, SOUTH AFRICA***S. L. BROUWER\**

Movement patterns of red steenbras *Petrus rupestris* were obtained from fish tagged and released in the Tsitsikamma National Park, South Africa. Of 217 fish tagged, 38 were recaptured. Juveniles (<700 mm *FL*) were resident, whereas adults (>700 mm *FL*) migrated in a north-easterly direction towards the Transkei coast.

Key words: marine protected areas, movement, tag and release, sparids

The red steenbras *Petrus rupestris* is the largest species of the family Sparidae, attaining a size in excess of 1.5 m total length and a mass of 70 kg (Smith and Heemstra 1986). The species is endemic to South Africa, occurring along the southern and eastern seaboard between False Bay and KwaZulu-Natal, to depths of 160 m (Smith and Heemstra 1986, Hecht and Buxton 1993). Because of its large size and sought-after flesh, red steenbras are important to both commercial and recreational skiboat fishers. Since the early 1900s, catch rates of the species have declined markedly (Biden 1948, Winch 1990, Smale and Punt 1991), and the distribution range of large adults has also contracted (Hecht and Buxton 1993). This decline prompted research into aspects of its biology, as well as its distribution within the Tsitsikamma National Park (Buxton and Smale 1984), its feeding (Smale 1986), reproduction (Smale 1988) and growth (Smale and Punt 1991). This note reports on the movement of red steenbras within the Tsitsikamma National Park.

**MATERIAL AND METHODS**

The Tsitsikamma National Park (TNP) is a marine protected area that is closed to all forms of offshore exploitation. It covers a 75-km stretch of coastline between the Groot River East at 34°06'S, 24°11'E and the Groot River West at 33°59'S, 23°34'E (Hockey and Buxton 1989, Hanekom *et al.* 1997). The offshore extent of the TNP is 5.6 km, and includes reefs extending from the shore to depths of about 100 m. The offshore section of the marine protected area was ex-

tended in 1996 to include 0.8 km from the low water mark offshore from the Bloukrans River to Natures Valley.

Red steenbras were caught from a skiboat using baited hooks (2/0–6/0) on reefs throughout the TNP. Prior to release, each fish was treated for barotrauma by inserting a hypodermic needle into the gas bladder and then measured to the nearest millimetre fork length (*FL*). They were tagged with dart D-tags (Hallprint, Australia) that were individually coded and marked with a return address. The number of people fishing, fishing time, depth and location were recorded on each fishing trip. The research team recorded all recaptures within the TNP, and fish recaptured outside the Park were reported by commercial and recreational fishers. However, an estimated 60% of fish recaptured outside the Park were probably unreported (Brouwer 1997).

**RESULTS**

Between January 1996 and January 1999, 217 red steenbras, ranging from 250 to 1 050 mm *FL*, were tagged during 436.6 hours of fishing in the TNP. In all, 38 (17.5%) were recaptured. All juvenile fish (<600 mm) exhibited zero displacement, being recaptured at the same reef where they were tagged ( $n = 29$ ; Fig. 1). Their time at liberty ranged from 103 to 1 371 days (mean 547 days). All adults (>700 mm) and some maturing juveniles (600–700 mm) moved north-eastwards, their time at liberty ranging between 330 and 1 482 days (mean 971 days,  $n = 9$ ; Fig. 2).

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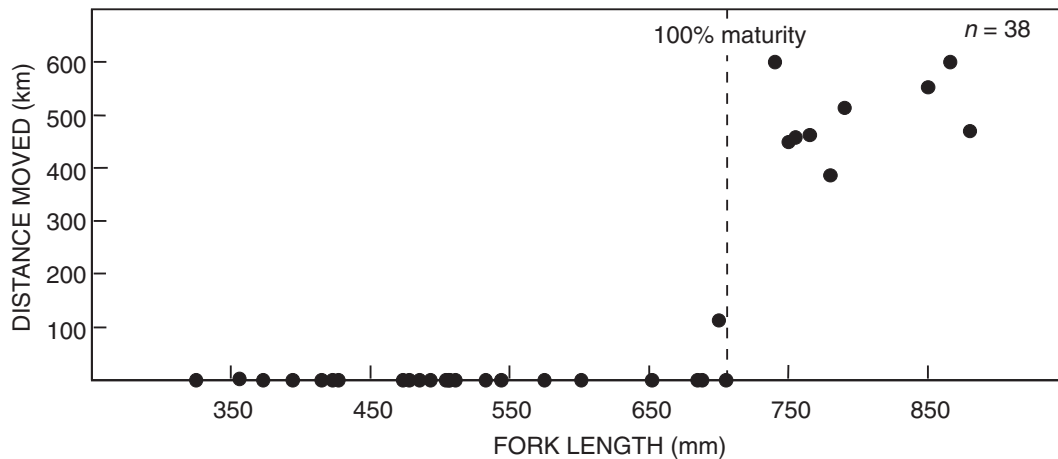


Fig 1: Distance moved by recaptured red steenbras in relation to their size

## DISCUSSION

Red steenbras exhibit a number of life history characteristics that make them vulnerable to overexploitation. Juveniles appear to be highly resident and thus would be susceptible to local depletion by fishing activities, and their slow growth rate (Smale and Punt 1991) renders them prone to growth overfishing. The declining catches of red steenbras in areas such as Port Alfred and Port Elizabeth (Brouwer 1997) are evidence of their susceptibility to fishing activities on the Eastern Cape. Also, Penny and Wilke (1993) noted a decline in the size of catches on the Agulhas Bank. As a result of a contraction in the distributional range of large adults, red steenbras are now only caught in relatively large numbers along the Transkei Coast (Hecht and Buxton 1993).

Once red steenbras move to the Transkei Coast they seem to remain there for their entire adult lives. Penny and Wilke (1993) stated that most of the stock is concentrated on the Agulhas Bank, from where adults undertake an annual spawning migration to the Transkei Coast. This would suggest that catches along that coastline would increase during the spawning season. However, Hecht and Buxton (1993) found only slight increases in catches during that period along the Transkei Coast. They postulated that catches were influenced rather by the prevailing weather conditions, as suggested by Smale (1988) and Brouwer (1997). Tagging studies conducted by Bullen *et al.* (1999) support the theory of a one-way migration by red steenbras. Also, Penny and Wilke (1993) noted that the

largest fish were only caught off the Transkei Coast. It therefore seems unlikely that large adults undergo return migrations to the Agulhas Bank.

Residency is a common behavioural pattern in reef fish from both temperate (Barrett 1995) and tropical (Roberts and Polunin 1991, Holland *et al.* 1996) systems. However, some species have predictable migrations (Griffiths and Hecht 1995), whereas others disperse unpredictably (Attwood and Bennett 1994). Although many South African sparids are resident throughout their lives (Buxton and Allen 1989, Cowley *et al.* 2002), the longshore migrations of adult red steenbras observed in this study support Smale's (1988) suggestion that they migrate to the Transkei Coast. Other South African sparids that are resident as juveniles but migratory as adults/adolescents include white steenbras *Lithognathus lithognathus* (Bennett 1993) and musselcracker *Sparodon durbanensis* (P. D. Cowley, South African Institute for Aquatic Biodiversity, unpublished data).

Given that juvenile red steenbras appear to be resident within the TNP, they are afforded protection from exploitation. There are currently six marine protected areas along the Eastern Cape coast, all of which are potential havens for adult fish; three along the coast from East London to the Kei Mouth and three along the Transkei Coast (Fig. 2). To limit further depletion of the stock, it is essential to protect the reproductive capacity of the species. The importance of these marine reserves in protecting adult red steenbras should be investigated with a view to providing effective management of the stocks.

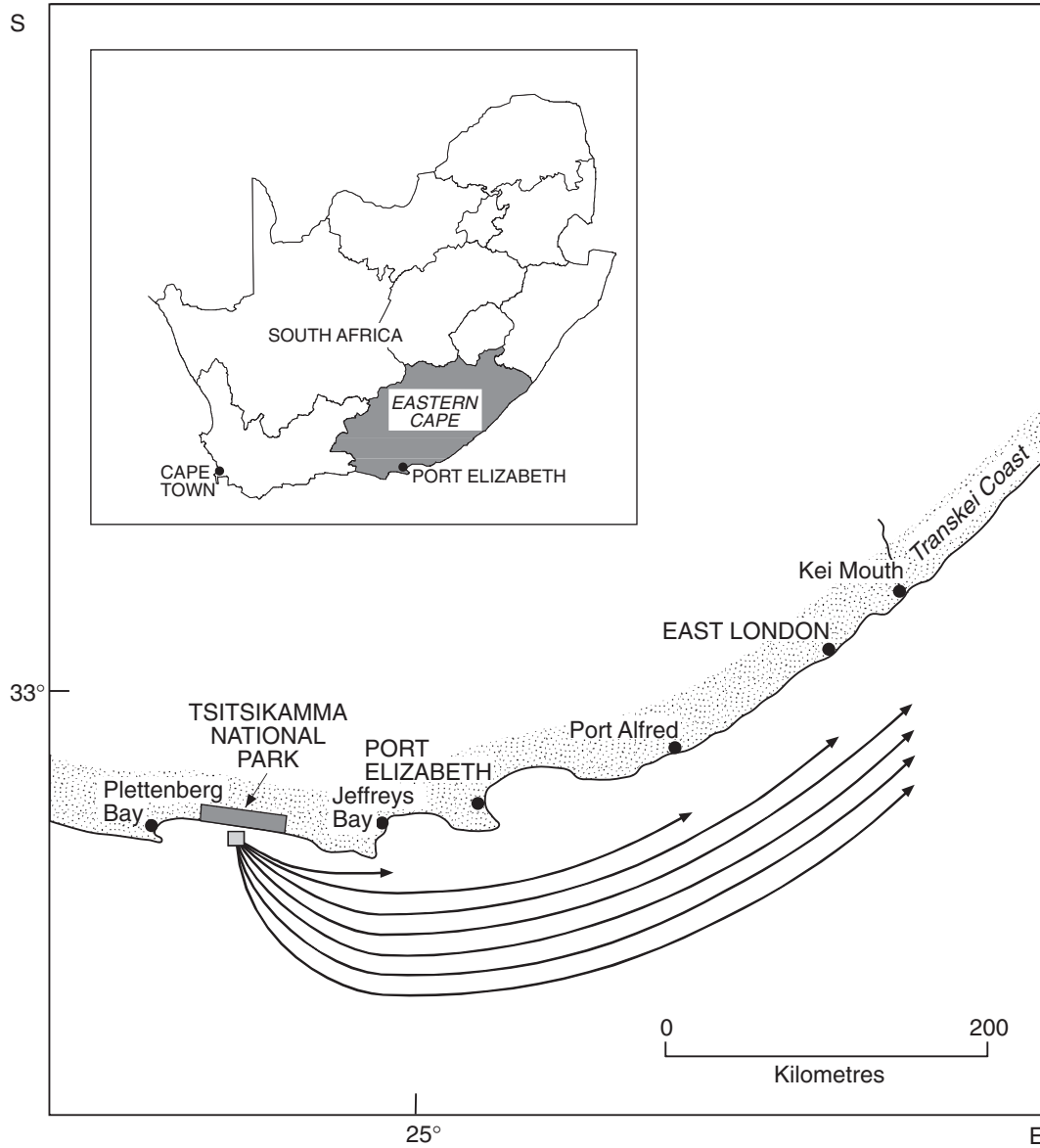


Fig 2: Migration of seven large (>700 mm FL) red steenbras tagged and released in the TNP

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