How adult penguins fish and the body condition of their chicks are directly linked to local fish abundance, and could potentially inform fishery management, a new study has found. The researchers studied an endangered African penguin colony during a rare three-year closure of commercial fisheries around Robben Island, Cape Town, and their findings are published today in the Journal of Applied Ecology.

Dr Kate Campbell, who led the research at the University of Cape Town (UCT) said: “Understanding how African penguins forage to feed their chicks in their variable marine environment can help us identify conservation measures for these endangered populations.”

“A three-year commercial fisheries closure around Robben Island created a unique opportunity to study how African penguins directly respond to natural changes in local abundance of their prey – anchovies and sardines”, she added.

Fishing is often considered to be one of the biggest drivers of biodiversity loss in the ocean. It is so widespread that we lack an understanding of the ‘natural’ relationships between marine predators and their prey, and thus the extent to which predators are disrupted by competition from fisheries.

This is a critical knowledge gap since many marine predators such as penguins are considered indicator species: a species whose success indicates the condition of their habitat.

The researchers estimated fluctuations in prey fish populations over three years within the fisheries closure zone (20km radius around Robben Island) using 12 hydro-acoustic surveys, which detect the presence of anchovies and sardines by bouncing sound waves off their swim bladders (gas-filled organs). Over the same time period researchers used GPS-temperature-depth loggers to monitor adult penguins’ fishing behaviours for one trip
to sea per breeding season. At the Robben Island colony, researchers also measured the
diet of breeding adults and the body condition of chicks.

They found that local abundance of anchovy and sardine was directly linked to African
penguin foraging behaviour and chick offspring condition; a common assumption about
predator-prey relationships which has rarely been tested in the absence of fishing.

When fish abundance was lower, adults increased foraging effort: foraging for longer,
swimming further and diving more often. This likely explains why chick body condition
also declined, as finding fish became more challenging for breeding adults and required
more energy.

Dr Richard Sherley of the University of Exeter said: “Interestingly, the variation in foraging
behaviour between individuals also increased when prey fish were scarcer.”

“While some ‘superstar’ penguins find food easily, others are less successful. Once food
gets harder to find, more individuals will start to struggle and work harder, but they will
do so at different rates, increasing the variation we see in foraging effort”, he added.

These results indicate that penguin foraging behaviour and chick condition could be key
indicators for local fish abundance, making a case for their inclusion in monitoring of local
ecosystem health.

“Since these short-term changes will likely have knock-on effects for chick survival and
penguin population size, they could be used as powerful early warning signs to inform
fisheries’ policies and marine conservation efforts”, said Campbell.

“Technological advances also means there’s exciting potential to better understand how
these endangered penguins behave when prey resources are scarce”, she added.

“Hopefully, in the future, we could aim to effectively balance fishery management with
penguins’ needs, to reduce the impact on local economies whilst maximising the benefits
to our oceans”, Sherley concluded.

Notes to Editors

Kate Campbell, et al. ‘Local forage fish abundance influences foraging effort and offspring
condition in an endangered marine predator’ is published in the *Journal of Applied Ecology*
on 21 May 2019 and will be available [here](#).

A pdf of the study and high-resolution images and videos can be downloaded [here](#) (please
note the copyright information in the file names).

University of Cape Town
The University of Cape Town (UCT) is one of the leading universities in South Africa and in Africa. It is an inclusive and engaged research-intensive African university that inspires creativity through outstanding achievements in learning, discovery and citizenship; advancing a more equitable and sustainable social order and influencing the global higher education landscape.

www.uct.ac.za
Twitter: @UCT_news

British Ecological Society
Founded in 1913, the British Ecological Society (BES) is the oldest ecological society in the world. The BES promotes the study of ecology through its six academic journals, conferences, grants, education initiatives and policy work. The society has 6,000 members from more than 120 different countries.

www.britishecologicalsociety.org
Twitter and Instagram: @BritishEcolSoc

*Issued by: UCT Communication and Marketing Department*

**Aamirah Sonday**
Media Liaison and Monitoring Officer
Communication and Marketing Department
University of Cape Town
Rondebosch
Tel: (021) 650 5427
Cell: (076) 947 6071
Email: aamirah.sonday@uct.ac.za
Website: www.uct.ac.za