NELSON MANDELA UNIVERSITY

Advancing Marine Science Tourism & Conservation

Dr Lorien Pichegru

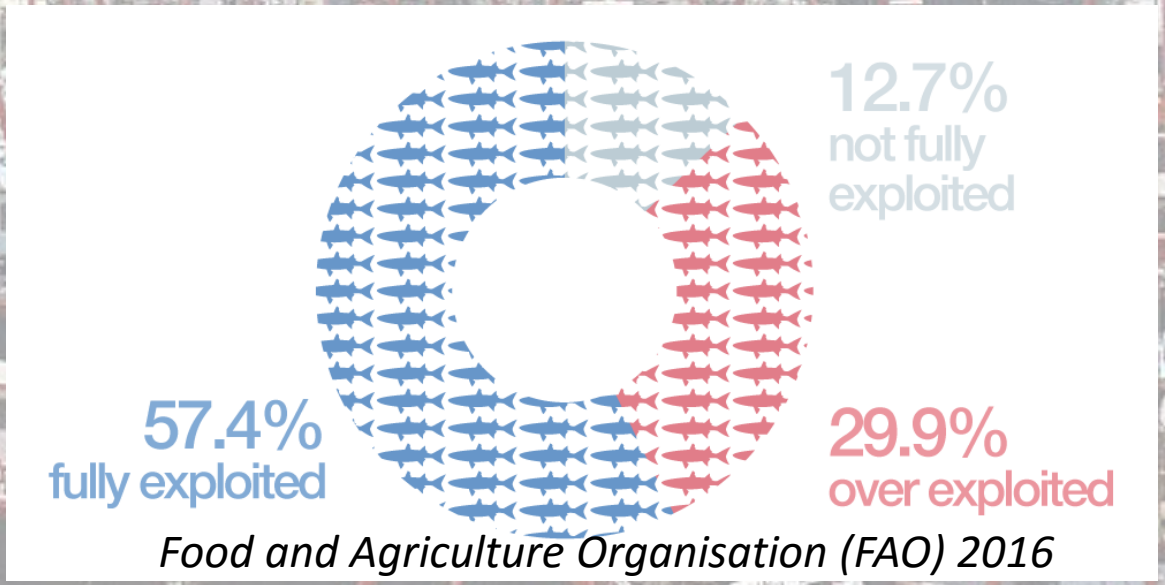

Anthropocene era


Less visible in the oceans

The state of our oceans

1- Over-fishing

Ca 90% of the global fish stocks are either over-exploited or fully exploited



Food and Agriculture Organisation (FAO) 2016

Worm et al. 2006 *Science*

The state of our oceans

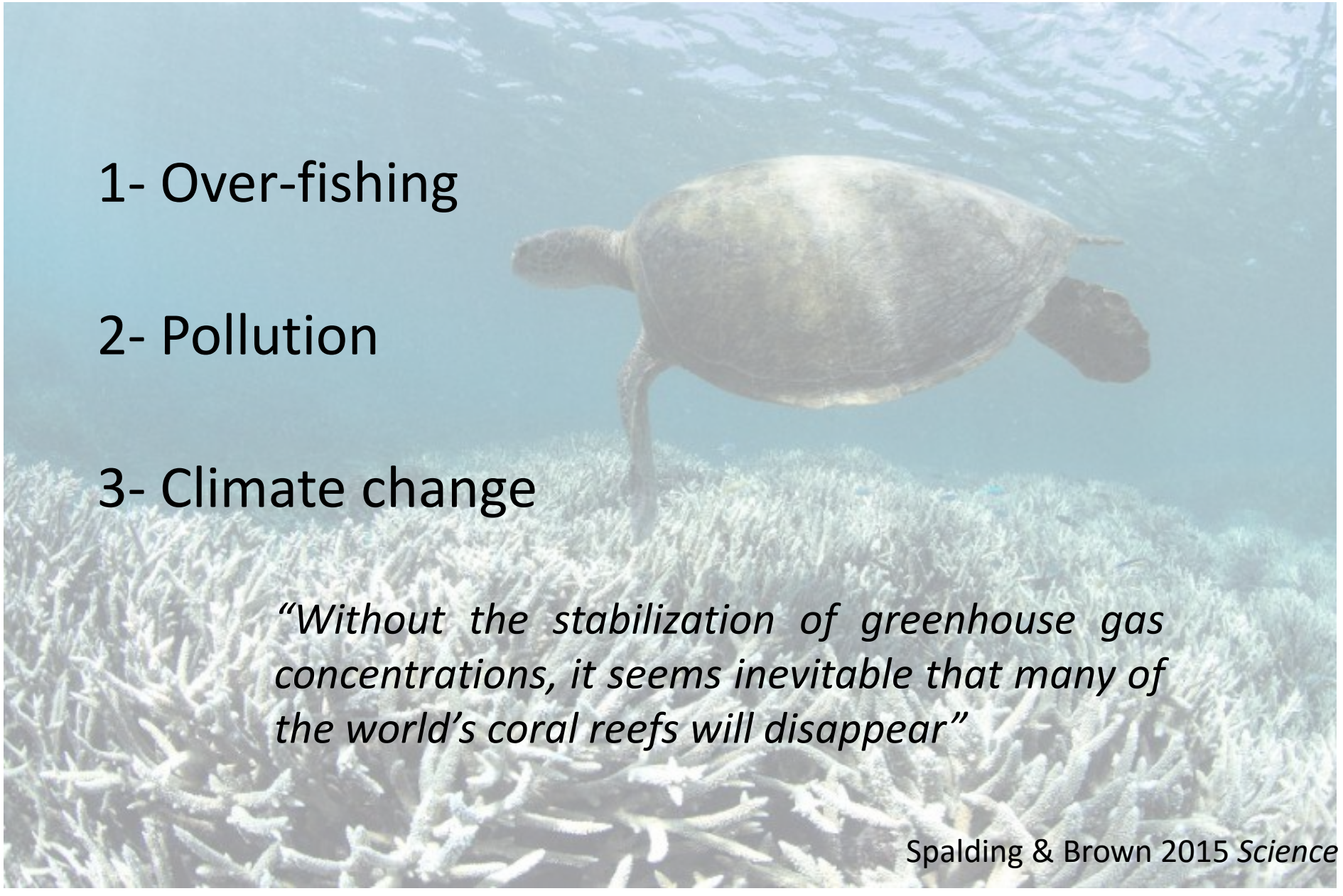
1- Over-fishing

2- Pollution

By 2050, there will be more plastic than fish in the oceans; 99% of all seabird species would have ingested plastic

Jambeck et al. 2015 *Science*
Wilcox et al. 2015 *PNAS*

The state of our oceans



1- Over-fishing

2- Pollution

3- Climate change

"Without the stabilization of greenhouse gas concentrations, it seems inevitable that many of the world's coral reefs will disappear"

Spalding & Brown 2015 *Science*

How can tourism help?

Ecotourism

"Responsible travel to natural areas that conserves the environment and improves the well-being of local people."
(The International Ecotourism Society 1990).

Education

Conservation

Local people

Growing 20-34 % annually

1.8 billions travellers annually

$2.1 trillions revenues

Ecotourism

Exponential growth since 1970s from global environmental movement, and increased awareness of our impact on the environment

Poaching of African wildlife

Mining in the Amazonian rain forest

Ecotourism

As well as from dissatisfaction of mass tourism

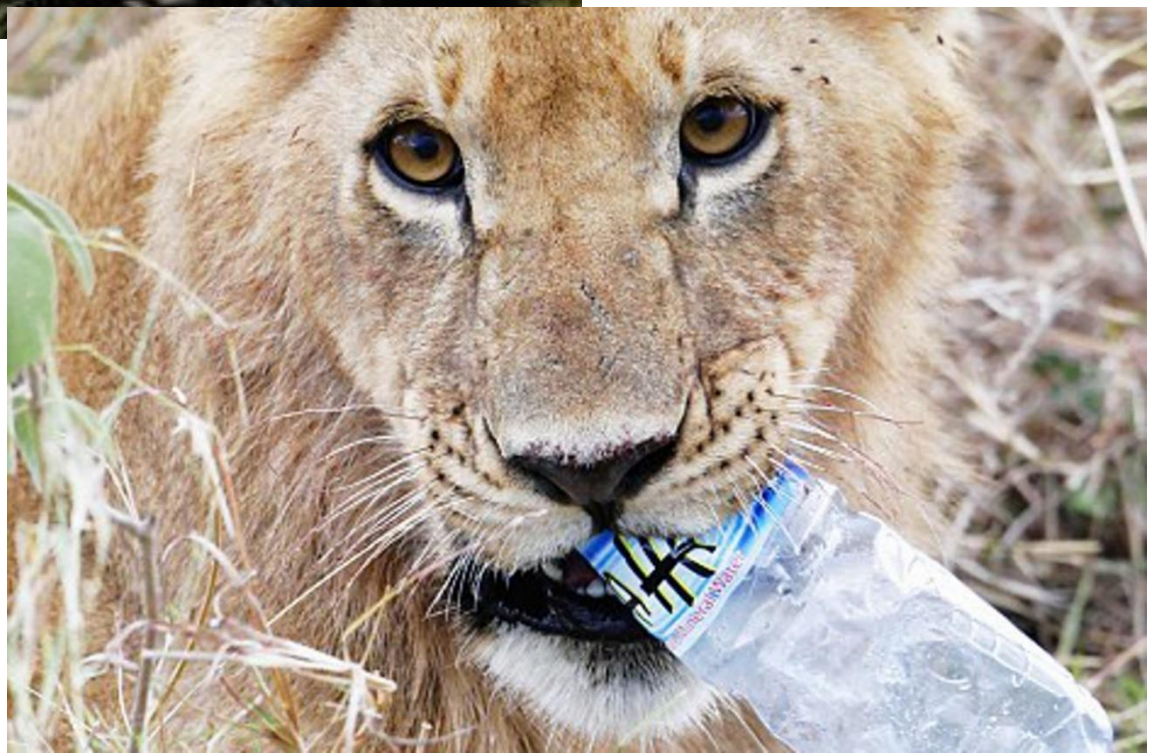
Some initiatives flag themselves as “ecotourism” although they do not fulfil the 3 legs of ecotourism.
But there is an ever growing consciousness of the impact of these industries and for responsible and ethical tourism.

When it comes to dolphins, TripAdvisor's new policy is look but don't touch / *Getty Images*

New rules on animal interactions should be in place by early 2017

Exponentially growing number of visitors to wild places will have an impact on the environment.

The science is then necessary to understand these impacts and to contribute to the formulation of sound regulations of the activities, for the tourism initiatives to remain responsible and sustainable



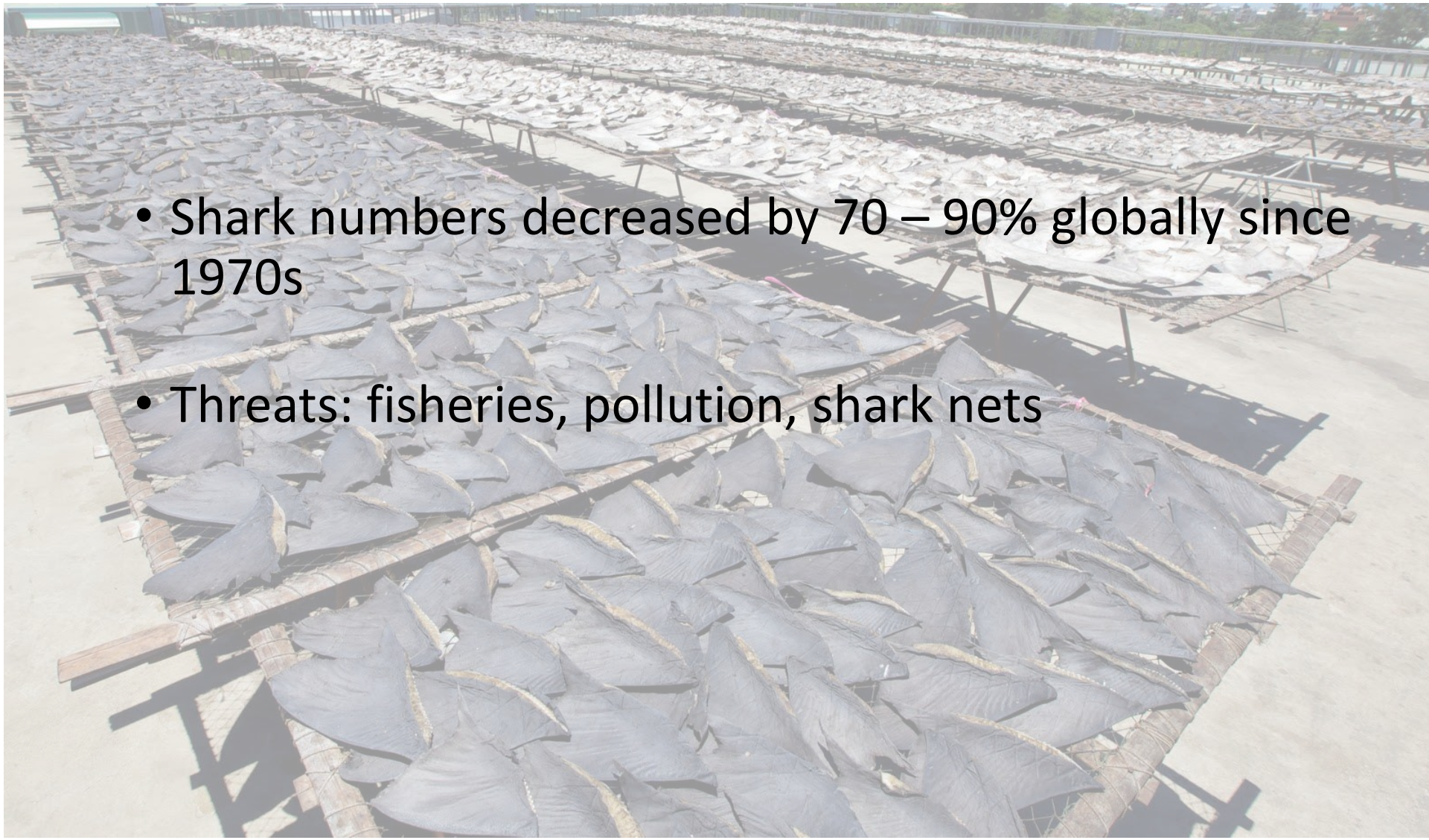
Structure

- Marine ecotourism: conservation, economy, education; impacts on ecosystems - when science helps drawing the line *3 case studies*
- Operation Phakisa: need to develop marine and coastal tourism responsibly
- The value of being a tourist at home


From fishing to shooting:
SHARK DIVING
© Frederic Buyle/Hungry Eye Images

Shark diding

Conservation issue

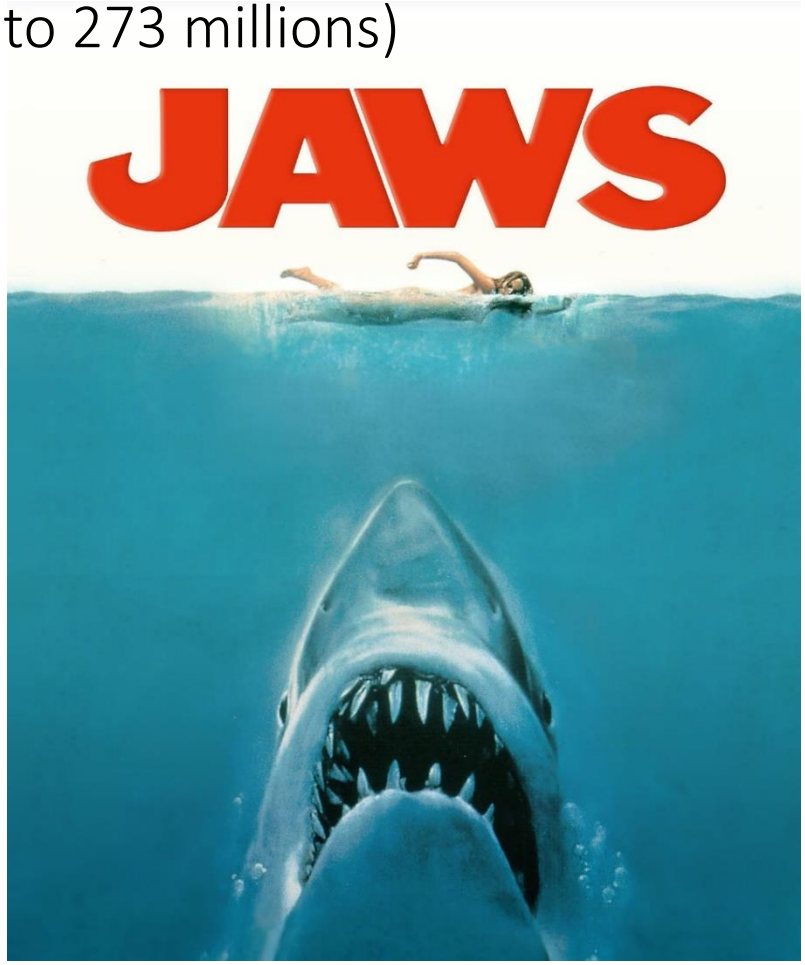


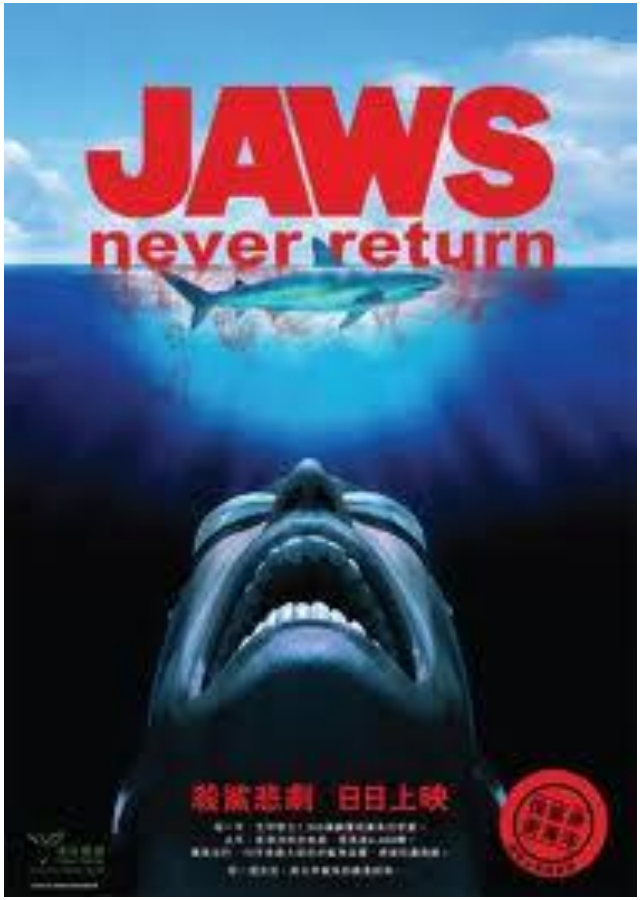
- Shark numbers decreased by 70 – 90% globally since 1970s
- Threats: fisheries, pollution, shark nets

Shark diving

Change of mind in the 1980s, explosion the shark-diving industry on the 1990s

In 2014, 7 fatal shark attacks VS 100 millions sharks killed globally (up to 273 millions)





Shark diving

Ecological benefits

Palau (Micronesia):

Shark diving with a population of ca **100 sharks.**

If fished, they'd generate **US$10 800** once off.

Shark diving generates **US$ 18 million annually** (8% GDP)

***Fishermen earn more selling fish for consumption by shark divers than they would gain by catching sharks*.**

Vianna et al. 2011 *Biol. Conserv.*

Shark diving

Economic benefits

- Shark diving: 43 different countries, involving 500 000 tourists annually (in 2006)
- In South Africa: the industry contributes R289 million to the local economy

Shark diving

Ecological impacts

Feeding/chumming to attract them.

Increase attacks on humans?

Science showed no evidence of impacts

Vignon et al. 2010 *Mar. Fresh. Res.*
Maljkovic & Cote 2011 *Biol. Conserv.*

Shark diving

Ecological impacts

Change in activity or habitat shift
above a threshold of divers and/or boats

		1998	2005
In Belize	Number of operators	2	30
	Chance of sightings	80%	20%
	Number of whale shark	13	6

Graham & Roberts 2007 *Fish. Res.*

Smith et al. 2010 *Env. Manag.*

Shark diving

Regulations in South Africa

1. Limited number of licensed operators
2. No feeding
3. Obligation of collecting basic information for research in South Africa
4. Promote education before and during tours

Science showed that sharks around cage-diving operations are transient (no habituation/attraction)

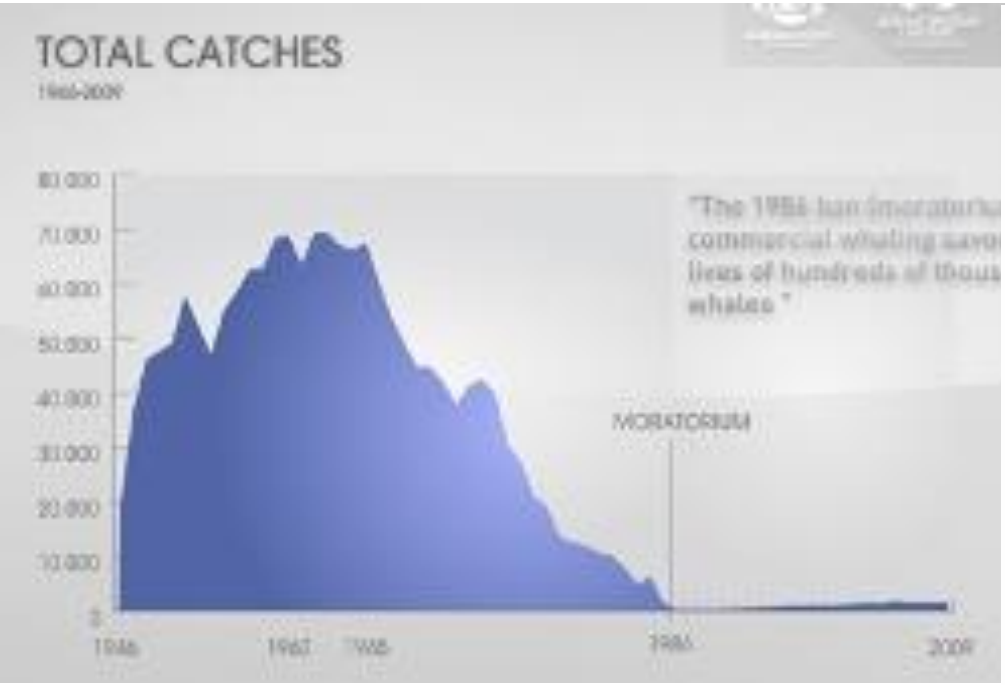
From whaling to whale watching

L. Edwards

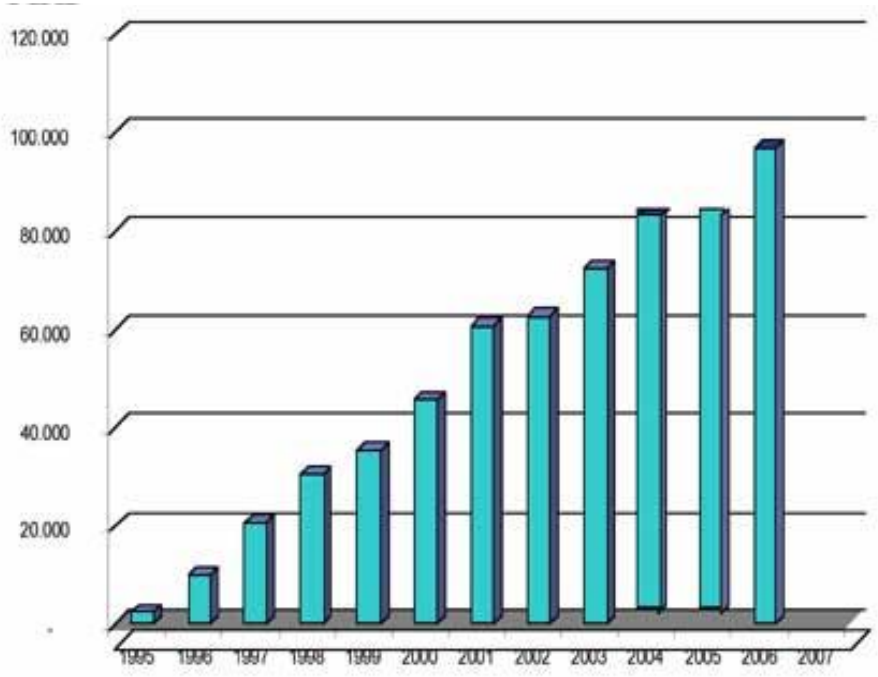
Whale watching

Conservation issue

Whaling decreased whale population globally by 85%



Number of whales caught 1960 - 2009



Number of whale watching tourists in Iceland since the 1990s

Lotze & Worm 2006 *Trends Evol. Ecol.*

Whale watching

Economic benefits

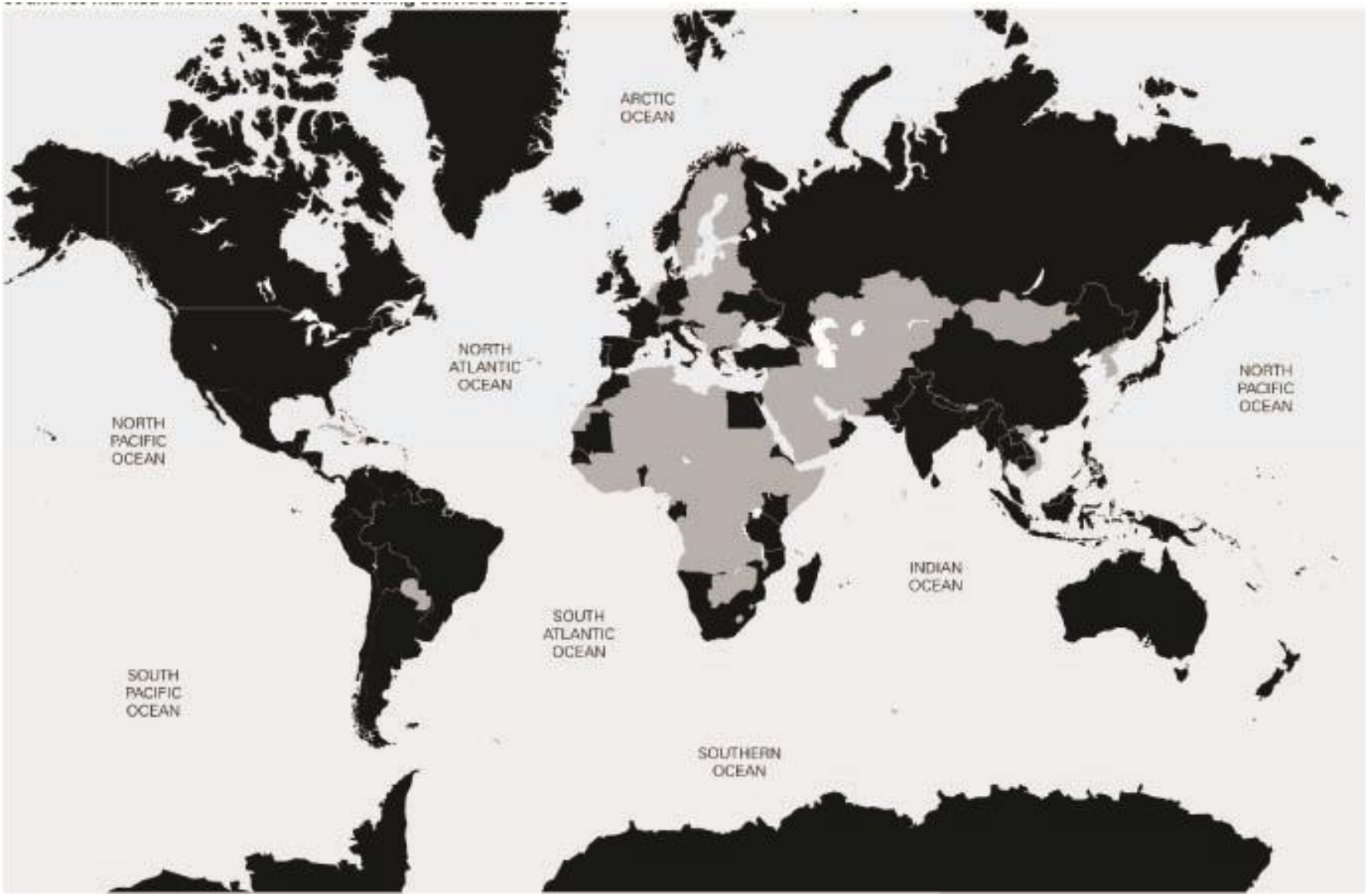
- The example of the Azores

From whaling to whale watching within 1 year

Whale watching

Economic benefits

Whale watching countries in the world



Whale watching

Ecosystem impacts

Typical scenarios:
- too many boats in a limited area,
- too many close approaches
- sometimes collisions
- strain on the infrastructure of local communities from too many visitors,
- lack of guidelines/regulations/enforcement

Hoyt 2008 *Encyclopedia of Marine Mammals*

Whale watching

Ecosystem impacts

- Increase intensity of sounds to compensate for underwater noise by boats above a certain number of boats

Foote et al. 2004 *Nature*

- Habitat shift

- Increased frequency of still birth, decreased population

Lusseau & Bejder 2007 *Int. J. Comp. Psy.*

Conclusion

- Small populations, with restricted immigration and/or emigration, are at risk.

- Changes occur above a threshold of pressure.

Whale watching

Regulations

1. Limited number of **permits** issued for whale watching per area, operator must have minimum **knowledge** of cetaceans + educational value to the participants
2. Limited **distance** to view the animals (50 m with a permit, 300 m without).
3. Do not pursue, overtake, head-off or encircle cetaceans or cause groups to separate.
4. Never approach whales/dolphins **head on**.
5. Avoid sudden changes in **noise** level
6. Reduce **speeds** in areas where whales may be sighted; approach and leave whales cautiously and slowly.
7. Extreme **caution** is required when any of the following is present: (a) feeding whales, (b) cow/calf pairs and juveniles, (c) resting, (d) breeding or rowdy groups, or (e) socially active groups. Cetaceans engaged in such behaviour are particularly sensitive to disturbance and may be vulnerable to collisions. Abandon approach if behaviour is modified.
8. Provide scientific data for research

PENGUIN VIEWING

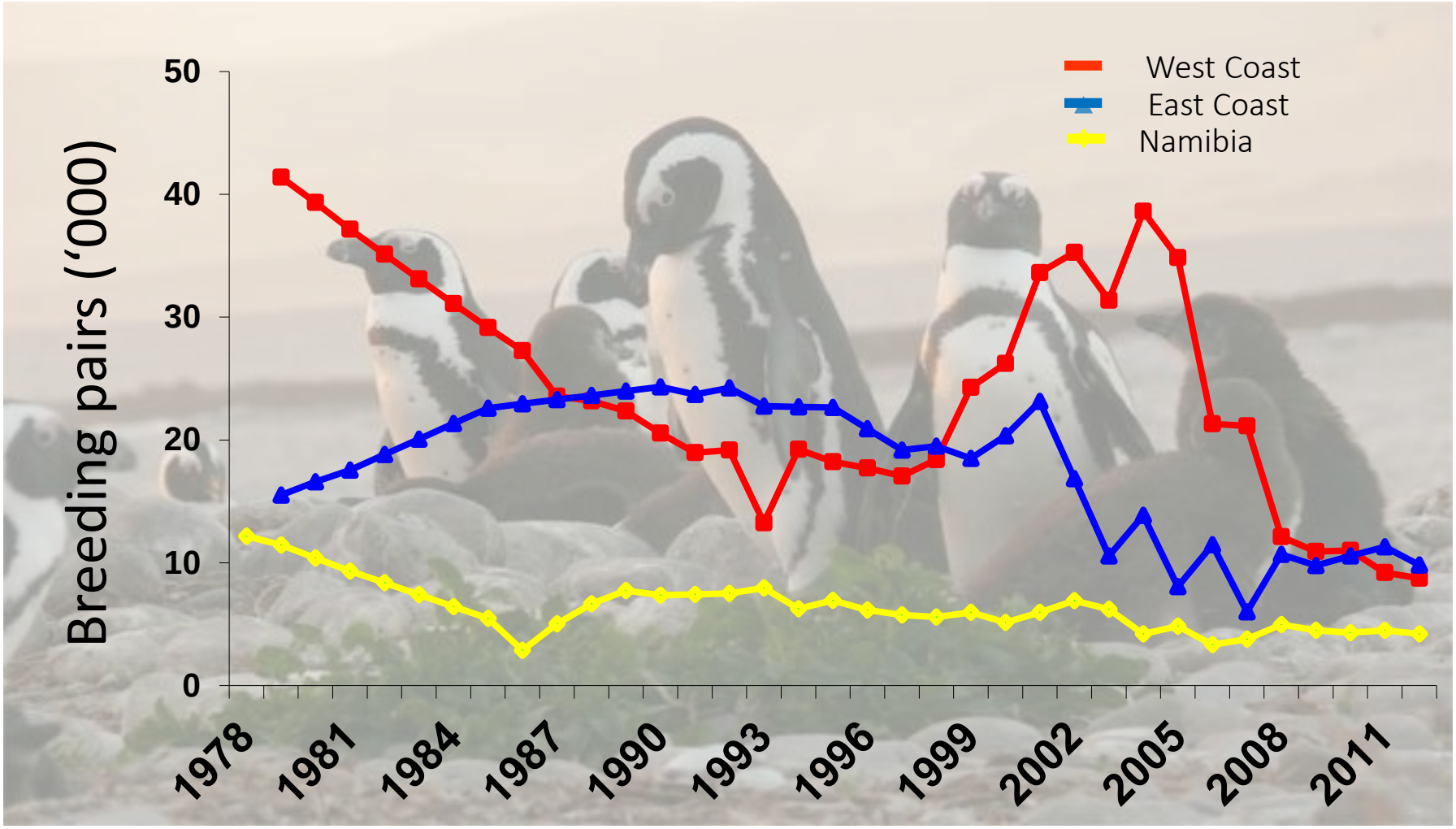
Penguin viewing

Conservation issue

- 15 out of 17 species of penguins globally are threatened.
- Harvesting of eggs for consumption, adults as fuel for ship boilers, of guano for fertilizer (habitat destruction) – 90% decrease in 20th century

Penguin viewing

Conservation issue



African penguins are Endangered

Penguin viewing

Economic benefits

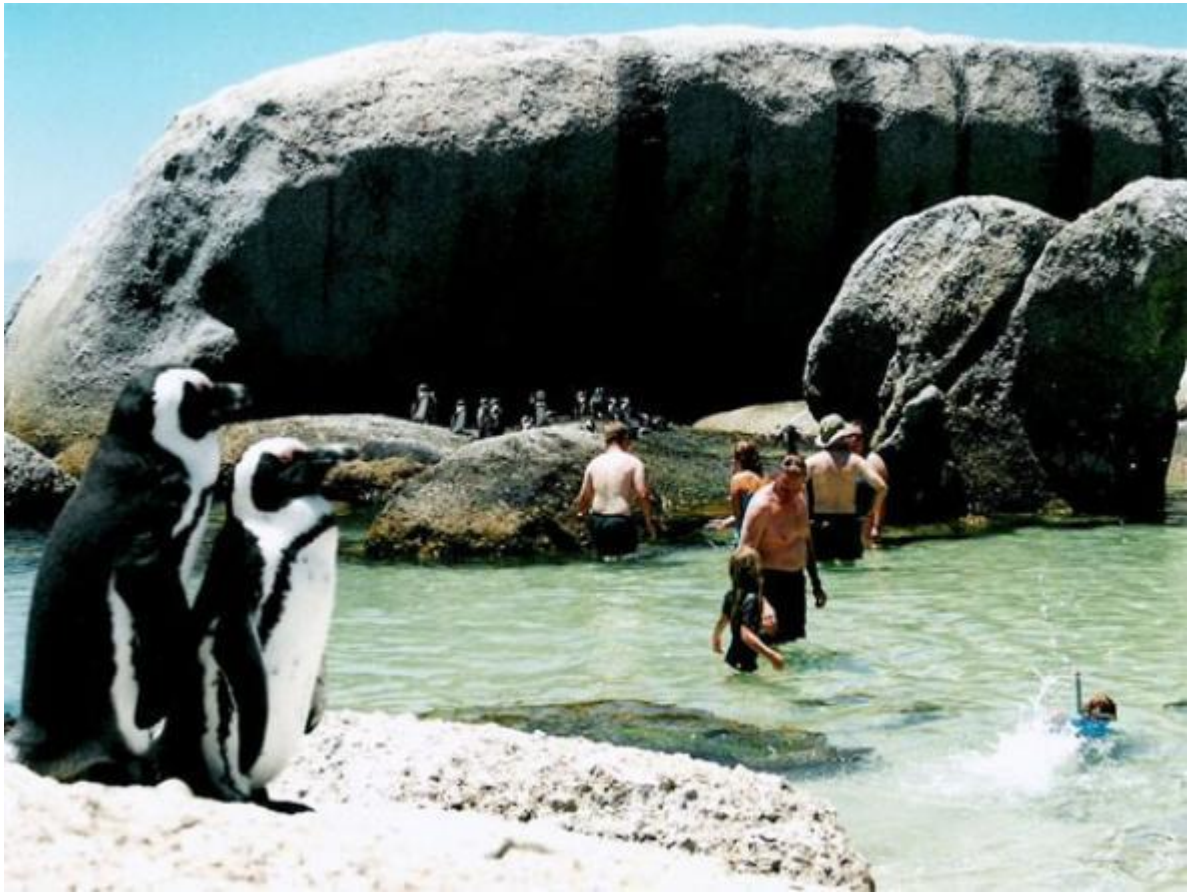
- Boulders have 500 000 – 600 000 visitors a year, representing R14.5 millions in entry fees for SANParks
- The 1/3rd preferred destination in Cape Town (after Cape Point and Table Mountain)
- Benefits local businesses and tourism in RSA

Boulders valued R28 millions

Lewis et al. 2012 *A.J.M.S*

Penguin viewing

Ecological impacts?



- Research is on-going

Penguin viewing

- In Algoa Bay

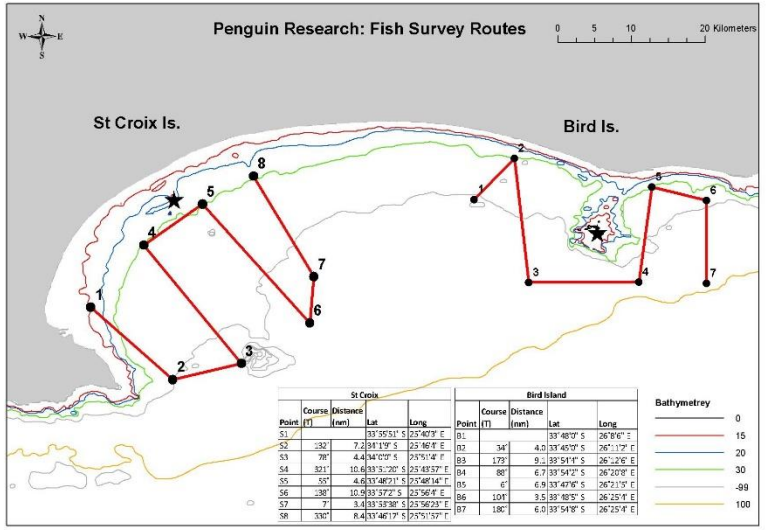
Raggy Charters
ALGOA BAY - PORT ELIZABETH

PENGUIN RESEARCH FUND
PRESERVE AND PROTECT

Penguin viewing

Economic benefits

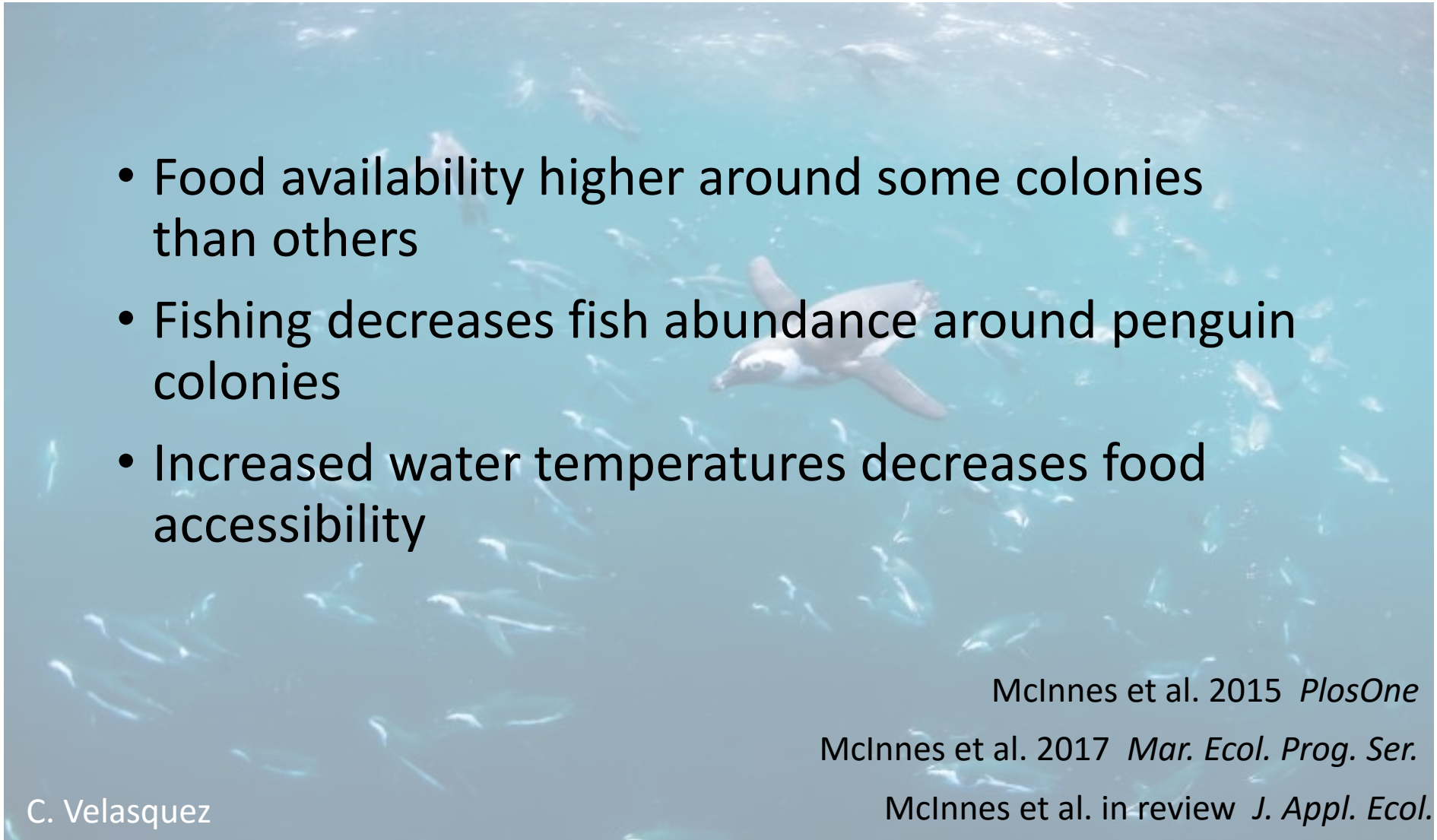
Fund raising for a dedicated research vessel



Government and fishery-independent fish survey, assessing influence of climate and fishing on food availability for African penguins

Penguin viewing

Scientific & ecological benefits



- Food availability higher around some colonies than others
- Fishing decreases fish abundance around penguin colonies
- Increased water temperatures decreases food accessibility

McInnes et al. 2015 *PlosOne*

McInnes et al. 2017 *Mar. Ecol. Prog. Ser.*

McInnes et al. in review *J. Appl. Ecol.*

C. Velasquez

~~Penguin~~ viewing

Scientists viewing…

Many other examples

- Marine turtle viewing instead of poaching eggs
- Scuba diving in Marine Protected Areas
- …

- Tourism, science and conservation

Combine job creation, economy growth & environmental sustainability

In South Africa: Operation Phakisa

Unlocking the economic potential of South Africa's oceans

Create 1 million jobs, contribute R177 billion to GDP by 2033


Marine Transport & Manufacturing


Offshore Oil and Gas Exploration


Aquaculture


Marine Protection
Services and Ocean
Governance


Small Harbours


Coastal and Marine Tourism

The need for a sustainable development

When science brings touristic opportunities…

Stromatolites discovered in 2014

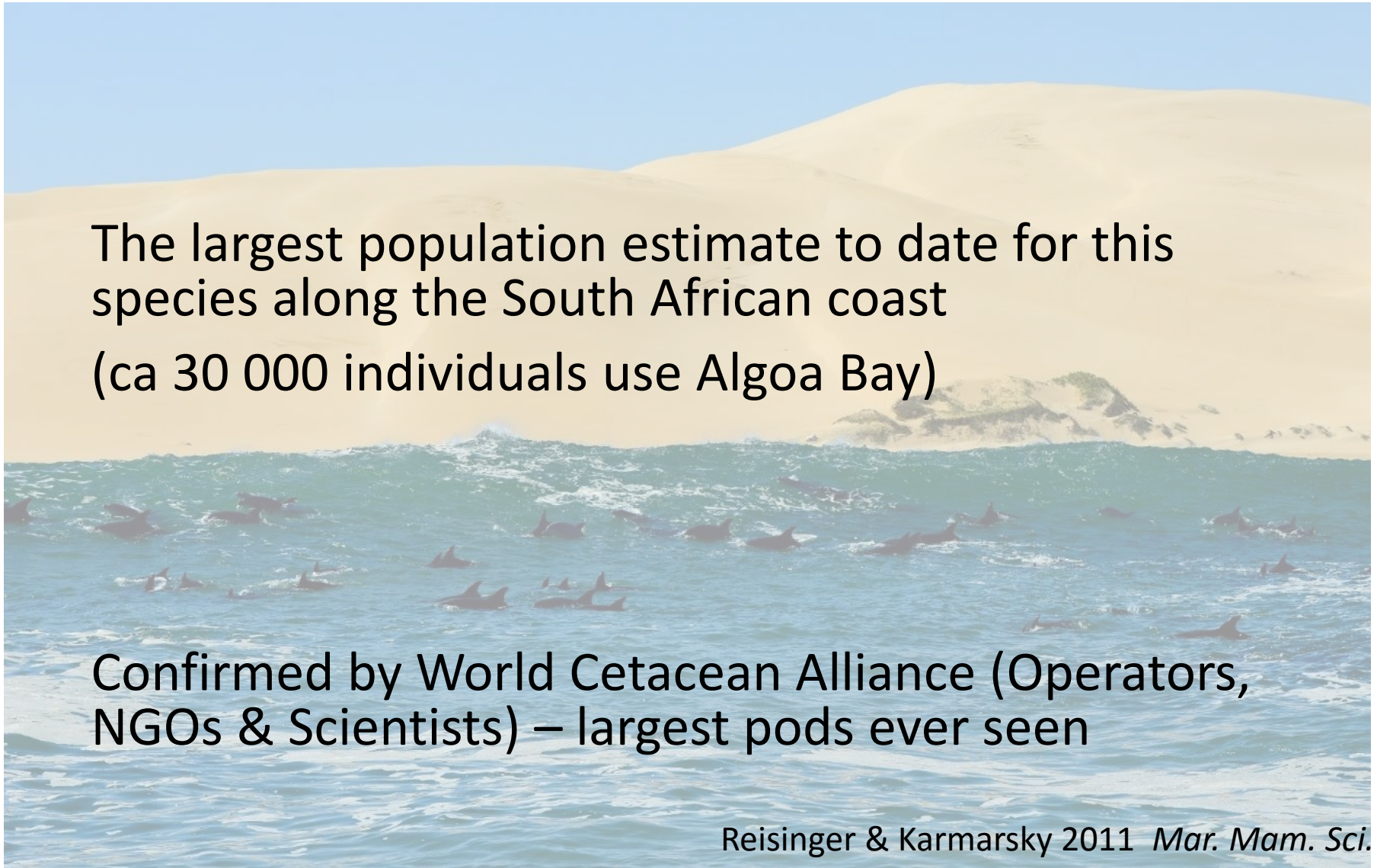
Most ancient form of life on Earth (3.7 billion years)

Perissinoto et al. 2014 *S. Afr. J. Sci.*

Khoisan fish traps at Cape Recife

Discovered by Alan Tours in 2013

Indo-pacific bottlenose dolphins



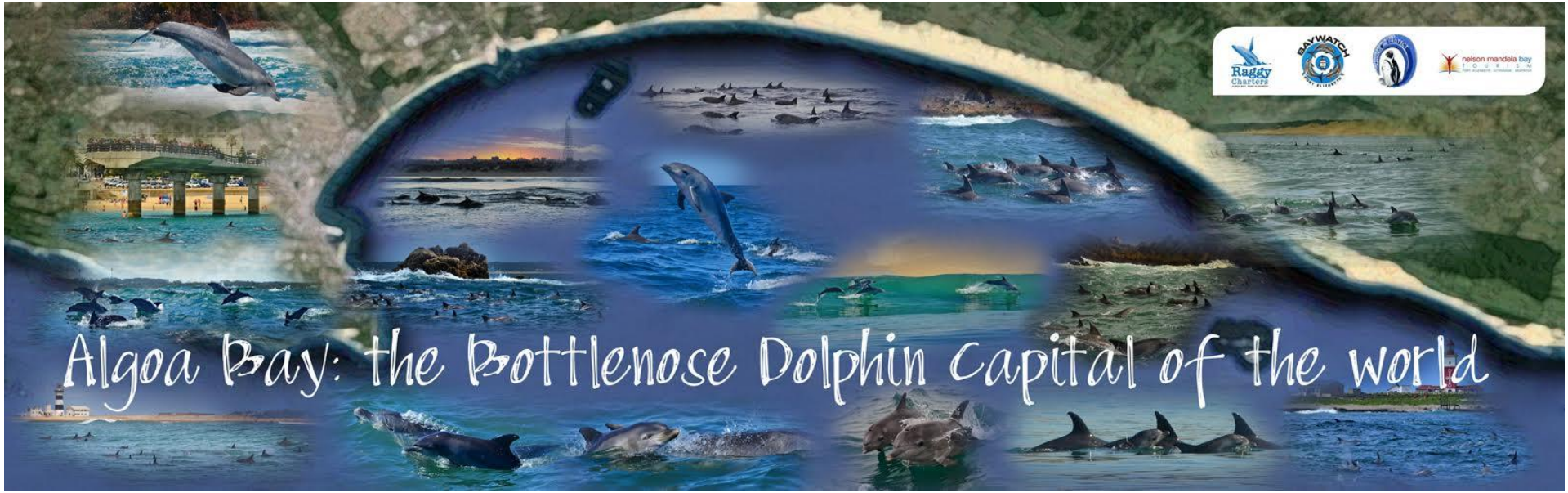
The largest population estimate to date for this species along the South African coast

(ca 30 000 individuals use Algoa Bay)

Confirmed by World Cetacean Alliance (Operators, NGOs & Scientists) – largest pods ever seen

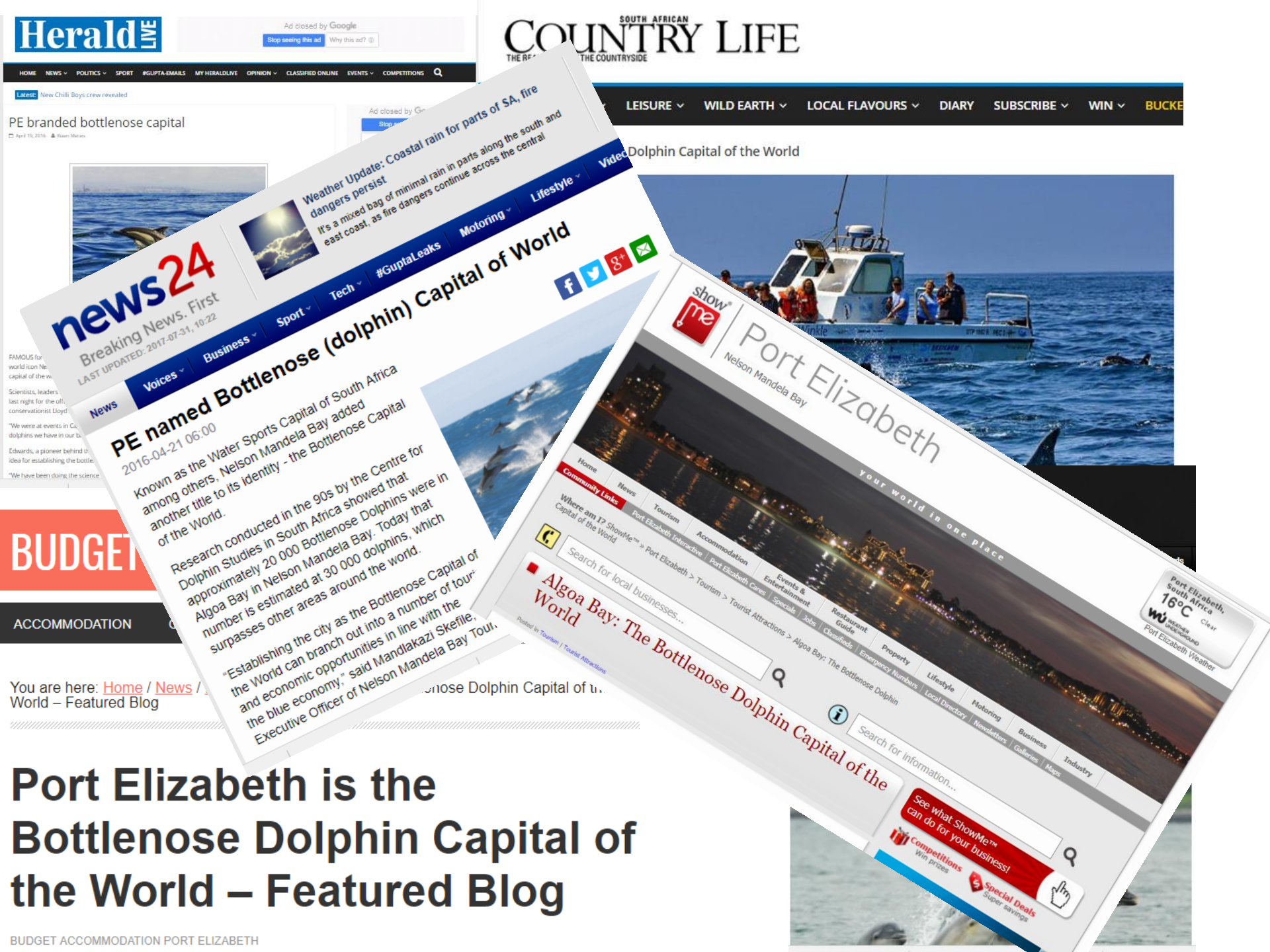
Reisinger & Karmarsky 2011 *Mar. Mam. Sci.*

Algoa Bay declared the Bottenose Dolphin Capital of the world



April 2016

Bottlenose dolphin Capital of the World



You are here: Home / News / … nose Dolphin Capital of t… World – Featured Blog

Port Elizabeth is the Bottlenose Dolphin Capital of the World – Featured Blog

BUDGET ACCOMMODATION PORT ELIZABETH

Bottlenose dolphin
Capital of the World

Next step: Marine Carnival - 2018

Involving schools and locals…

Jacques Cousteau
(1910- 1997)

"We protect what we love,
and we love what we know"

Sylvia Earle
(1935 - present)

"With the power of knowledge
comes the power of choice,
choice to make the right change"

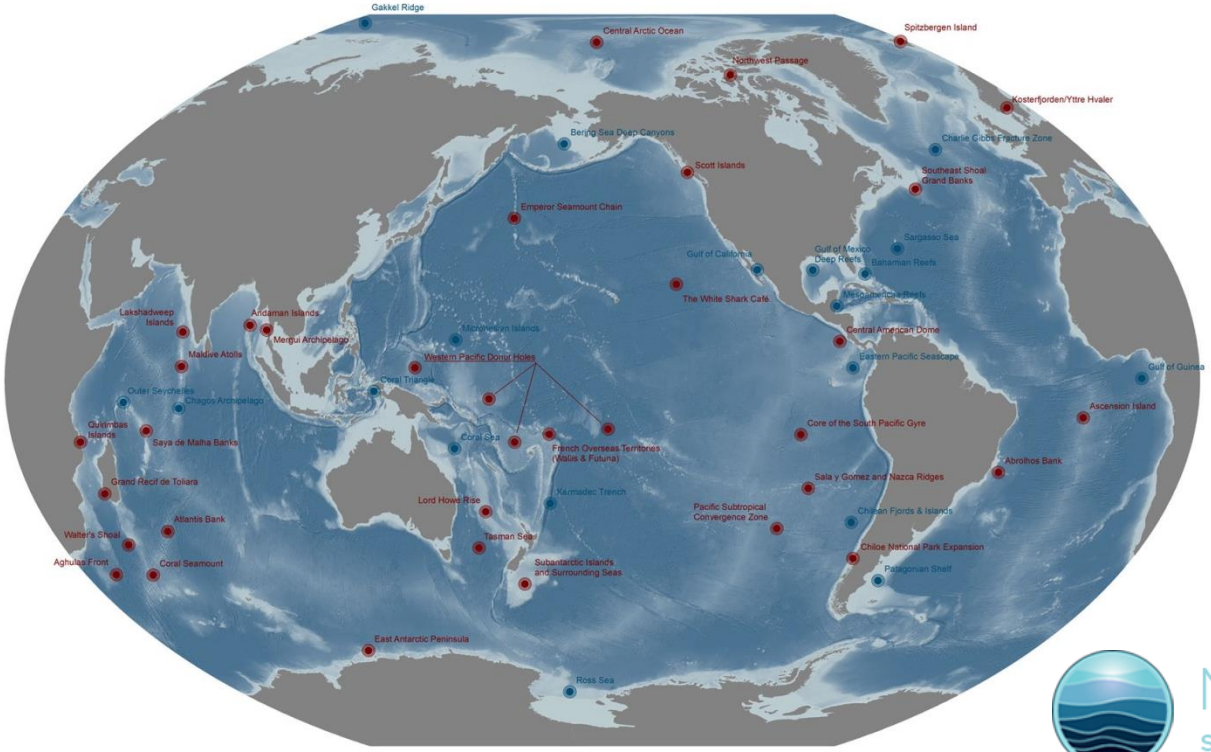
Algoa Bay as a Hope Spot

SST
Sustainable Seas Trust

Nelson Mandela Metropolitan University
for tomorrow
Coastal and Marine Research

What are Hope Spots?

Hope Spots are special places that are critical to the health of the ocean



MISSIONBLUE
SYLVIA EARLE ALLIANCE

PUBLIC SUPPORT

ALGOA BAY

Hope Spot

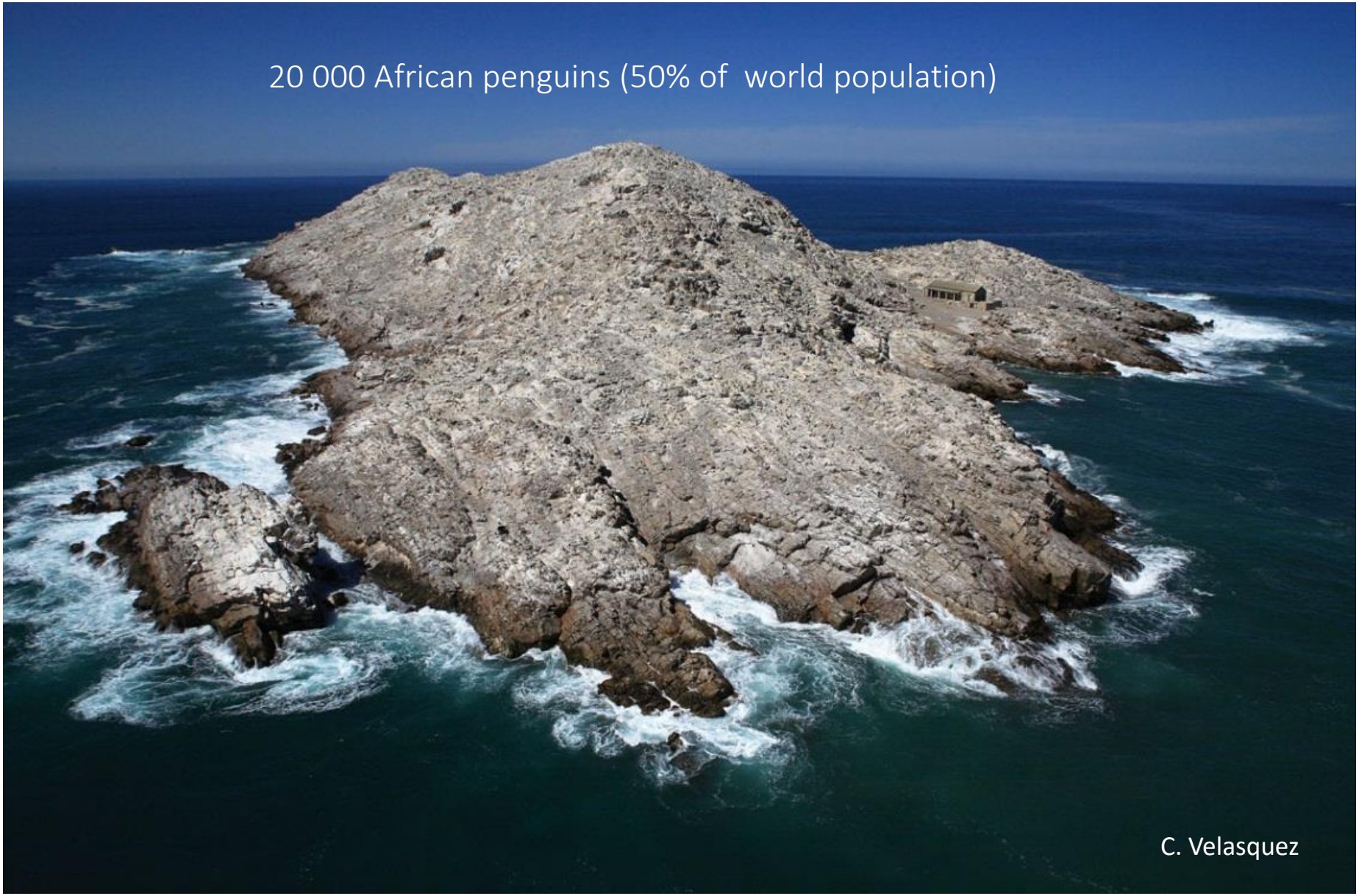
Launch

11 December 2014

Port Elizabeth – a coastal city


Alexandria
dune field
Sundays river
estuary
Swartkops river
estuary
The St Croix Island
group
The Bird Island
group
ALGOA BAY
26 km
© 2014 Google
Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat
© 2014 Europa Technologies
Google
Imagery Date: 4/10/2013 33°51'58.20" S 25°59'30.20" E elev -58 m eye alt 11

St Croix Island



St Croix Island

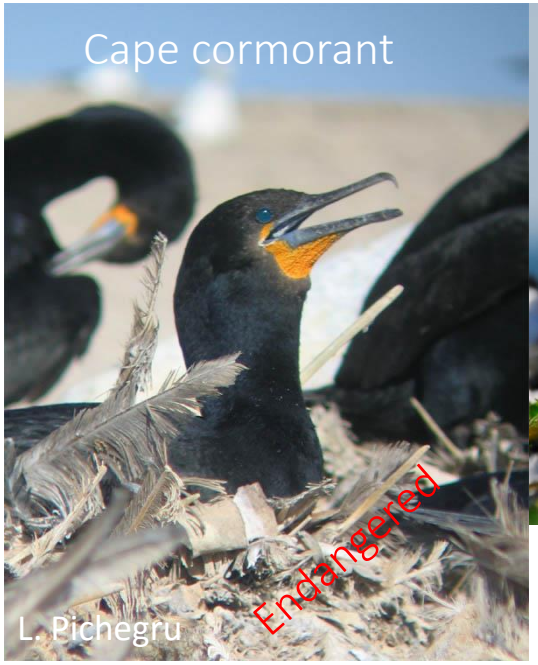
Bird Island

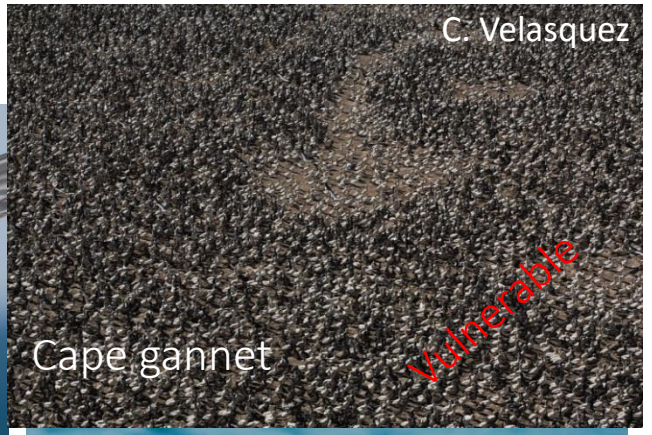
Bird Island

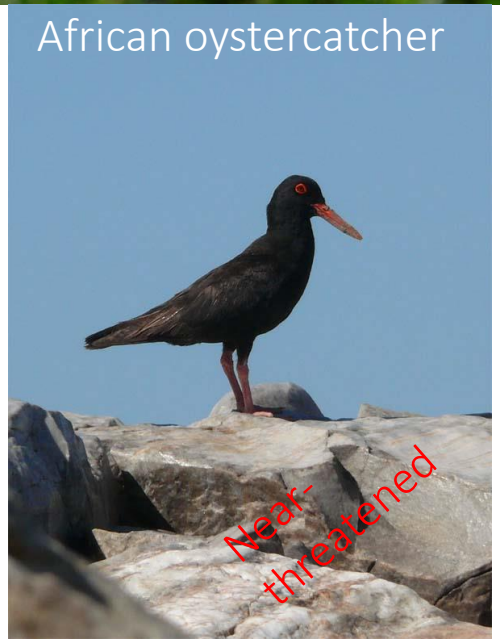
Bird Island

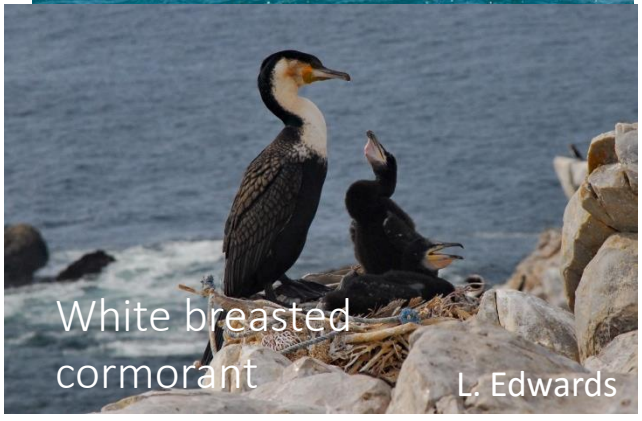
Great white Sharks

Algoa Bay islands are marine Important Bird Areas



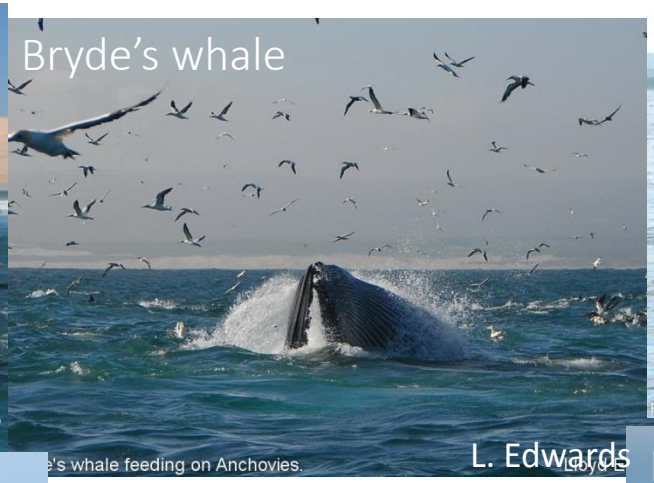




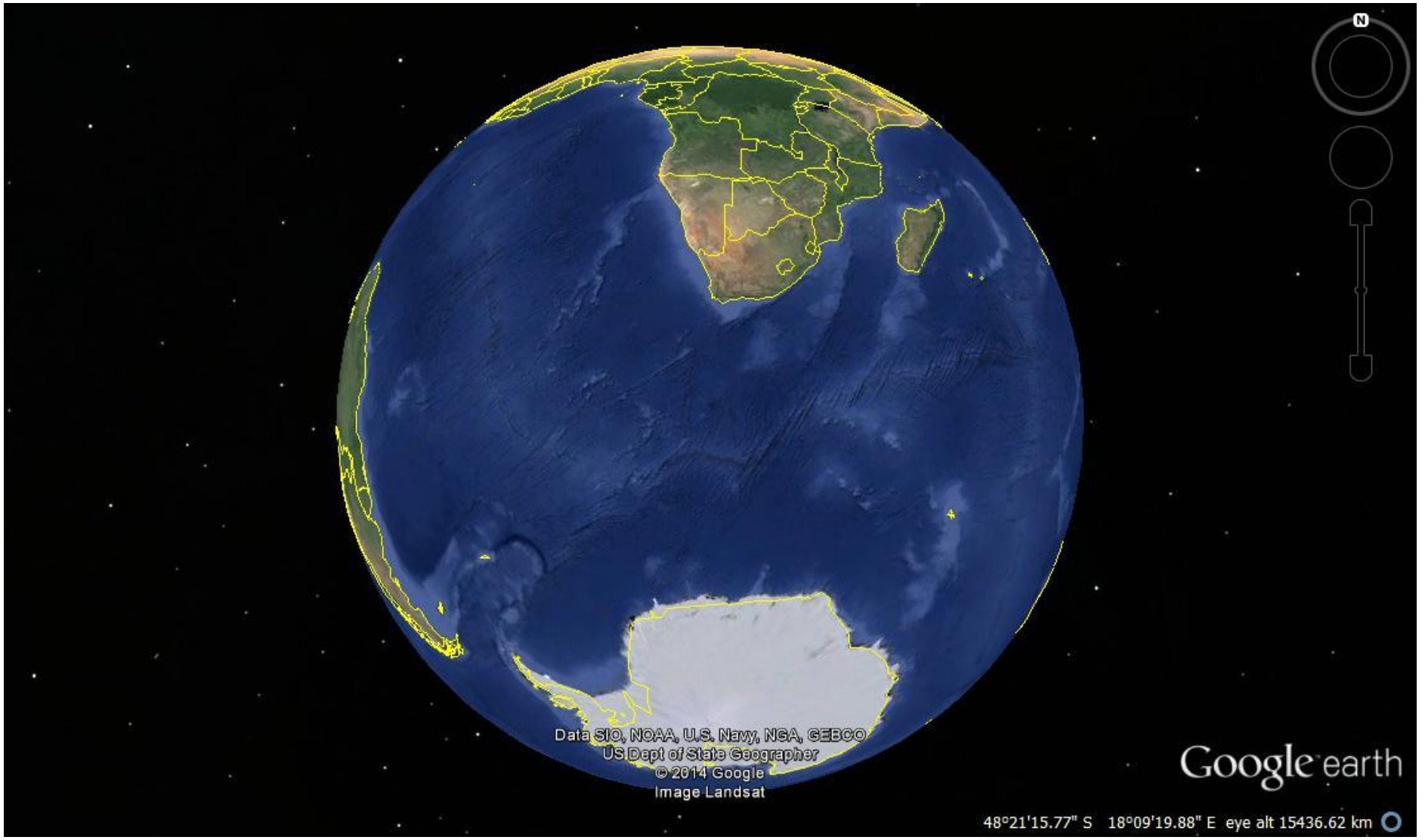


African penguins are Endangered

Charismatic top predators



Some whales come from Antarctica



Southern right whales

Southern right whales

Humpback whales

Our resident whale: the Bryde's whale

Our resident whale: the Bryde's whale

The sardine run

The sardine run

The sardine run

Common dolphins

Bottlenose dolphins

The greatest super predator in the oceans

Underwater life

Underwater life

Reefs

Reefs

Reefs

Reefs

Reefs

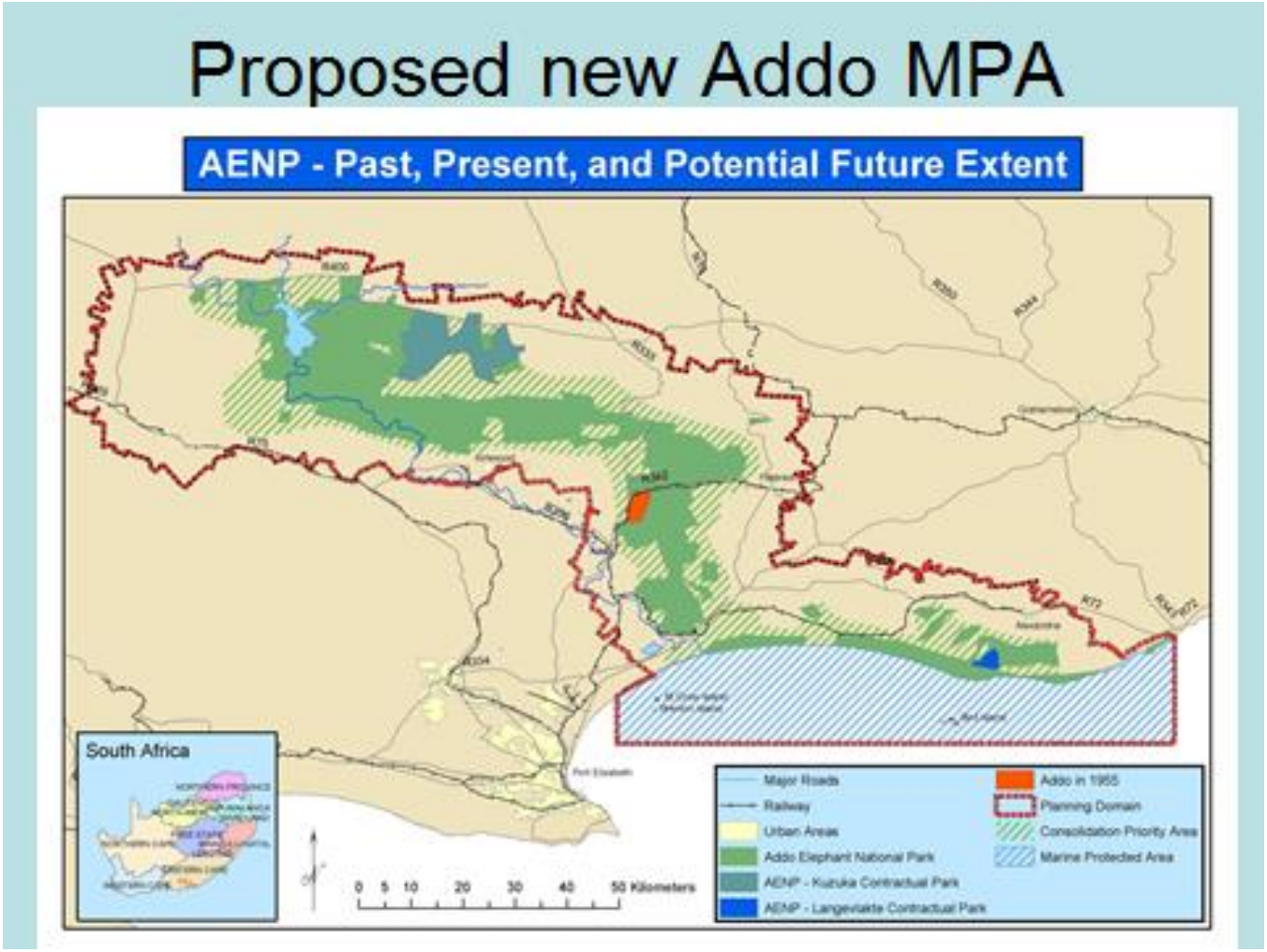
Precious estuaries

Precious estuaries

Alexandria Dune field – proposed World Heritage Site

Alexandria Dune field – proposed World Heritage Site

Greater Addo National Park



The only place in the world where you can spot the big 7

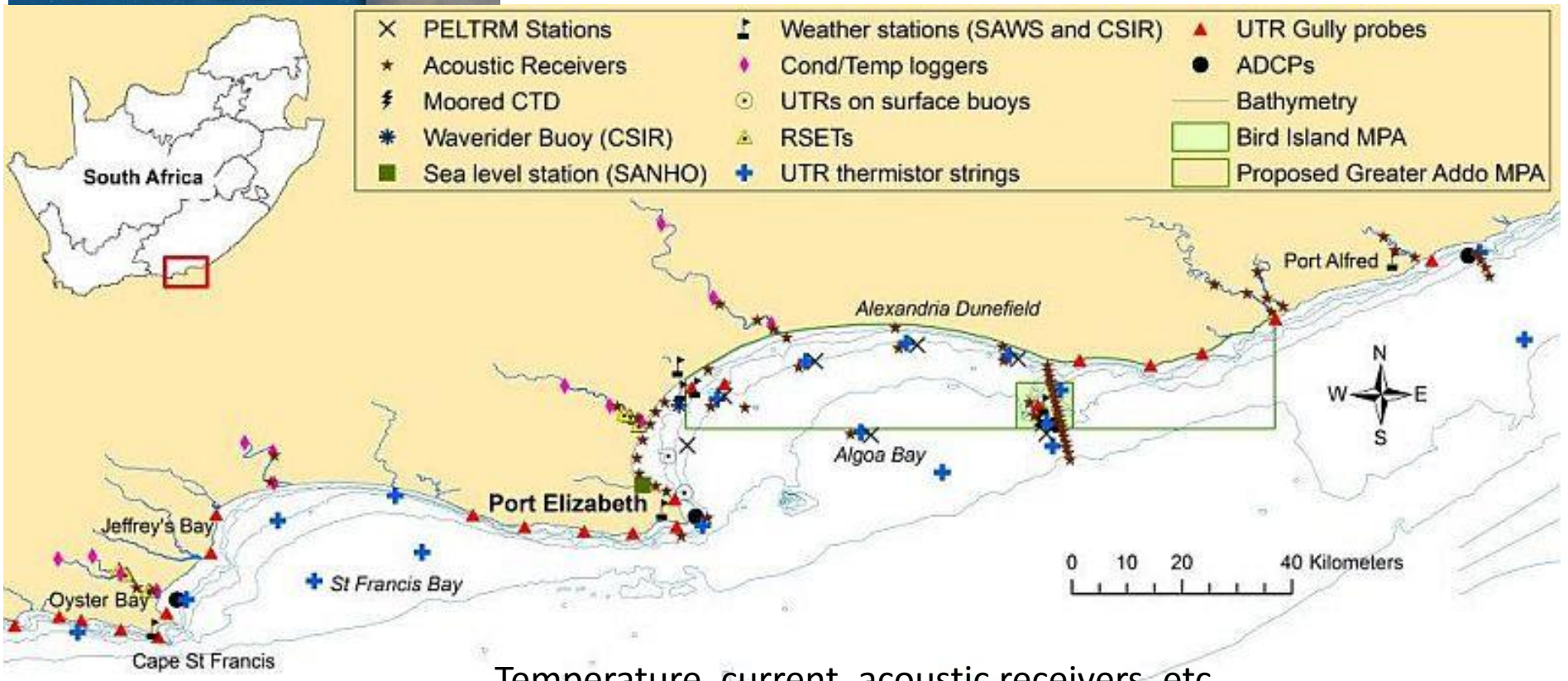
Blue Flag Beaches

THE BLUE FLAG

eco-label for beaches and marinas

Algoa Bay:
the most studied bay in Africa

NRF National Research Foundation | SAEON South African Environmental Observation Network



Temperature, current, acoustic receivers, etc

Early shipwreck history:
Sacramento Trail

Early human history: Khoisan shell middens

International sporting events

Take a Sea Pledge

Do One Thing

Enjoy the sea

Organise beach clean-ups

WESSA
PEOPLE CARING FOR THE EARTH

Saturday 5th August Cape Recife 9:30

The solutions to the big problems are in our hands

1- Over-fishing

SASSI

GREEN – YES

- Anchovy
- Angelfish (Atlantic pomfret)
- Bluefish (bluenose)
- Blueskin (trawl soldier)
- Blue hottentot
- Butterfish
- Chub mackerel (makriel)
- Dorado (dolphinfish; mahimahi)
- Gurnard
- Hake (stockfish)
- Harder (mullet) – not from estuaries
- Horse mackerel (maasbanker)
- Hottentot
- Jacopever
- John Dory
- Monkfish
- Mussels
- Octopus
- Oysters
- Panga
- Queen mackerel (Natal snoek)
- Sand soldier (red tjor-tjor)
- Santer (soldier)
- Sardine (Pilchard)
- Snoek
- South coast rock lobster
- Squid (calamari; tjokka)
- Steentjie
- Tuna – all except bluefin tuna
- West coast rock lobster (west coast crayfish)
- White stumpnose
- Yellowtail

FOLD

ORANGE – MAYBE

- Abalone – local wild caught
- Bluefin tuna
- Carpenter (silverfish; silver)
- Dageraad
- Elf (shad) – no-sale in KZN
- Englishman
- Geelbek (Cape salmon)
- King mackerel (couta; cuda)
- King soldierbream
- Kingklip
- Kob (kabeljou; dusky, silver, and squaretail kobs)
- Langoustines – local trawled
- Marlins
- Poenskop (black musselcracker)
- Prawns – local trawled
- Red steenbras (copper steenbras)
- Red stumpnose (Miss Lucy)
- Rockcods – all except potato and brindle bass
- Roman (red roman)
- Scotsman
- Sharks – all except those on Red list
- Skates and rays
- Slinger
- Snappers – all except river snapper
- Sole
- Swordfish

FOLD

RED – NO

- Baardman (belman; tasselfish)
- Banded galjoen
- Blacktail (dassie; kolstert)
- Brindle bass
- Bronze bream
- Cape stumpnose
- East coast rock lobster
- Galjoen
- Garrick (leervis)
- John Brown (Janbruin)
- Kingfishes
- Knife jaws, Cape and Natal (cuckoo bass; kraaibek)
- Large-spot pompano (moony; wave garrick)
- Natal stumpnose (yellowfin bream)
- Natal wrasse
- Potato bass
- Ragged tooth shark
- River bream (perch)
- River snapper (rock salmon)
- Sawfishes
- Seventy-four
- Southern pompano
- Spotted grunter (tiger)
- Spotted gulley shark
- Springer (ten pounder)
- Stonebream
- Striped cat shark (Pyjama shark)
- West coast steenbras
- White musselcracker (brusher; cracker)
- White steenbras (pignose grunter)
- Zebra (wildeperd)

The solutions to the big problems are in our hands

1- Over-fishing

2- Pollution

The solutions to the big problems are in our hands

1- Over-fishing

2- Pollution

3- Climate change

Wynes & Nicholas 2017 *Env. Res. Lett*

Be an informed active citizen

Be the change you want to see in the world
- *Gandhi*


Thanks for your attention
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www.facebook.com/algoabayhopespot