

Sentinels of ocean health: *monitoring marine predators in the Namibian Islands' Marine Protected Area*

By Dr. Jessica Kemper - African Penguin Conservation Project

Anybody who has spent a few days in the small harbour town of Lüderitz in southern Namibia will tell you that the wind blows there like nowhere else. In fact, the prevailing southerly winds there are so strong, that Lüderitz holds the distinction of being in the centre of the strongest area (or cell) of “upwelling” on our planet. Upwelling is the process during which the strong wind, together with the Benguela Current, moves cold, nutrient-rich water from the deep ocean to the surface. This “nutrient pump” provides the basis for a highly productive and unique marine ecosystem that supports a wealth of life, from tiny plankton to giant whales, and includes a number of species that are endemic to the Benguela region, i.e. species that are found nowhere else in the world.

Apart from featuring extensive rocky shores, reefs and kelp beds, the southern Namibian coastline also boasts

a number of islands, islets and rocks. Safely out of the reach of land predators such as brown hyenas and jackals, they provide safe breeding habitats and roosting grounds for a number of seabird species, many of which are considered threatened or endangered. An array of bays also offers breeding habitat for marine mammals such as Heaviside's dolphins and southern right whales.

Unfortunately, the health of this unique and delicate ecosystem is being threatened in a number of ways, mainly through the effects of human activities. Threats include habitat loss and modification, oil pollution and, following overexploitation in the 1960s and 1970s, a lack of the favourite and highly nutritious food of many marine predators – and key species in the Namibian marine food web, the sardine.

In an attempt to halt the ecosystem's degradation, the Namibian Islands' Marine Protected Area (NIMPA), was proclaimed in 2009, covering about 1 million ha

A Cape gannet noisily announces its intent to land©J Kemper

of coastal waters along a 400 km stretch of coast. One of the NIMPA's three main objectives is to protect the breeding sites and key foraging areas of a number of threatened species, and it is therefore no surprise that the design to determine the shape and size of the NIMPA was largely based on research done in Namibia on the foraging ecology of globally endangered African penguins and bank cormorants, as well as locally critically endangered Cape gannets. The Ministry of Fisheries and Marine Resources (MFMR) is responsible for managing the NIMPA and for implementing relevant monitoring programmes to track the population trends of these and other flagship species, to investigate the effects of environmental change and disturbance on the health of the marine

ecosystem, and to assess whether the implementation of the NIMPA and other conservation actions are actually successful in halting the observed degradation. An arduous and sometimes expensive task.

Enter the diamond industry. Diamonds have played a key role in the country's economy since the discovery of the first diamond near Lüderitz in 1908. Until about ten years ago, the vast majority of diamonds were mined on land and on the seashore. However, as land deposits of diamonds are being exhausted, and as new techniques to extract diamonds from marine sediments are developed, marine diamond production is increasing, and it is expected that in future up to 95% of diamonds from Namibia will originate from the ocean floor. There

are concerns that these techniques could negatively affect marine habitats (including species of commercial and/or conservation importance), for example from increased water turbidity, sediment movement, displacement of forage prey species, entanglement in anchor spreads and underwater noise.

The Namibian Diamond Corporation (Namdeb) operates in nine mining license areas that border and/or overlap with the NIMPA. In order to contribute to and extend the monitoring efforts undertaken by MFMR to areas that might be affected by present and future diamond extraction activities south of Lüderitz, Namdeb has agreed to fund a two-year project to collect baseline data on several flagship species in the NIMPA and to subsequently monitor the effect

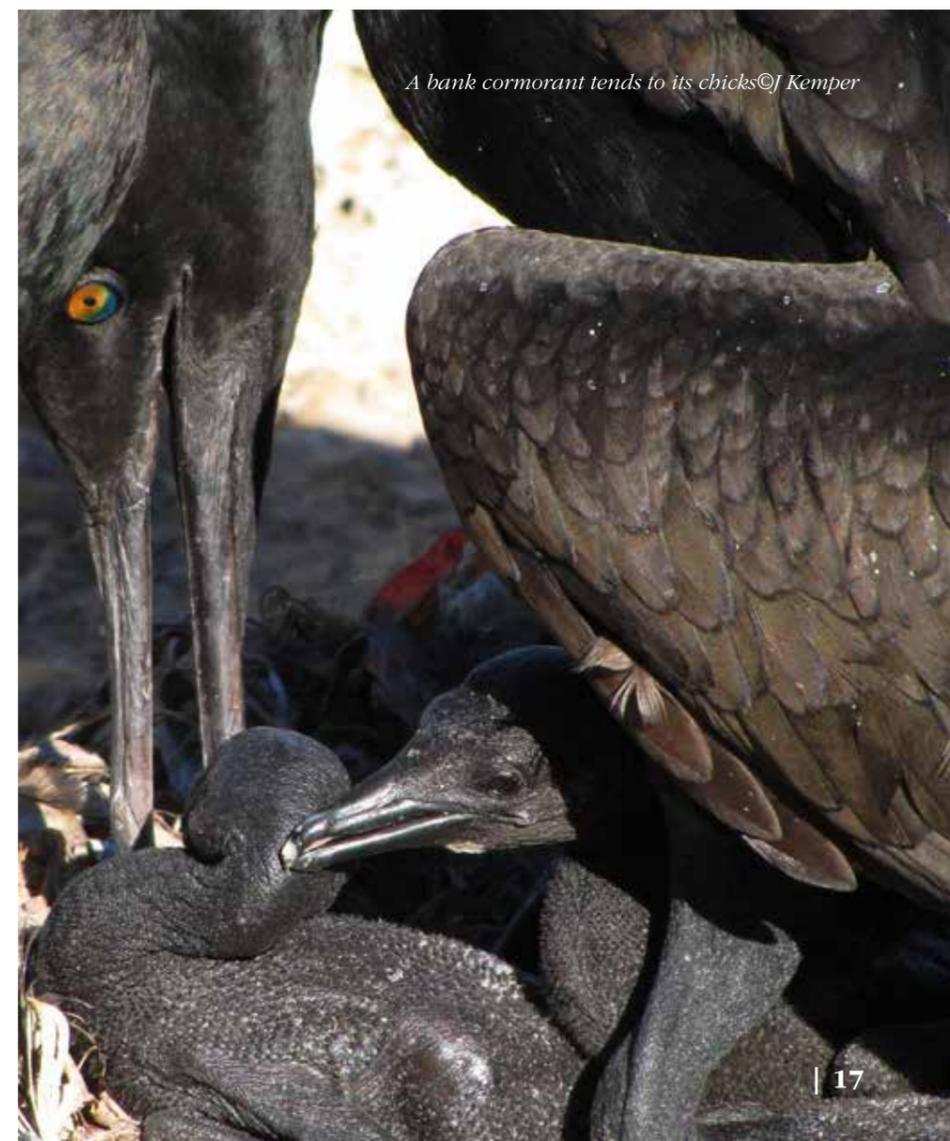
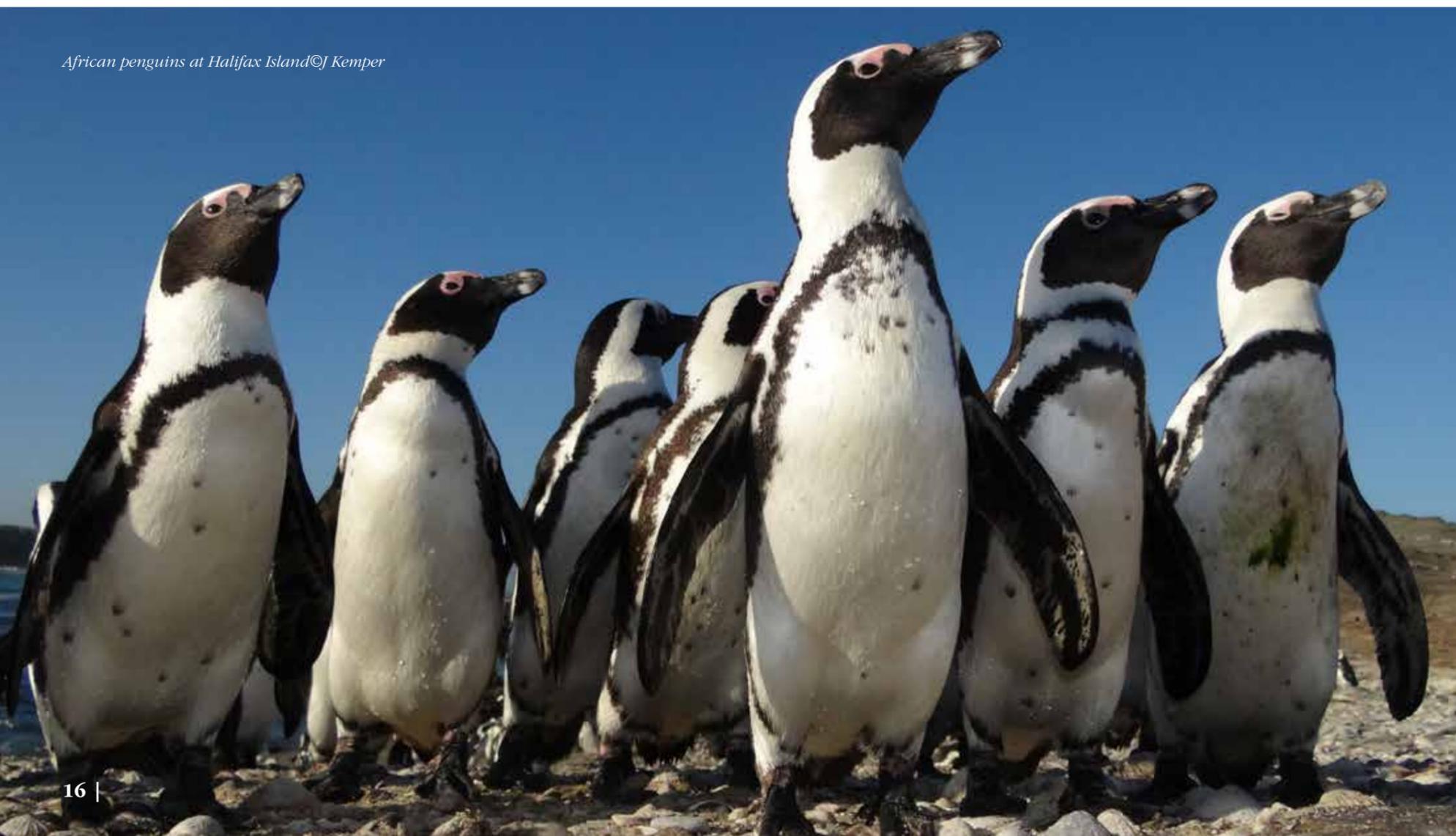
of these new mining technologies on these, in order to plan and implement mitigation measures if necessary. Logistic support for the project is provided by MFMR and the funds made available by Namdeb are administered by the Namibia Nature Foundation (NNF).

The project kicked off earlier this year and consists of three elements. It focuses on four species that were selected because of their conservation status, their ecology and distribution which make them useful indicators for monitoring any direct or indirect impacts that could be posed by diamond mining activities. The first element forms part of a long-term study that was initiated in 2005. It looks at the foraging ecology of African penguins at Halifax and Possession islands. It involves deploying small



Two small African penguin chicks peep out from underneath their parent ©J Kemper

African penguins at Halifax Island ©J Kemper



A bank cormorant tends to its chicks ©J Kemper



These two unusually coloured and patterned southern right whales were photographed during an aerial survey ©J-P Roux

mining activities could affect these areas and foraging efficiency.

During March this year, an intensive and successful three-week field season at Halifax Island produced reams of valuable data. Preliminary analysis suggests that the Halifax Island penguins had to work harder during the late summer of 2016 than in most other years where foraging ecology had been monitored at this island, with penguins travelling an average of 52 km in search of food before returning to the island to feed the chick(s), roughly 10 km further than in most previous years.

Monitoring the breeding success of African penguins, Cape gannets and bank cormorants has been tricky at islands that are remote and therefore seldom monitored or at breeding sites where the birds are particularly prone to disturbance. The second element of the project therefore investigates the viability of monitoring breeding success using camera traps and time-lapse photography, a non-invasive technique and potentially a fantastic tool to keep tabs on the secret lives of Namibia's

GPS data loggers on breeding African penguins that are retrieved after one foraging trip, i.e. after about two days. The data logger regularly records the position of the foraging penguin, as well as how often and how deep the penguin

dives to find food. This information in turn provides important insights on key foraging areas and habitats used by breeding penguins, indicates how hard the birds have to work to find food for themselves and their chicks, and how

seabirds. The biggest challenge here is to find a setup that can cope with sticky, corrosive sea spray, abrasive sandstorms (and sometimes flying gravel), and large amounts of dust-like guano, a mixture of sand and bird excrement, that gets into the most dust-proof camera housing and excels at coating camera lenses. Should this technique prove to be successful, camera traps will be deployed at a larger scale at key breeding sites.

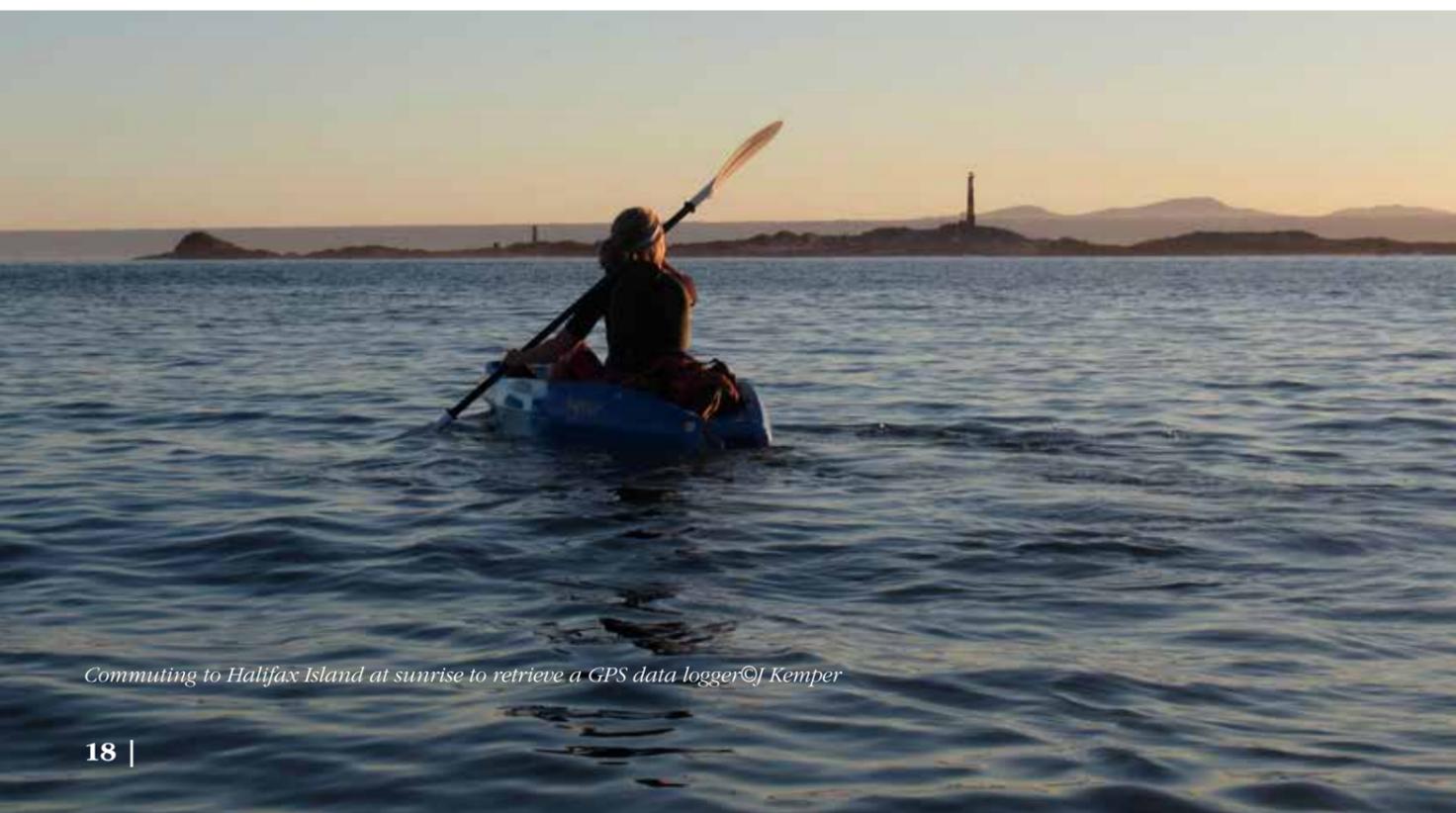
Southern right whales, long absent from Namibia's coast after being extensively hunted, are slowly making a comeback, and calves have been recorded since the mid-1990s in southern Namibia. Aerial surveys of these charismatic whales have been conducted since 1999; the third element of this project is a continuation of that programme and will help to record the numbers of southern right whales (including the number of calves born) in southern Namibia. It will also allow the mapping of coastal habitat use by the whales and to identify key calving areas. Just like fingerprints, the number and arrangement of callosities (prominent

calcified skin patches) on the head of a right whale form a unique pattern, which allows the identification of individual whales that can then be monitored over time. This element of the project is also not without its challenges as it depends on the availability of a suitable plane, complete with a window that can be opened to take usable photos of individual whales. Moreover, clear and calm weather conditions are a must - something that is not that common in the world's strongest upwelling cell.

This partnership between Namdeb, the African Penguin Conservation Project, Namibia Nature Foundation and the Ministry of Fisheries and Marine Resources contributes to the effective monitoring and conservation effort of the NIMPA's fragile biodiversity and habitats, and in particular to that of threatened marine predators. Hopefully, what will be learned from our "sentinels of ocean health" will assist in halting ecosystem degradation along Namibia's coast so that future generations can enjoy (and sustainably profit from) this unique marine environment.

The Namibia Nature Foundation (NNF) is one of the largest non-governmental organisations (NGO) targeting conservation and sustainable development in Namibia. The primary aims of the NNF are to promote sustainable development, the conservation of biological diversity and natural ecosystems, and the wise and ethical use of natural resources for the benefit of all Namibians, both present and future. We work closely with the African Penguin Project in supporting Penguin and Sea-bird conservation.

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Commuting to Halifax Island at sunrise to retrieve a GPS data logger ©J Kemper



The 10 ha Halifax Island supports about 1000 breeding pairs of African penguins ©J Kemper