

South Africa's Acoustic Tracking Array Platform (ATAP): history, status, challenges and opportunities

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The Acoustic Tracking Array Platform (ATAP) is an Ocean Tracking Network (OTN) affiliated marine science programme that monitors the movements and migrations of inshore marine animals using an expanded network of automated data-logging acoustic receivers moored to the ocean's floor around the South African coastline. The region is significantly influenced by two contrasting boundary currents, namely the warm Agulhas Current on the east coast and the cool Benguela Current on the west coast. The coastal area within this region, encompassing three biogeographic zones, is a biodiversity hotspot characterised by a high degree of endemism. The rich marine fauna includes several conservation icon species, including white sharks and coelacanths, and numerous fishery-at-risk species. The region is also home to one of the largest annual marine migration events on the planet. Dubbed as the "greatest shoal on Earth", this migration of small pelagic sardines, often in shoals up to 10km long, is pursued by a host of apex predators, including sharks, birds, dolphins and numerous predatory fish species.

The ATAP makes use of hardware (receivers and acoustic releases) loaned from the OTN project and additional equipment secured from the National Research Foundation (NRF) of South Africa. The platform collects data from approximately 200 receivers strategically moored across 2000km of coastline (Figure 1). Ten key monitoring sites are located from Cape Town on the south west coast to Ponto Do Ouro (Mozambique) on the east coast of southern Africa, with two more sites planned for KwaZulu-Natal. In addition, at least 15 estuaries are equipped with acoustic receivers. A registry of tagged animals maintained by ATAP and its collaborating partners from 17 research agencies suggests that the network currently collects data from approximately 350 tagged animals belonging to 12 species. Most of the tagged fish have been recorded by the array, which to date has yielded approximately two million detections.

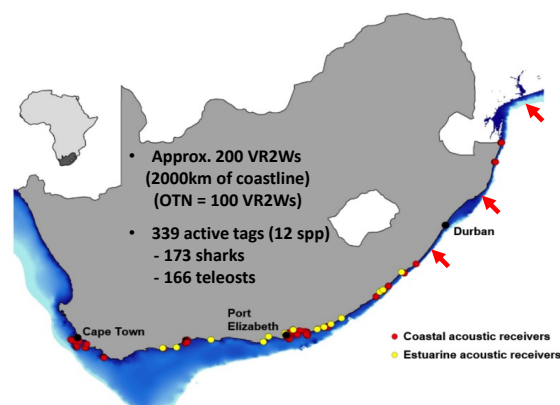


Figure 1. Map of the South Africa showing ATAP's coastal (red dots) and estuarine (yellow dots) deployment sites. Red arrow indicate new sites that will be equipped in 2014.

Current research is focused on large predatory sharks and coastal fishery species. There are several dedicated collaborative research projects that benefit from the ATAP. These include the *OCEARCH* South African Shark Project involving collaboration between more than 30 local and international scientists, who have tagged no less than 40 white sharks with 10-year lifespan acoustic transmitters. Other multi-institutional collaborative projects on bull sharks and estuarine associated fishery species also make use of this marine science platform. Furthermore, several of monitoring sites, such as Algoa Bay, are equipped with additional receivers and ocean monitoring devices through collaborative efforts by multiple institutions (Figure 2).

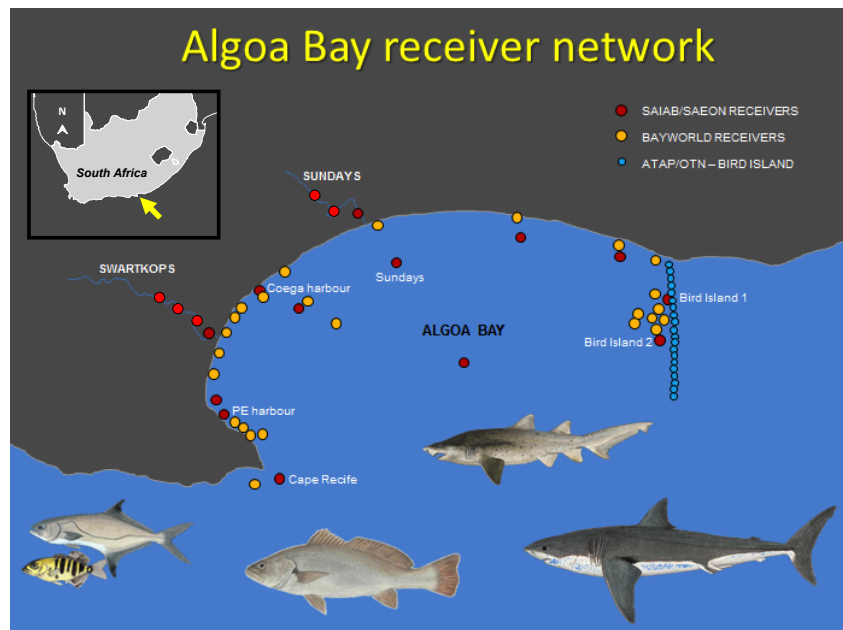


Figure 2. The acoustic receiver network deployed in Algoa Bay, where multiple species (sharks, teleosts and penguins) are monitored through collaborative research efforts.

Examples of data collected on most studied species provide testimony of the success and future potential of this nation-wide research platform to monitor multiple year residency and migration patterns (Figure 3).



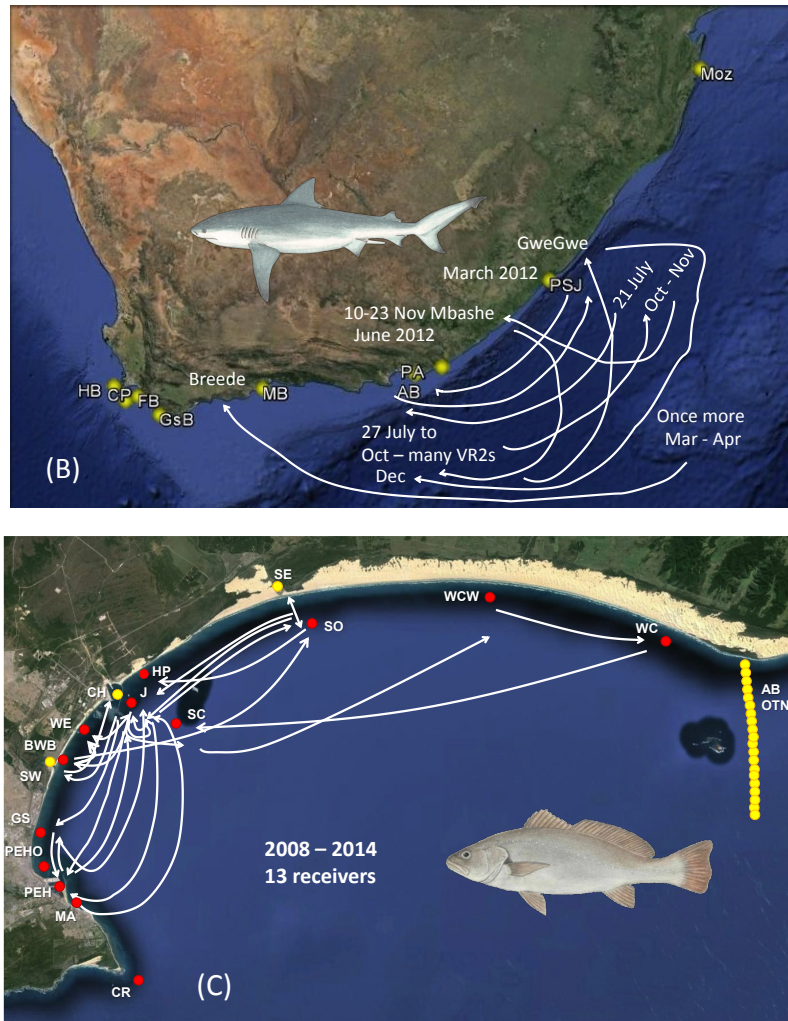


Figure 3. Examples of multiple year data collected on the longshore movements of (A) a white shark tagged in False Bay in April 2012 (data: OCEARCH), (B) a bull shark tagged at Port St Johns in March 2012 (data: KwaZulu-Natal Sharks Board), and residency of (C) a dusky kob tagged in Algoa Bay in November 2008 (data: South African Institute for Aquatic Biodiversity).

The development of this significant marine research platform has past and future challenges, which include: working in a hostile marine environment, securing buy-in by researchers to ensure broader collaboration efforts, servicing and maintaining equipment, developing and managing a local database, integrating with the global OTN project and securing adequate long-term funding. The South African Institute for Aquatic Biodiversity (SAIAB) hosts the ATAP receiver network and has secured funding to maintain the existing infrastructure until the end of 2018. Thereby providing an unprecedented opportunity to gather long-term movement/migration and environmental data to improve our understanding of the spatial ecology of marine animals. Such information is much needed to assist with the corrective management of over-exploited fishery species and conservation of threatened or endangered species.

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