

Biodiversity & Ecosystems:

Wildlife in a changing world



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International Education

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Some of the greatest challenges for biological science...



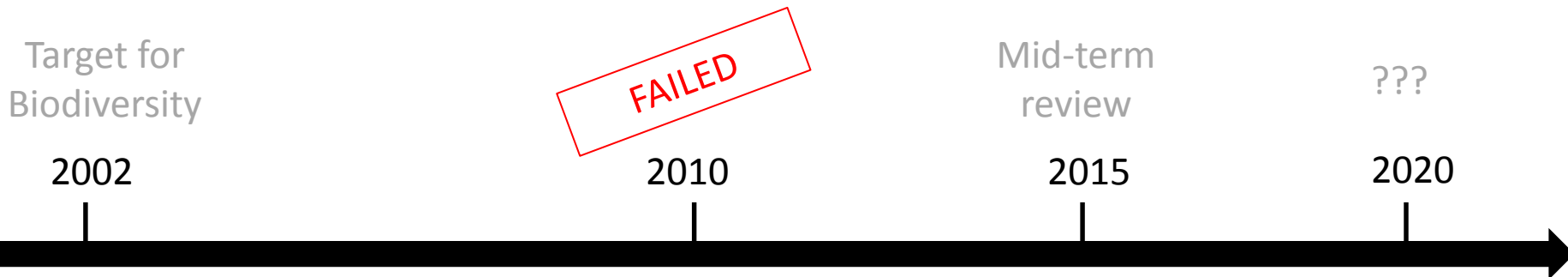
...changes to biological systems



Global commitment to biodiversity

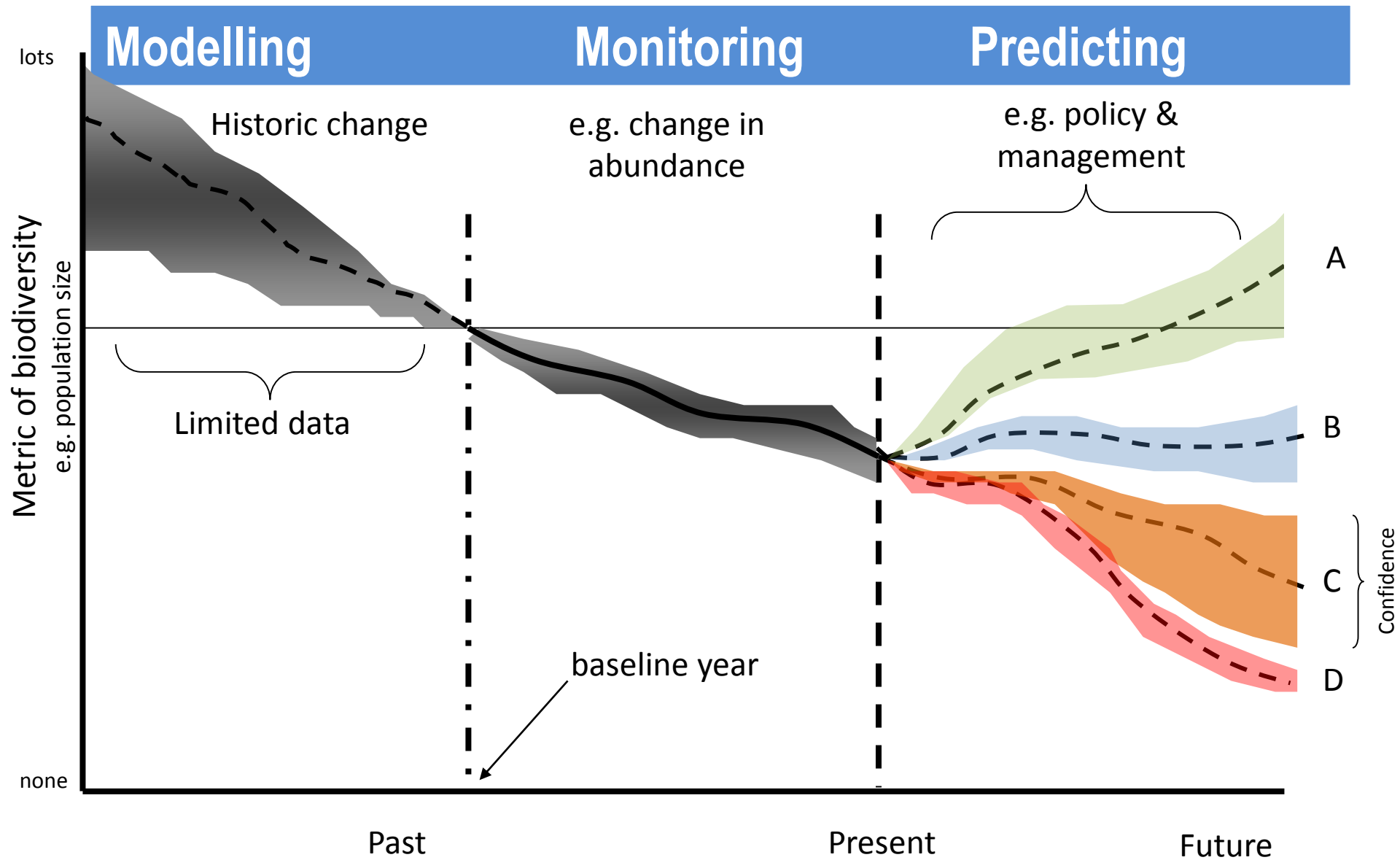


- As signatories to the Convention on Biological Diversity, 190 nations committed themselves to actions to:
 - “... achieve, by 2010, a significant reduction of the current rate of biodiversity loss”
- Replaced with 20 Aichi Targets and Strategic plan (2020)



Do we have the information with which to make robust decisions?

Understanding global biodiversity change



Understanding wildlife population change

1. Forest: Liberia, west Africa
2. Polar regions: Antarctica
3. Marine: Chagos, Indian Ocean



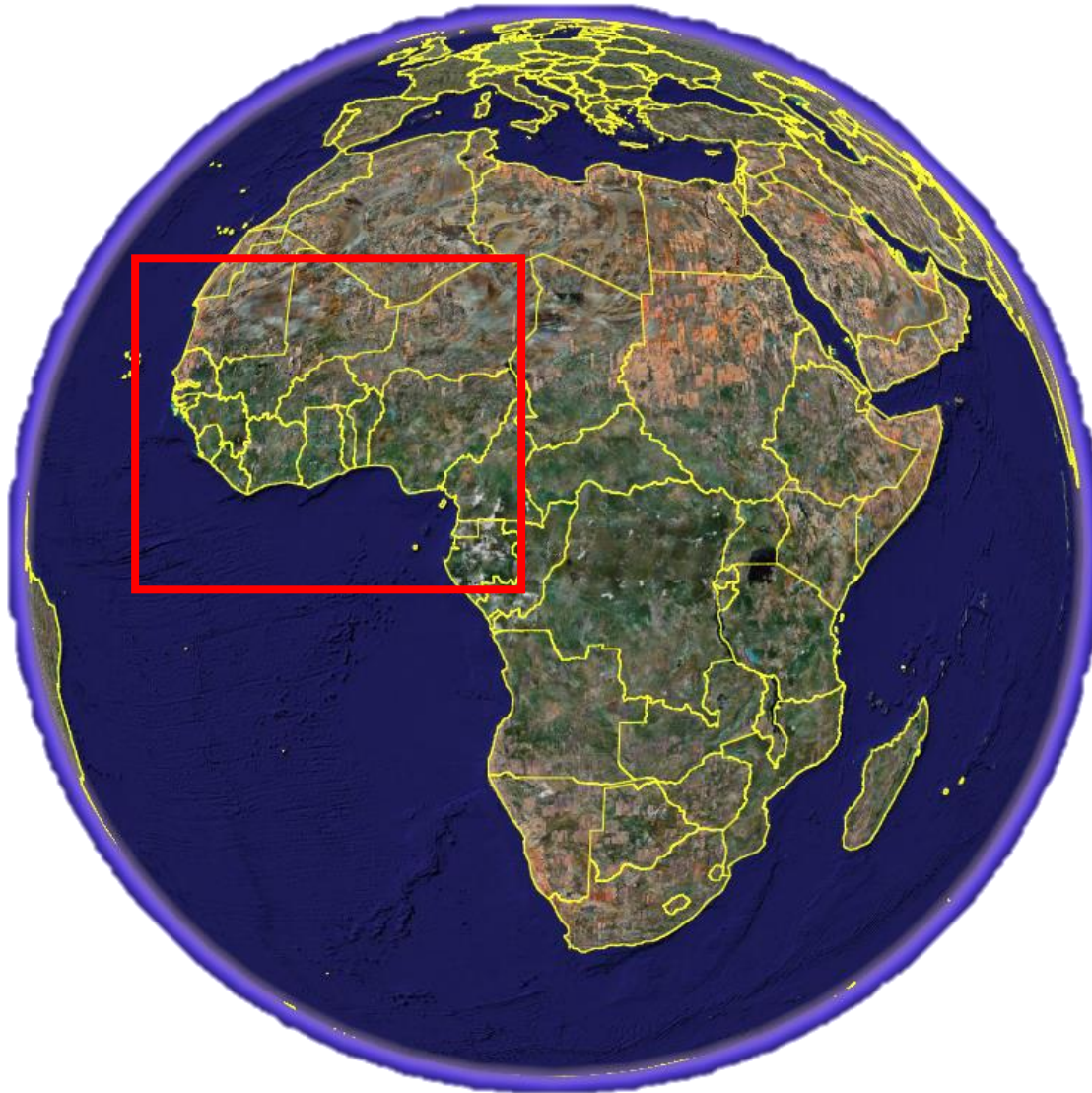
Change in forest ecosystems



Pygmy hippo (*Choeropsis liberiensis*)



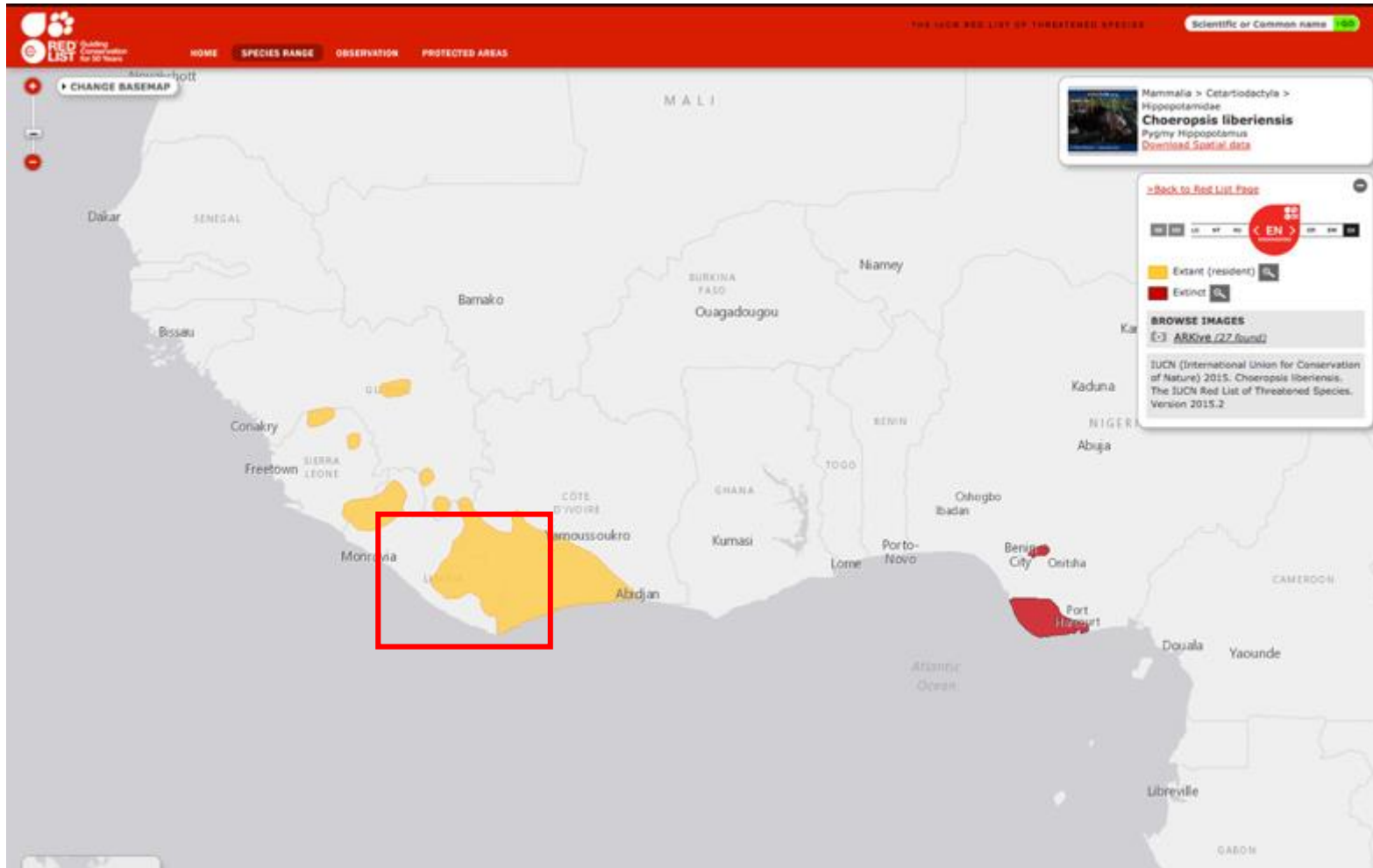
West Africa



Liberia



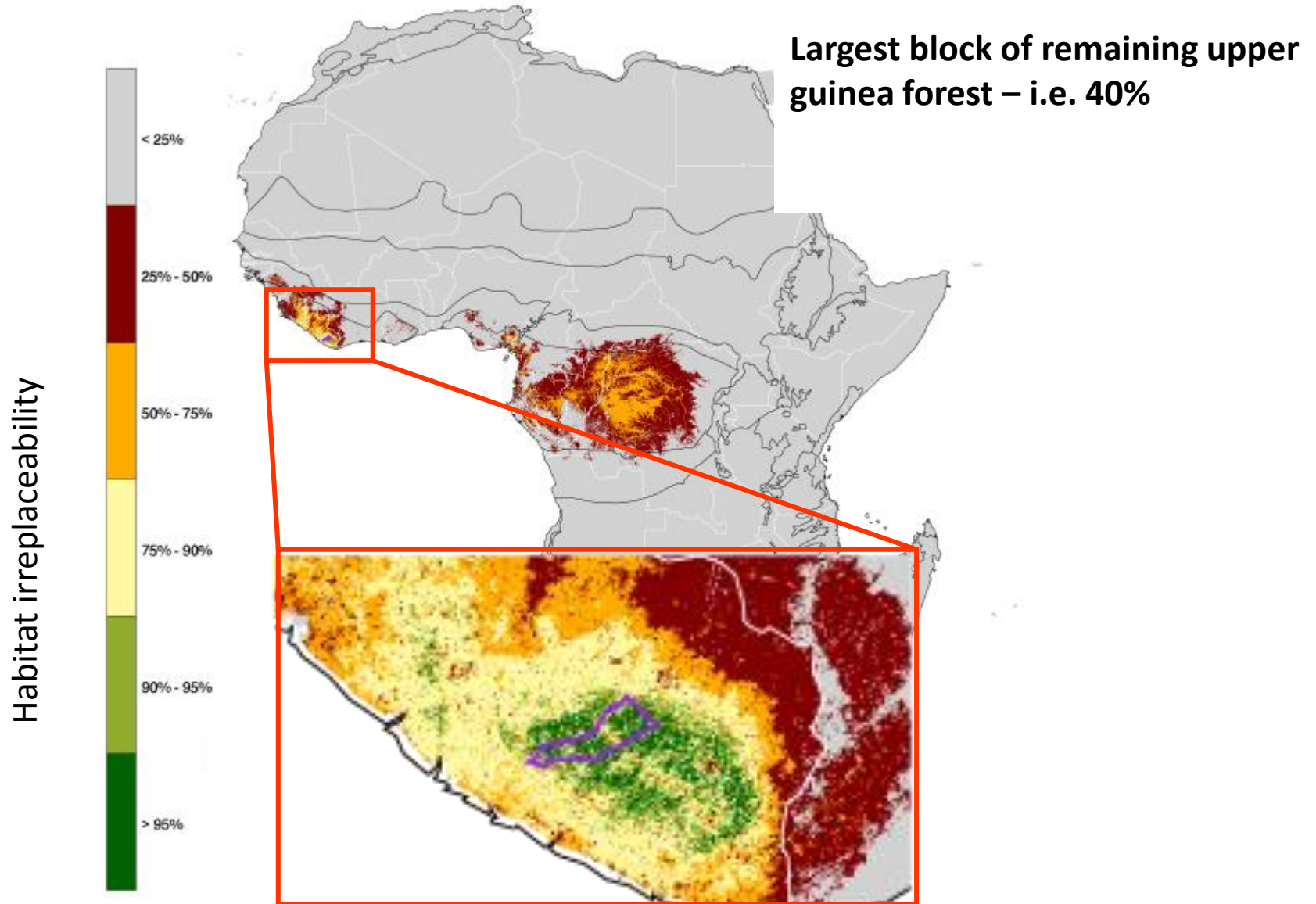
Pygmy hippo range



Sapo National Park



Sapo National Park



Threats



Aims of the research project

- Establish a monitoring programme in Sapo National Park in order to monitor terrestrial forest species
- Train local Park Rangers in camera trapping methods, building capacity for biomonitoring
- Try to obtain the first photographic records of rare and cryptic species in Sapo, in particular, the pygmy hippo

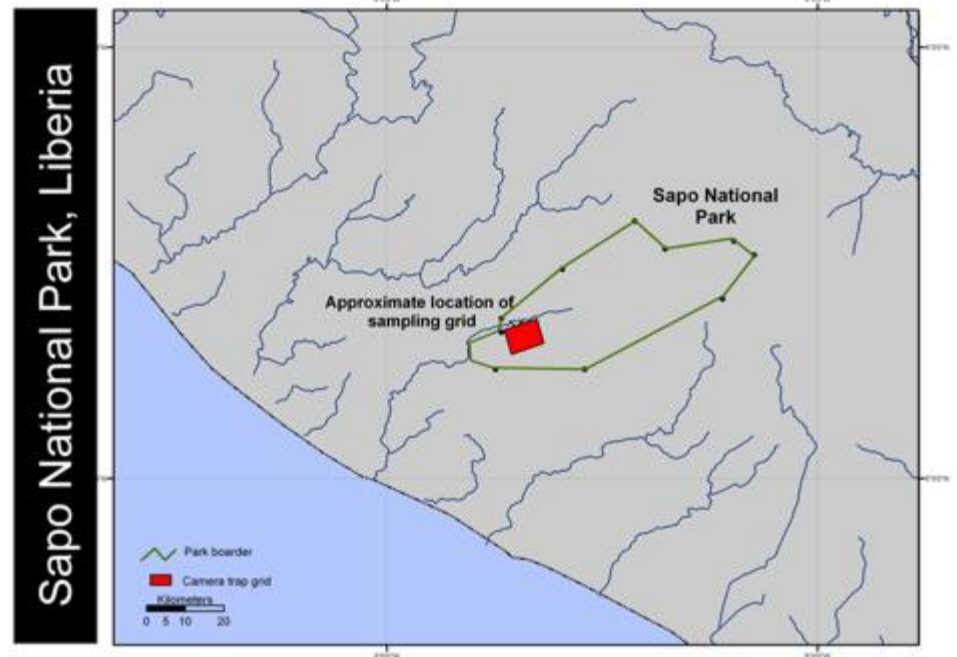


Methods

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|-------------|---|---|---|---|---|---|---|---|
| | Sinoe River | | | | | | | | |
| A | X | | X | | X | | X | | X |
| B | | X | | X | | X | | X | |
| C | X | | X | | X | | X | | X |
| D | | X | | X | | X | | X | |
| E | X | | X | | X | | X | | X |
| F | | X | | X | | X | | X | |
| G | X | | X | | X | | X | | X |



- 32 camera grid
- Deployed for 35 nights
- 1120 trap nights
- 60 – 80 km²



The team



Deployment

- Training
 - camera trap deployment in the field



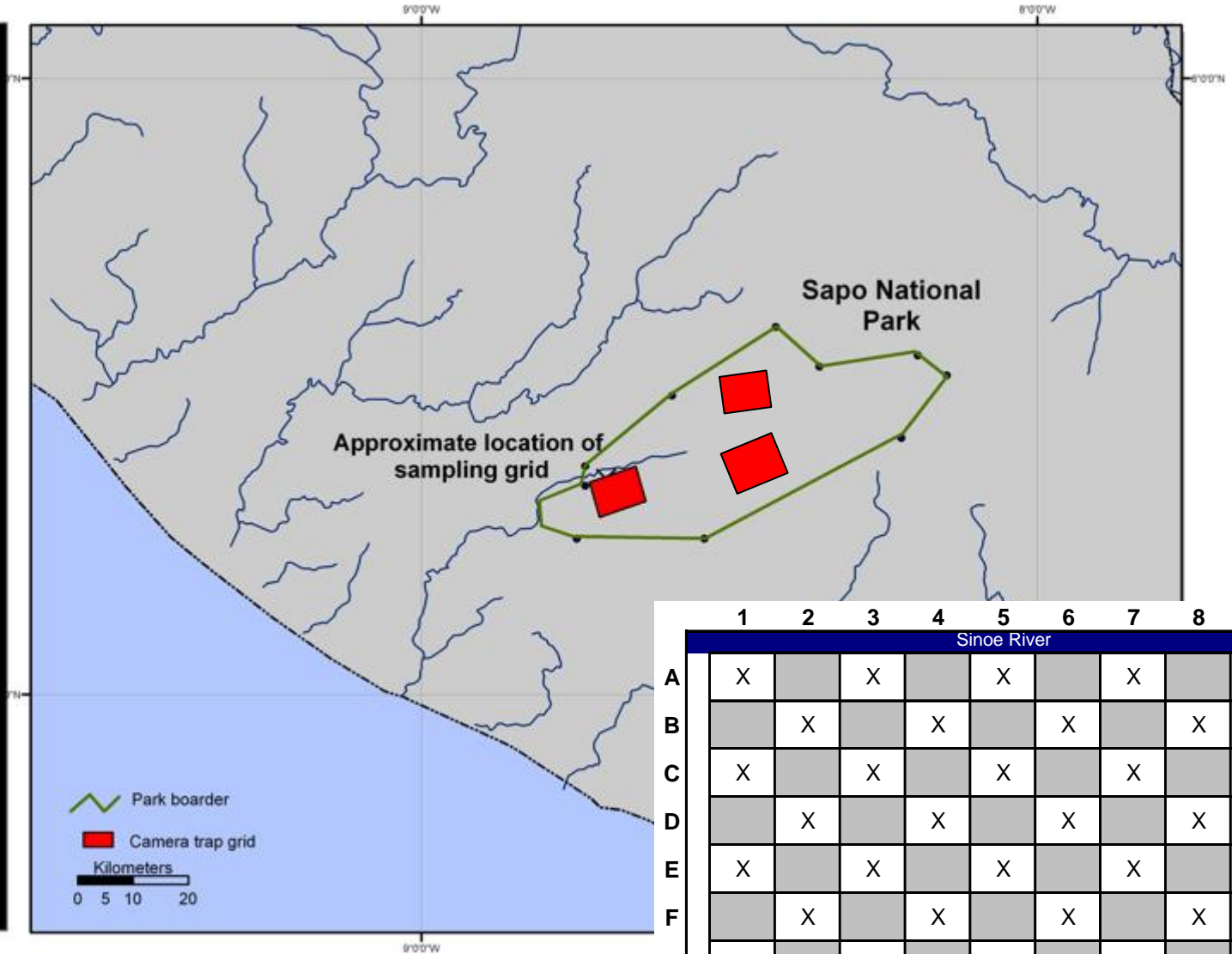
First record of pygmy hippo in Liberia



Stealth Cam 02-11-2008 08:02:38

Repeat surveys

Sapo National Park, Liberia



| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|-------------|---|---|---|---|---|---|---|---|---|
| Since River | | | | | | | | | |
| A | X | | X | | X | | X | | X |
| B | | X | | X | | X | | X | |
| C | X | | X | | X | | X | | X |
| D | | X | | X | | X | | X | |
| E | X | | X | | X | | X | | X |
| F | | X | | X | | X | | X | |
| G | X | | X | | X | | X | | X |

Using the information

- **Evaluate the symptoms of risk**
 - Reflect the likelihood of extinction under prevailing circumstances
- **Extinction risk greatest when:**
 - Population size is small
 - Decline rate is high
 - Fluctuations in size > growth
 - Very small populations susceptible (genetic, demographic, environment)

CRITERIA

A

Population reduction

B

Geographic range size

C

Small population size & decline

D

Very small or restricted population

E

Quantitative analysis



New IUCN Red List Assessment

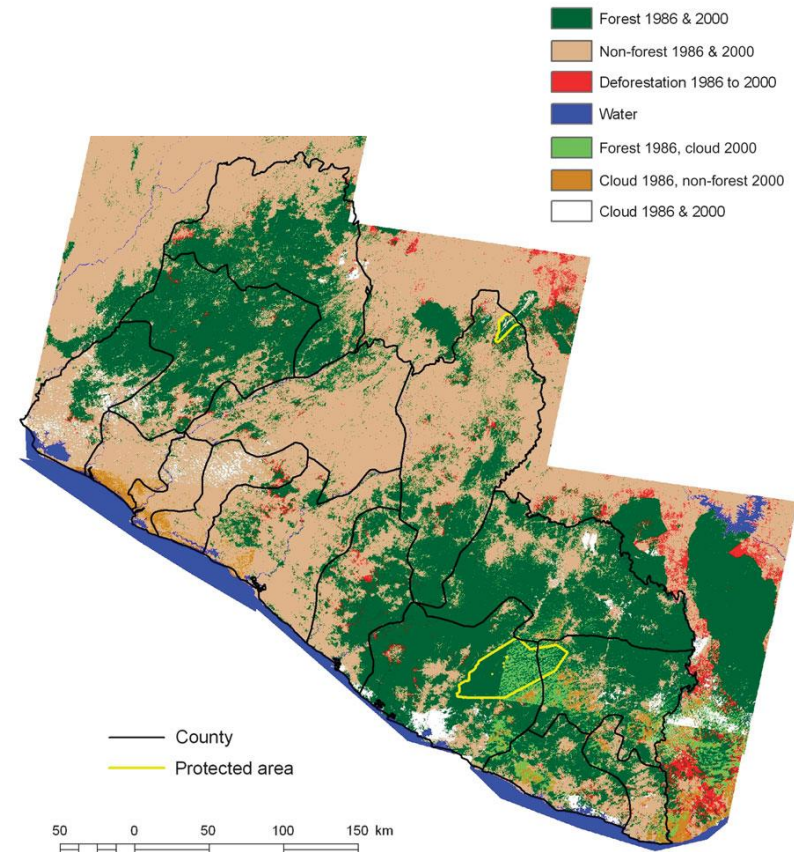
Endangered

- ~20% loss in two generations inferred from forest cover decline
- Population size <2500 individuals

CRITERIA

C

Small population size & decline



Media coverage

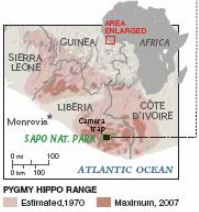
WILDLIFE



STEALTH CAM A pygmy hippo walks from its overnight hideout by the river into the forest to forage.



About 150 pygmy hippos live in zoos, this one in San Diego.



Hidden Hippos

The pygmy hippo is a solitary, elusive creature, pushing its way like a squat battering ram through the dense undergrowth of forests in Liberia and nearby countries. As its territory was hurt by logging and farming, then overrun by civil wars in the 1990s, conservationists could only guess at how many remained—certainly no more than 3,000. So when Ben Collen of the London Zoological Society heard that in just three days the first camera trap his team set up in Sapo, Liberia's largest park, had captured a *Hexaprotodon liberiensis* on its way to breakfast, he was overjoyed—and relieved. "It tells us they're still here." Now he plans to set up camera traps in other likely habitat to locate and monitor the remaining pockets of pygmies. —Karen E. Lange

PHOTOS: PHOTOGRAPHER RAMBERGEN/NOI MAPS

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Endangered pygmy hippo found in Liberia

By Paul Eccleston
Published: 12:01AM GMT 10 Mar 2008

and nearly nocturnal, the endangered hippo...

The endangered pygmy hippos were found by a team from the Zoological Society of London...

Two civil wars, illegal logging and poaching - it was thought this was more than enough to wipe out Liberia's population of pygmy hippos.

But this rare and endangered species has survived against the odds and there are photographers to prove it.

A team led by the Zoological Society of London travelled to the west African country to discover that the hippo population had not been wiped out.

Just three days after setting up hidden camera traps in Liberia's largest national park, the team of zoologists captured the pygmy hippos on film.

Ben Collen of the London Zoological Society is highly concerned about the survival of the pygmy hippos because they still face the threat of bushmeat hunters.

Shrinking world

Pygmy hippos - which look like miniature versions of the common hippopotamus - are one of the most endangered species of mammal on earth, and are thought to be the last of their kind in the wild in West Africa.

Less than 3,000 of them remain in the wild in the Upper Guinean forest which covers parts of Liberia and Sierra Leone.

As only 10% of the original forest is left, the hippos are being pushed into a shrinking world.

What is perhaps most amazing is that...

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Latest updated: Monday, 10 March 2008, 04:28 GMT

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Rare pygmy hippos caught on film

By Nary Harper
BBC News

LIBERIA: PEACE AT LAST

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NEWS Your views (2)

Rare pygmy hippo fights for survival

Sunday, March 9, 2008

A new image of one of the world's most elusive and endangered large mammals reveals it has managed to survive despite habitat destruction and two civil wars.



The Pygmy hippo

The pygmy hippopotamus was caught on camera in Liberia's only national park, Sapo, by a team led by the Zoological Society of London.

There are thought to be less than 3,000 of the hippos - which look like a smaller version of the common hippopotamus - left in the wild in Sierra Leone, Ivory Coast, Guinea and Liberia.

National Geographic, The Independent, The Metro, BBC Online, Daily Telegraph, The Times, The Sun, Daily Mirror, Daily Mail, Nature, USA Today, Nature and numerous others internationally; BBC Radio4's Today Programme, BBC Radio5Live, BBC Radio Wales, BBC Radio Scotland, BBC Network Africa (African countries' radio broadcast), BBC World Service, BBC News 24 (TV), BBC World (TV), Channel 4 News (lunchtime and 7pm shows), CNN (TV), CBC (TV) and LBC Radio.

Species response to changing threats



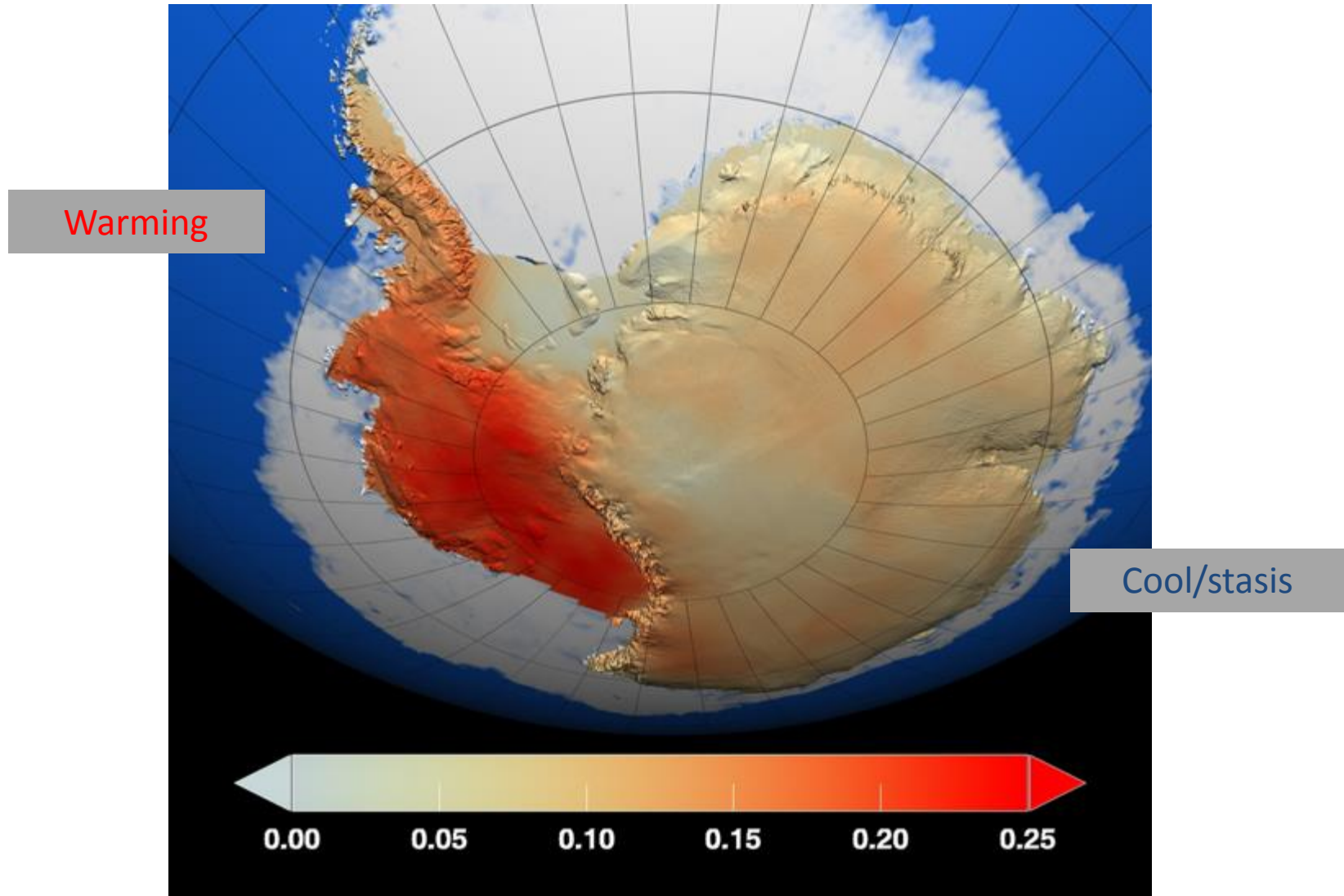
What are the dynamics of ecological change in Antarctica?



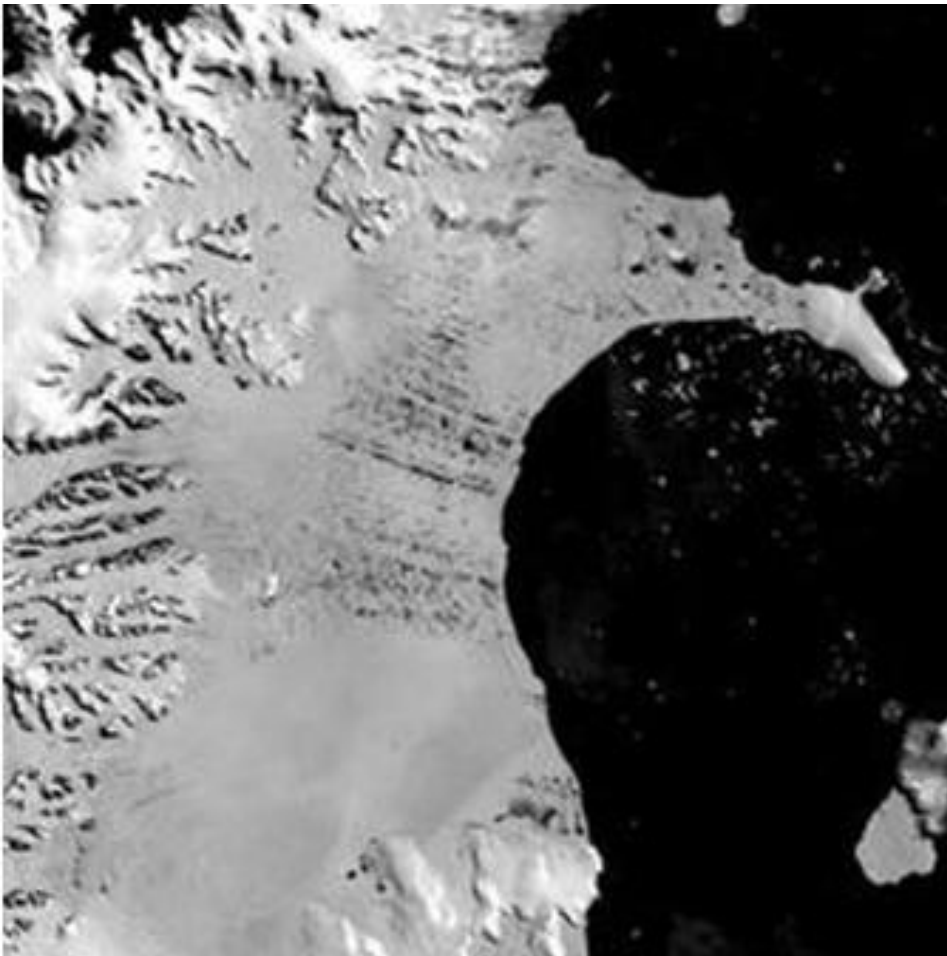
Penguins



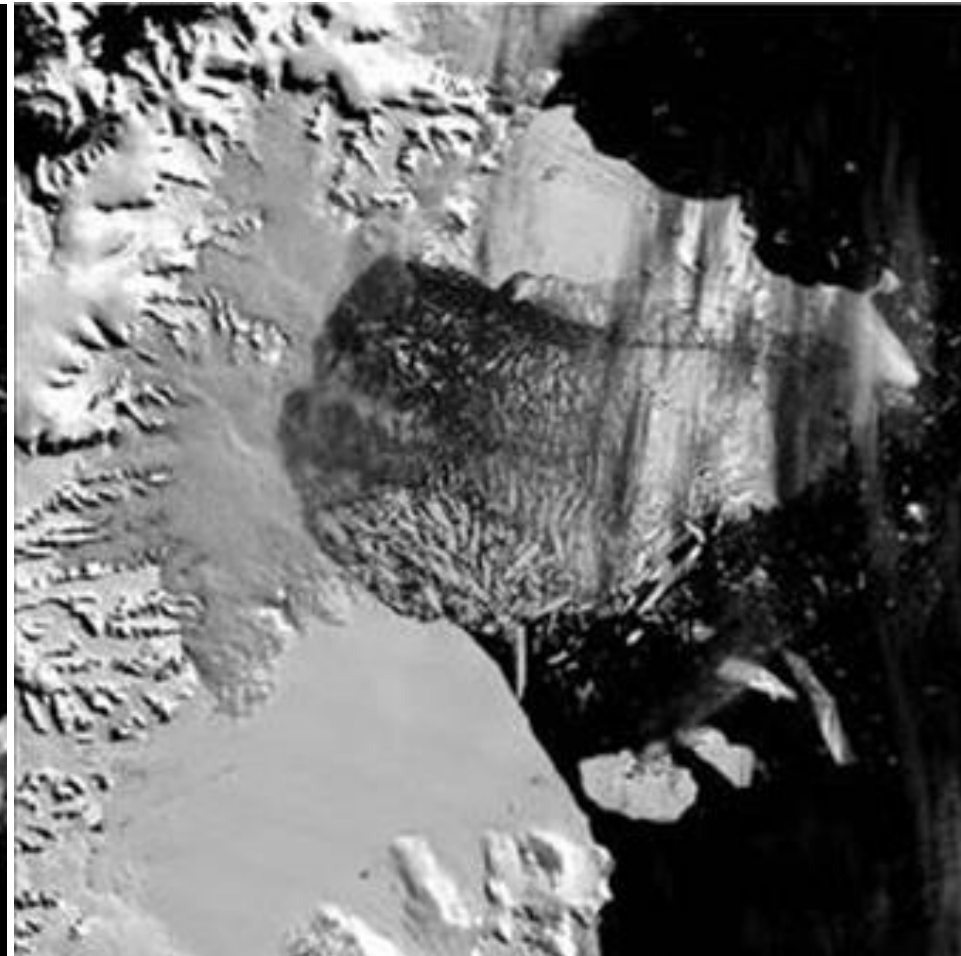
Antarctica's changing temperature



Larsen B ice-shelf collapse 2002

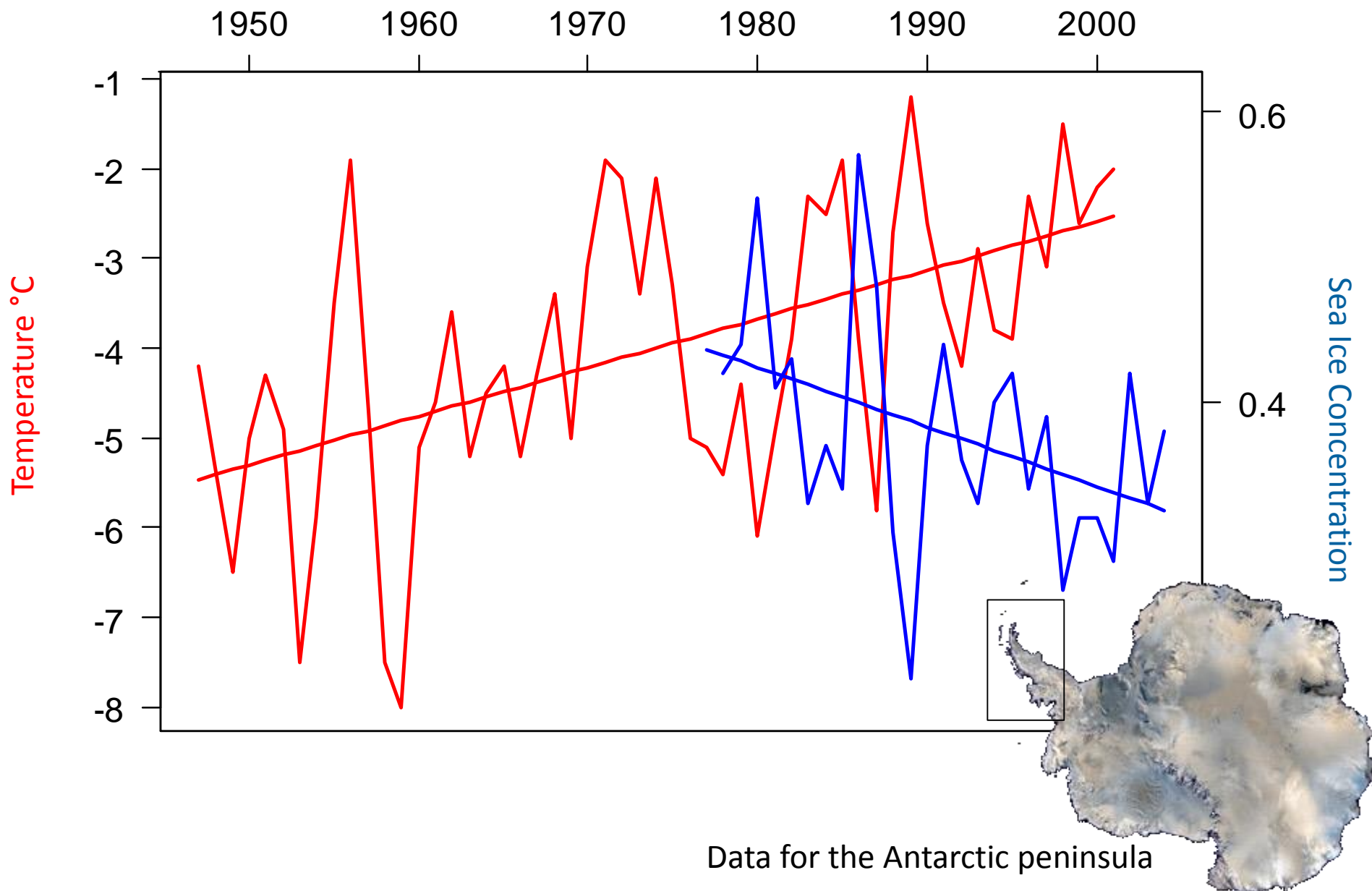


31st January 2002



5th March 2002

Antarctica's changing sea ice



Fisheries pressure & prey availability



THIS 144 metre trawler planned for completion in November 2009 is set to spearhead a major krill fishing effort in Antarctica. See report page 2.



\$170m KRILL CATCHER!

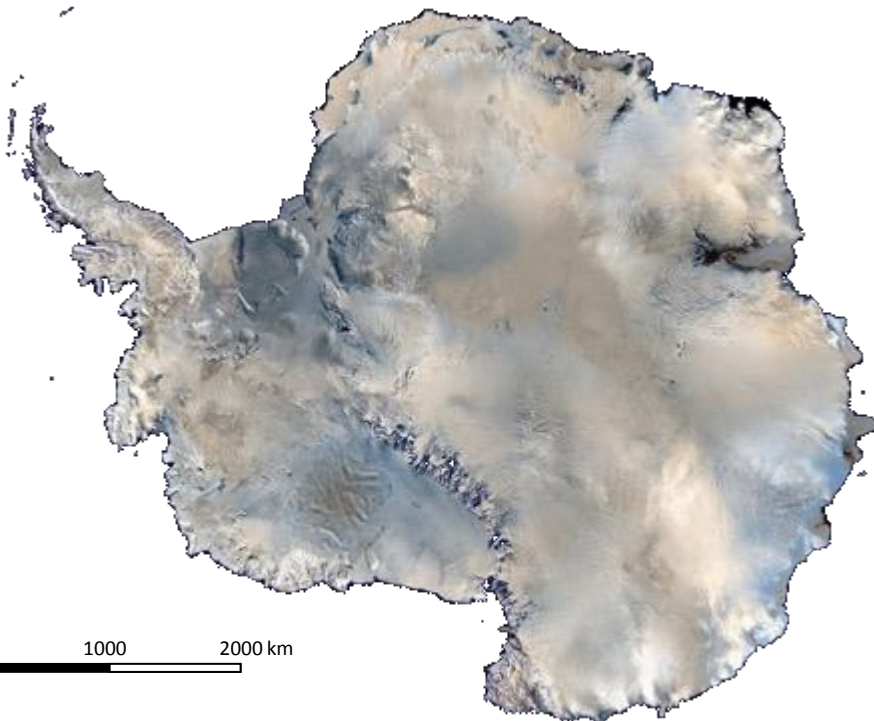


Photo: AFMA

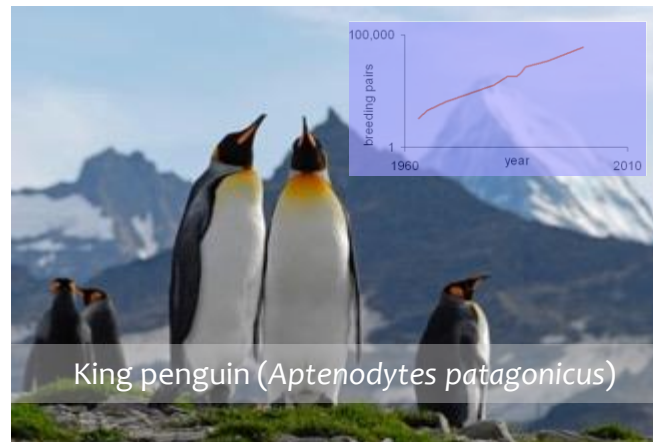
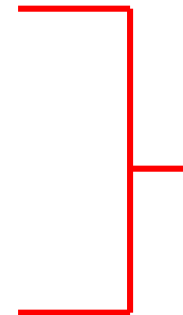
Collating existing abundance data

Abundance: sensitive to change, meaningful for function, loss is a prelude to species extinction, variability and quantity important

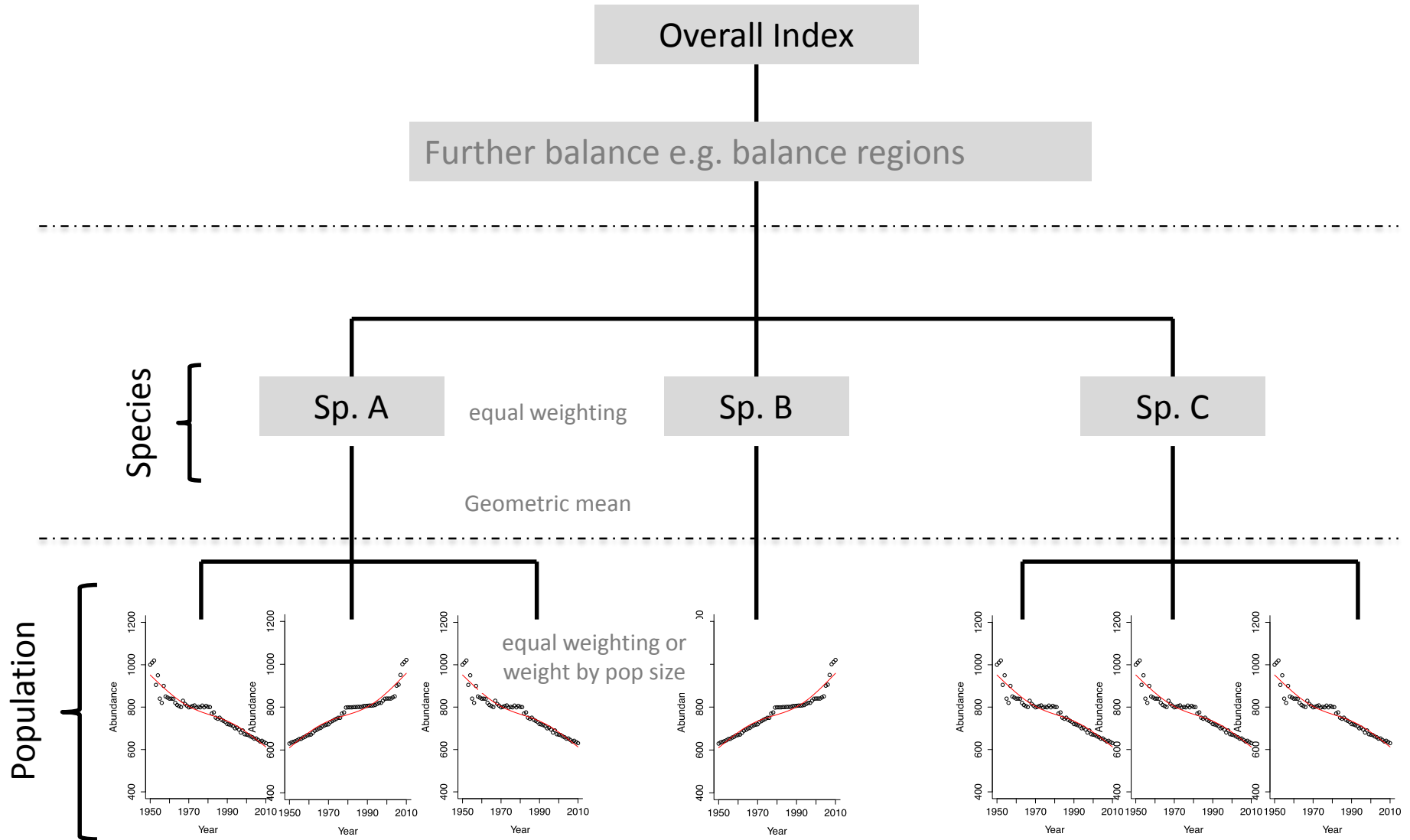
Sources and types of penguin abundance trend data:

- total population size estimates
- no. breeding pairs
- nests

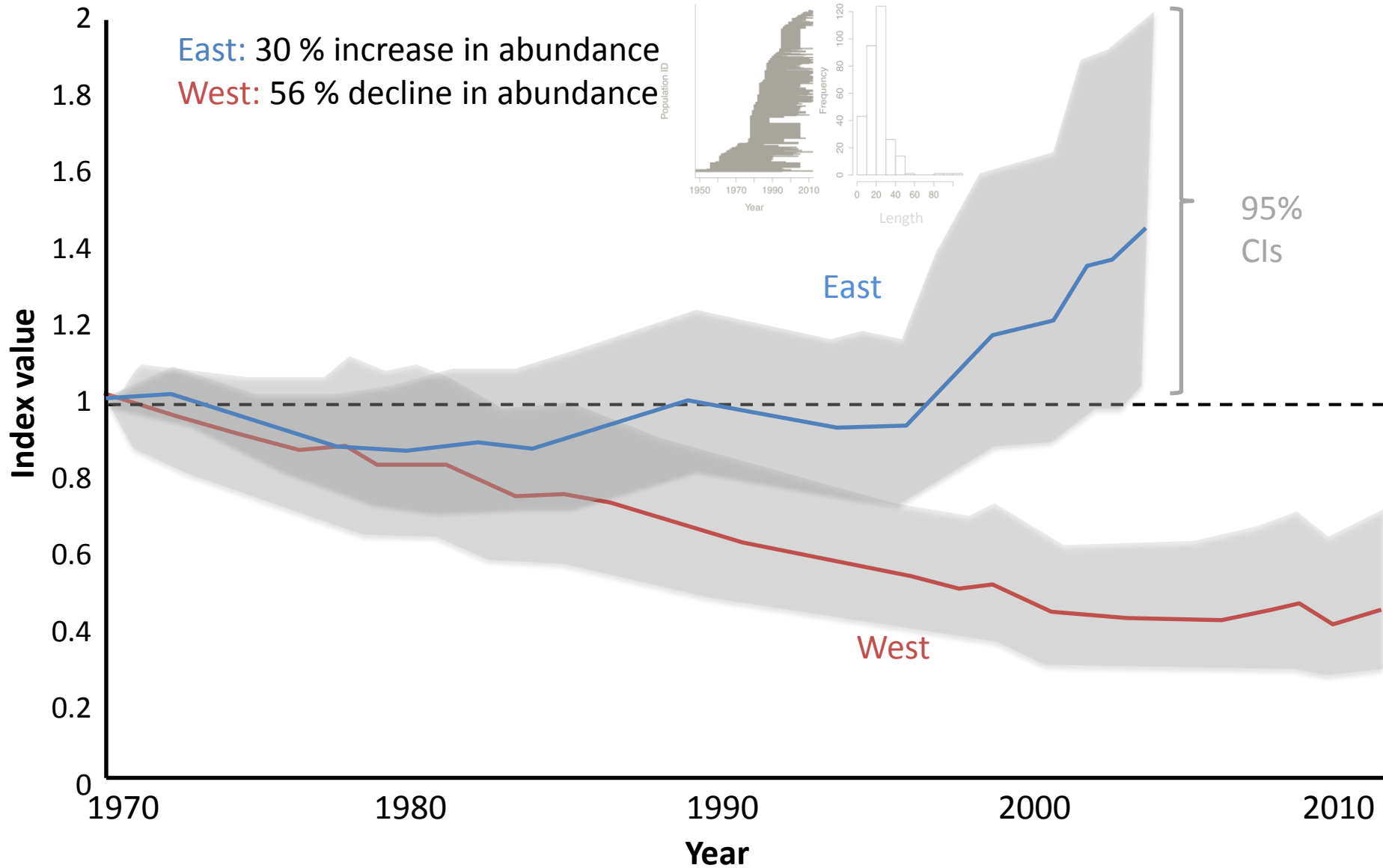
Collected primarily from journals, also NGO networks, grey literature, etc...



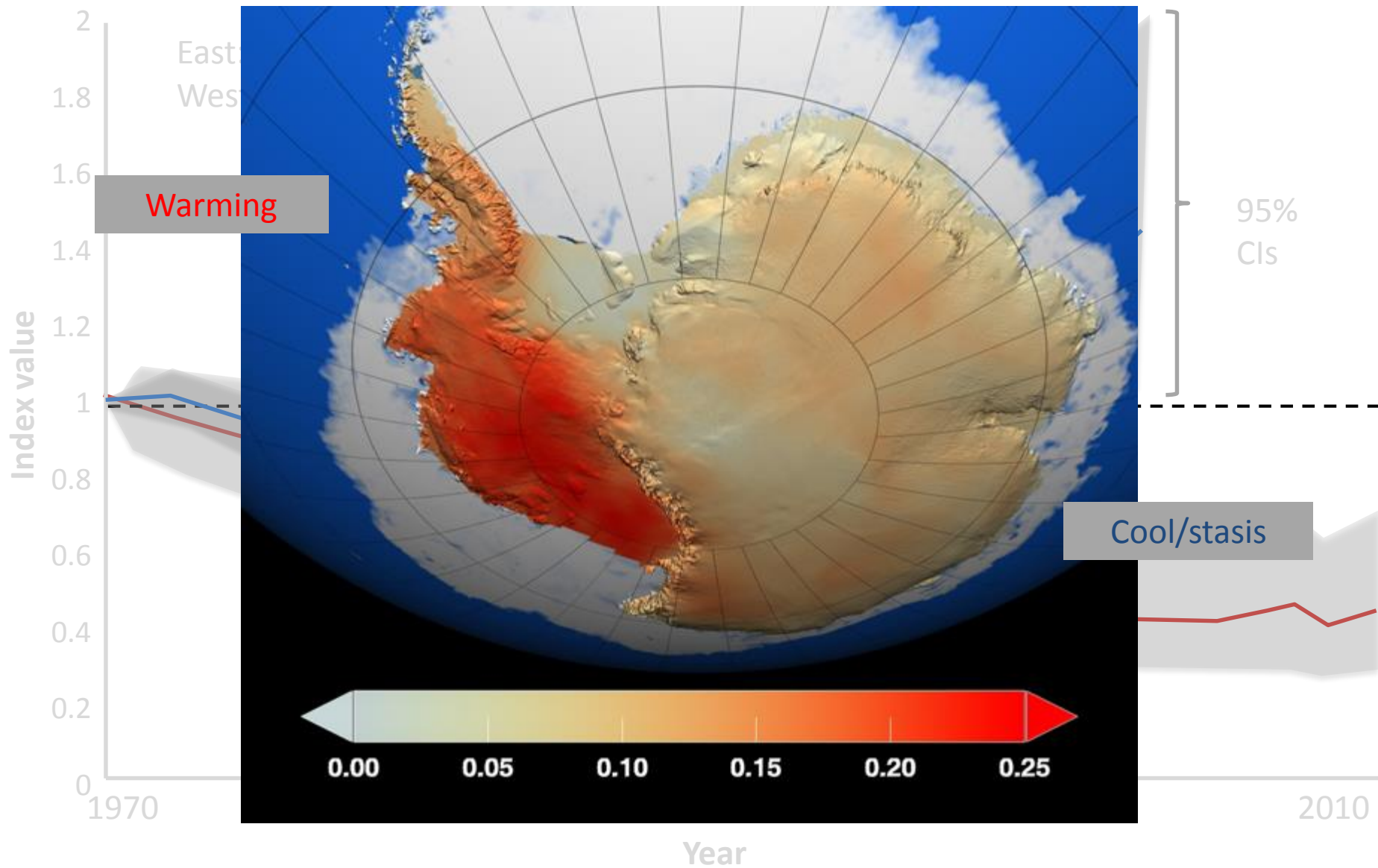
Creating an index



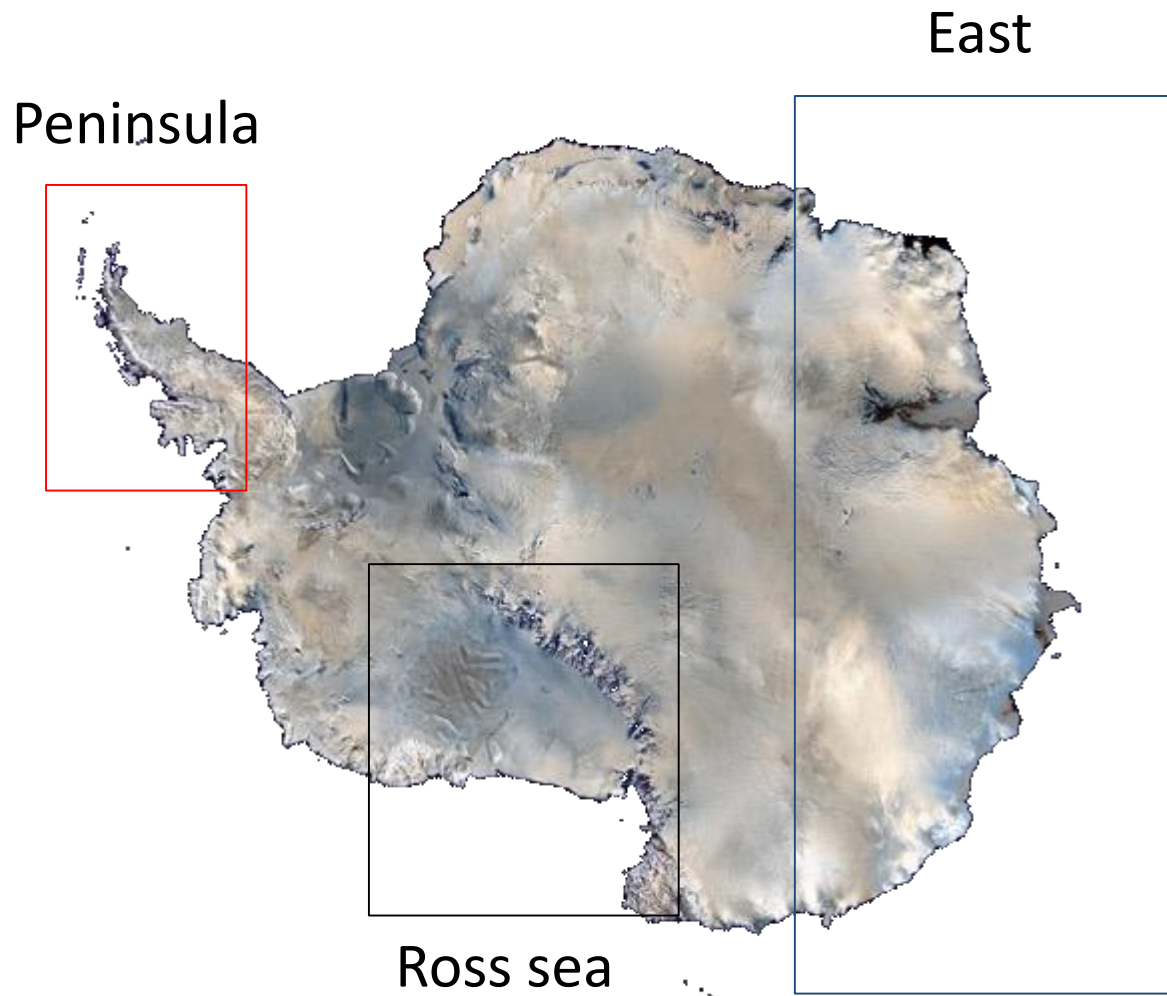
Index of population change: Antarctic



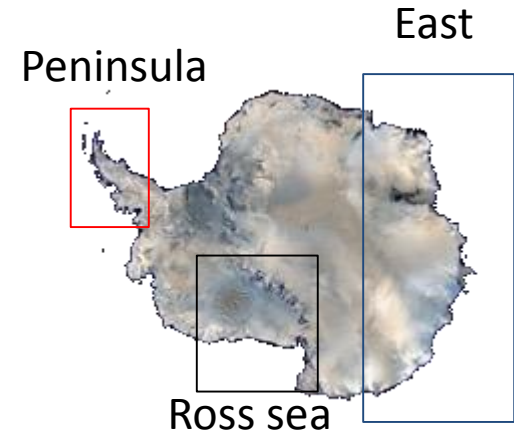
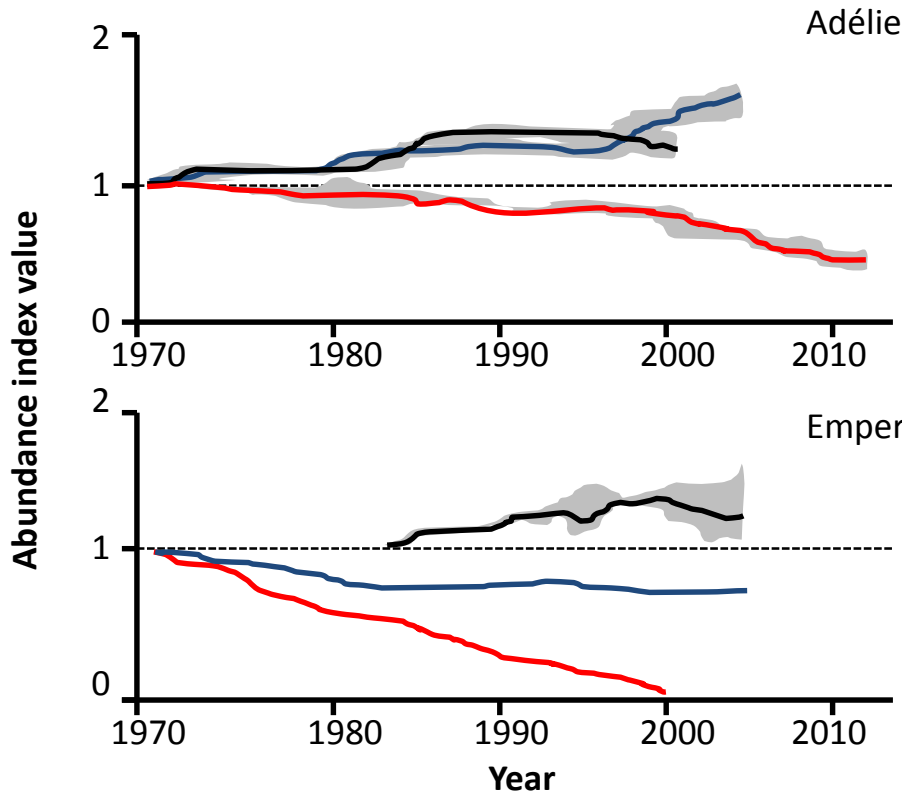
Index of population change: Antarctic



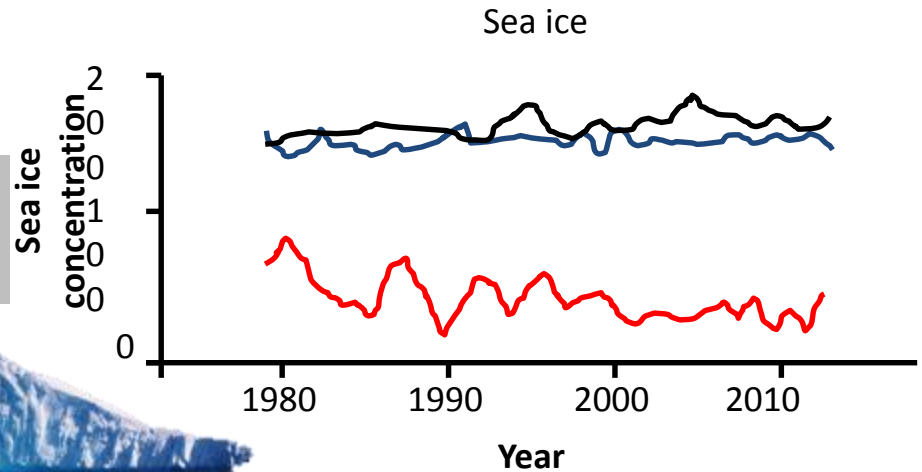
Population trends in different regions



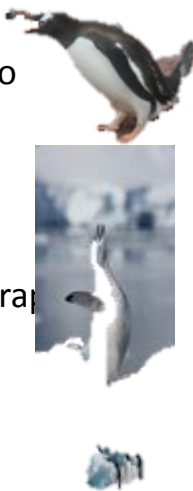
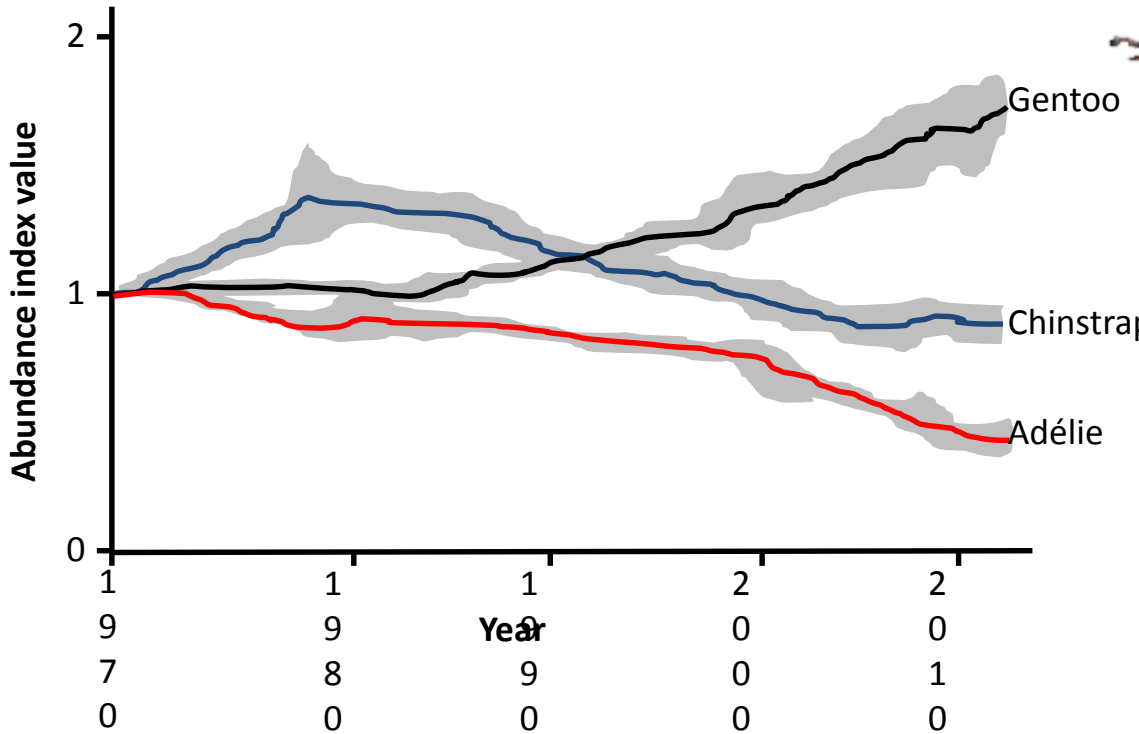
Mixed fortunes: where you live



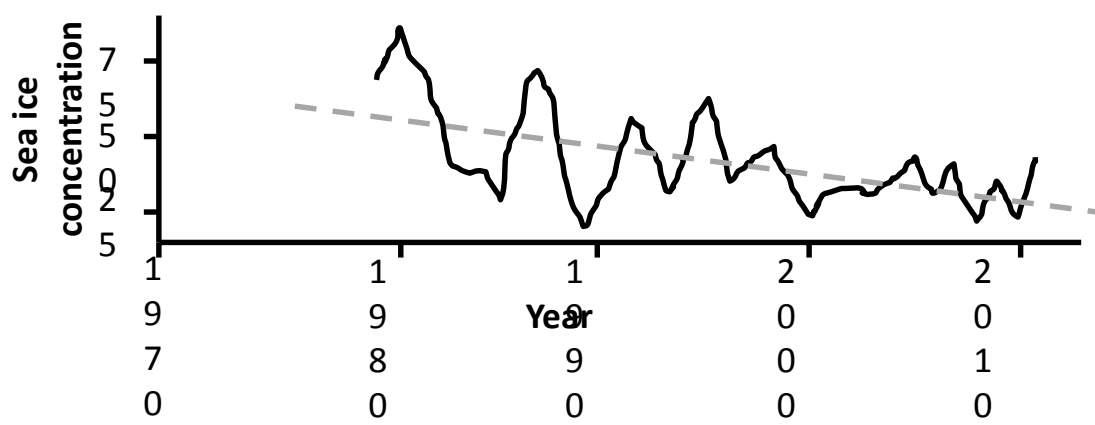
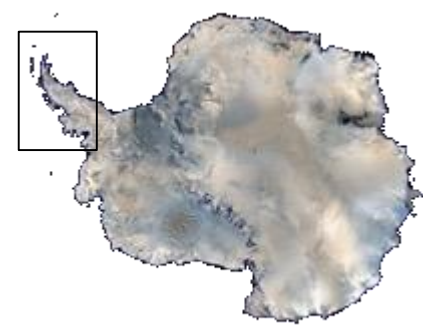
Broad differences among regions
consistent between species



Mixed fortunes: who you are



Antarctic peninsula



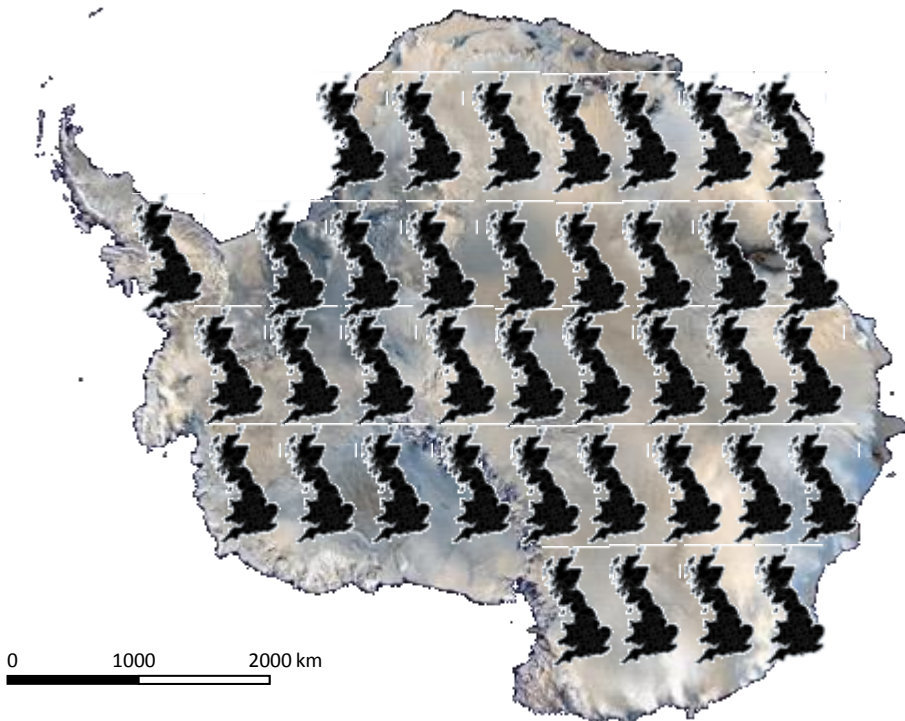
Changing dynamics in abundance & distribution



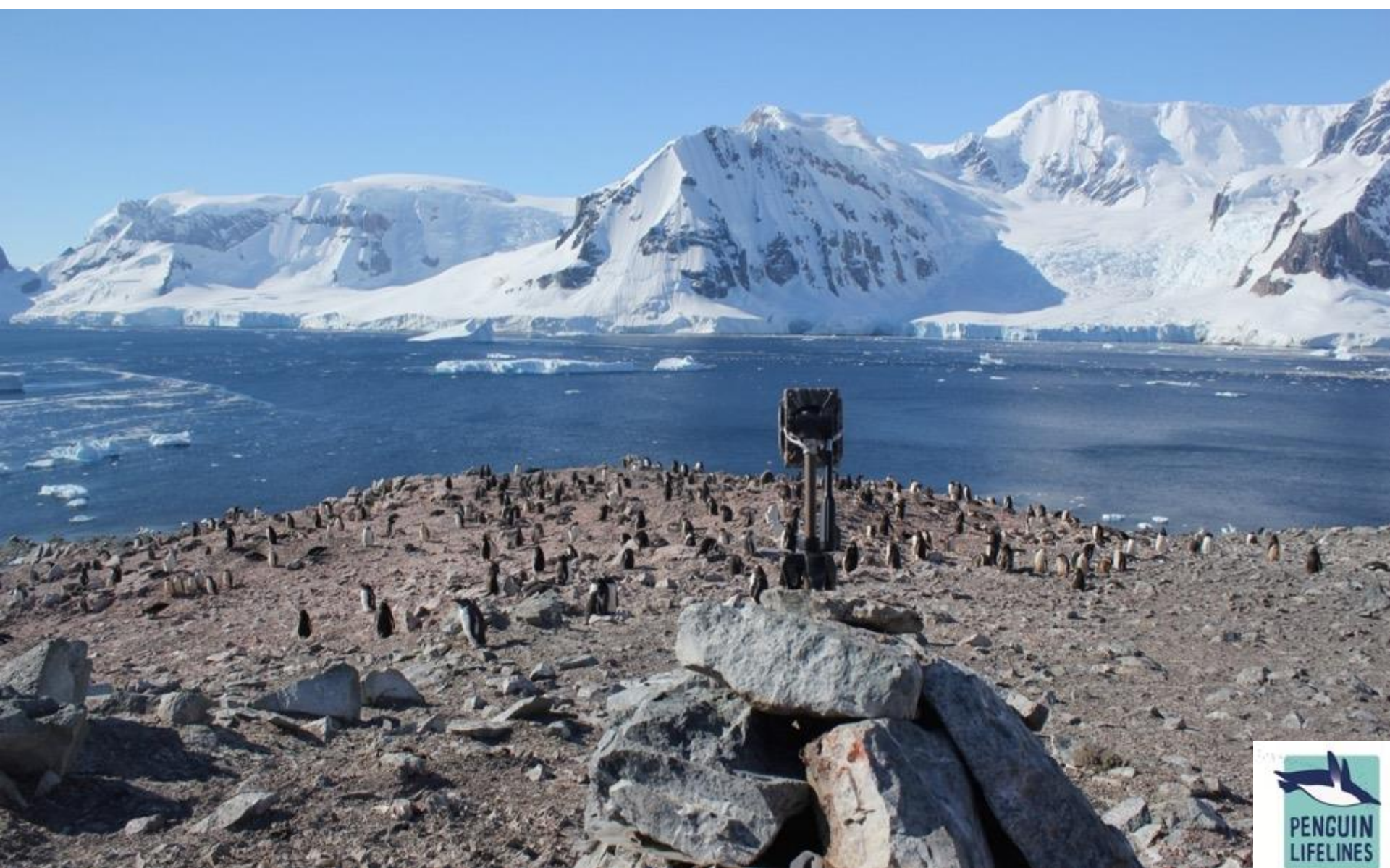
How to enhance ecological monitoring in Antarctica?

64 bases in Antarctica:

- 27 seasonal, 37 year round



Adapting new technology



Working with the tourist industry

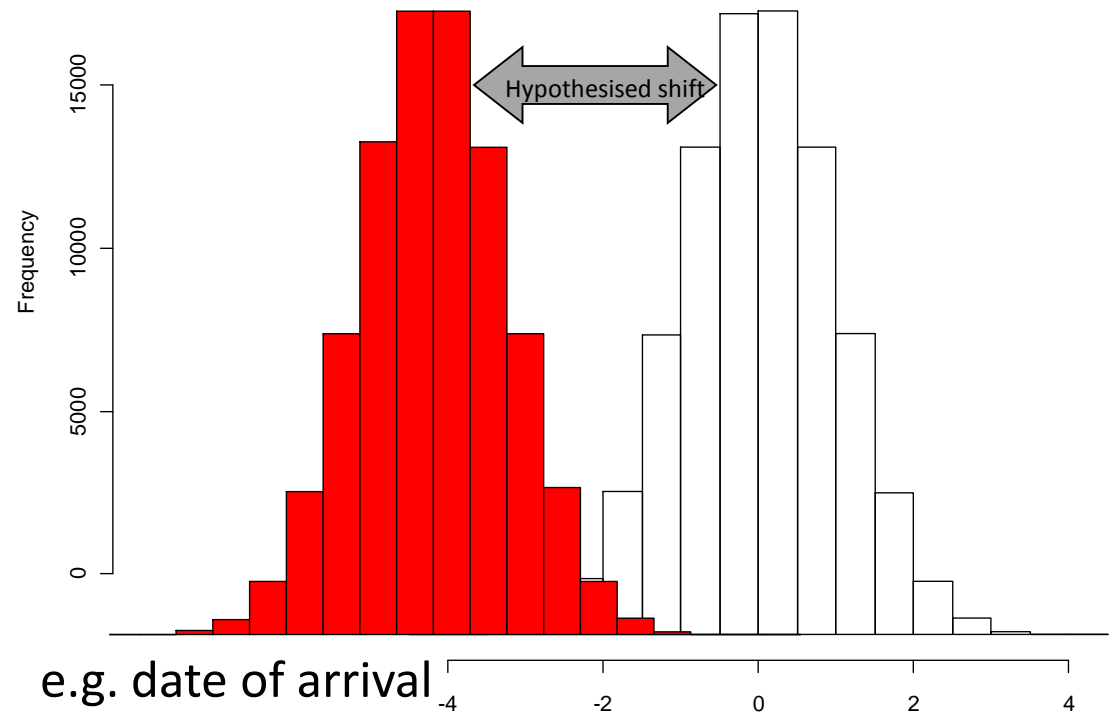


Time-lapse monitoring



Phenological change, e.g.

- 1st arrival
- 1st breeding
- Departure
- Chick fledging



Tracking species in the ocean



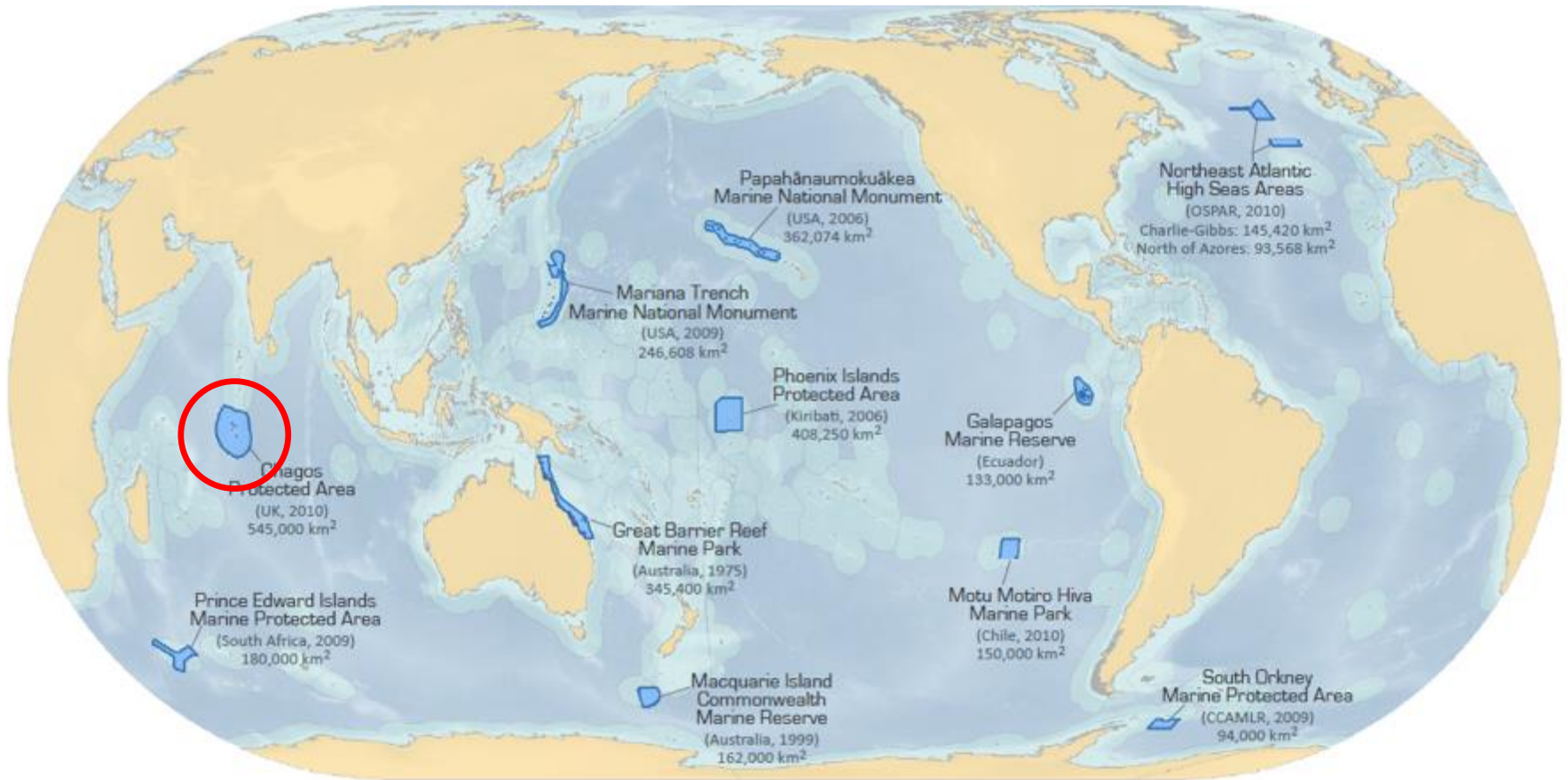
Chagos



More than 90% of all top marine predators have disappeared from the oceans

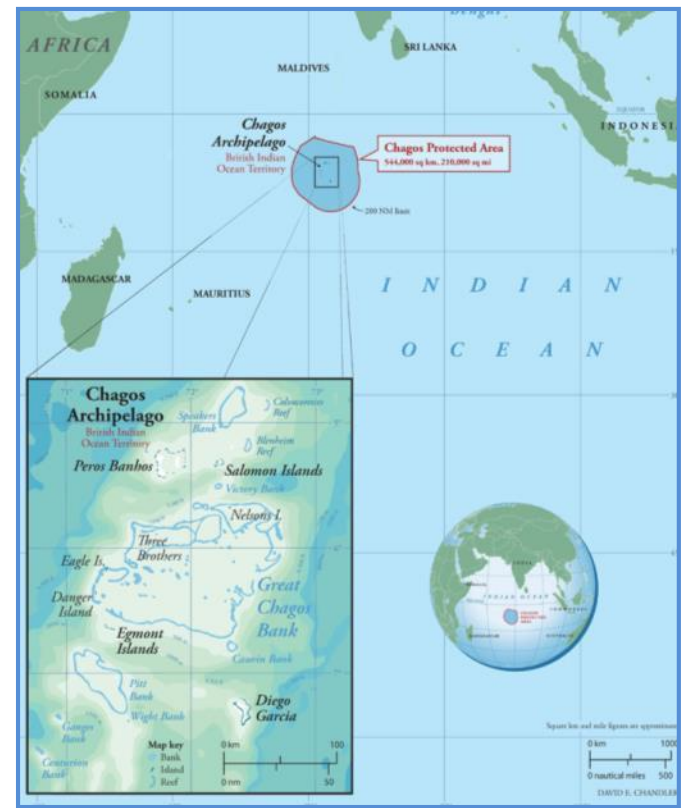
Myers et al. 2007; MacKenzie et al. 2009

Marine Protected Areas



The Chagos MPA

- UK Overseas Territory
- Established in April 2010
- 640,000km²
- All commercial fishing activity prohibited
- Could it help protect commercially important species?



How do you count animals in this?

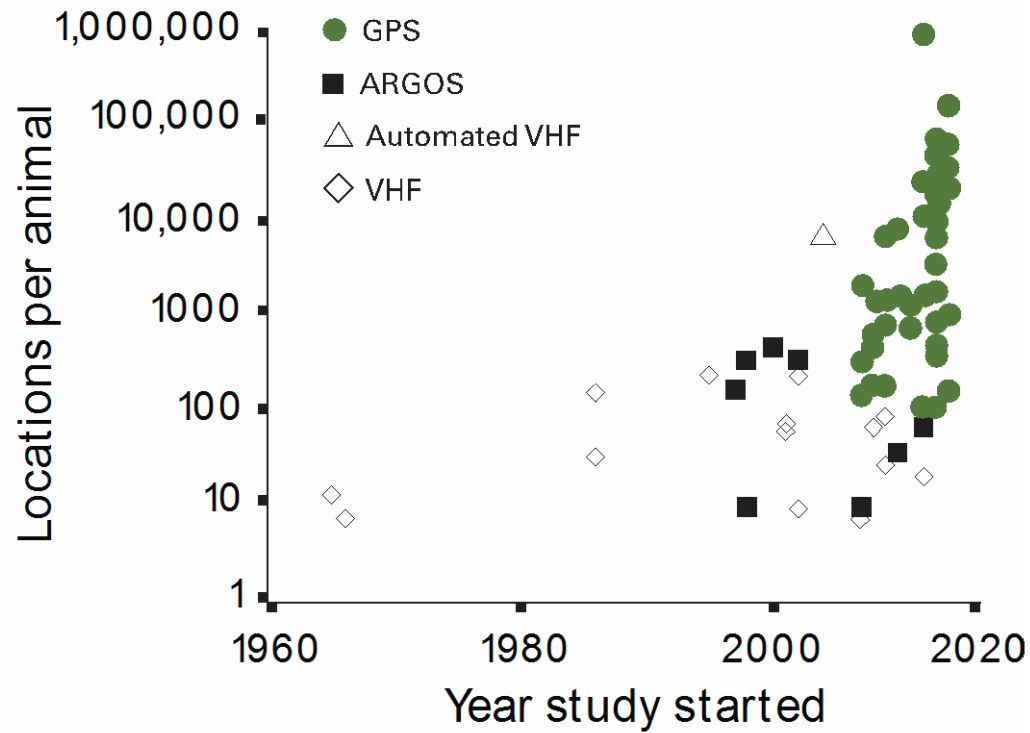


Open ocean monitoring

- Spatial movement of pelagic animals
- Attach pop-up satellite tags
 - Residence in MPA
 - Site fidelity
 - Habitat use
- Data gathered
 - Location
 - °C
 - depth



More information through technology



More information through technology



~ 150 sharks have been tagged

~ 25 manta rays

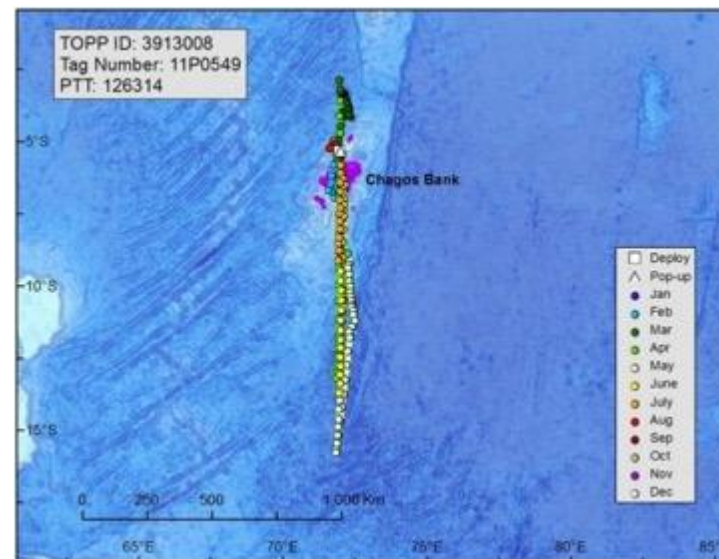
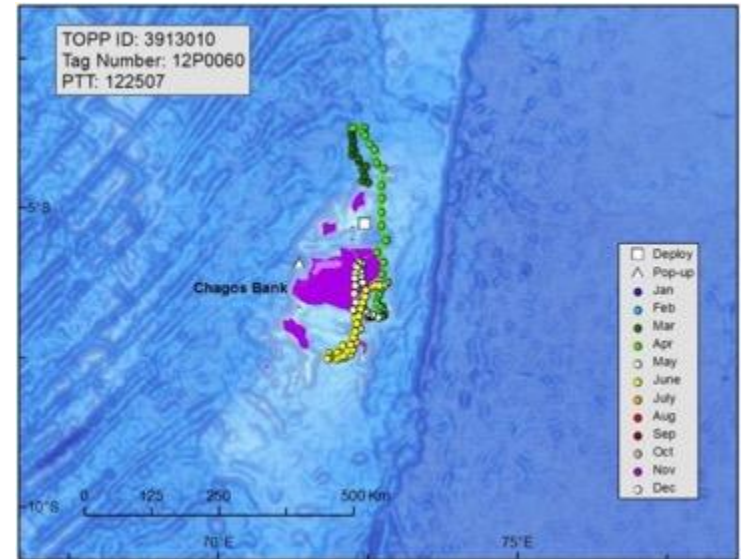
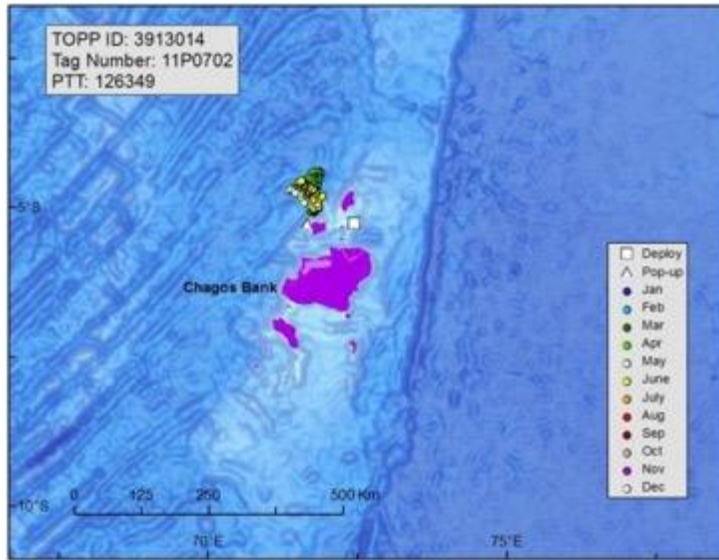
How do you tag?



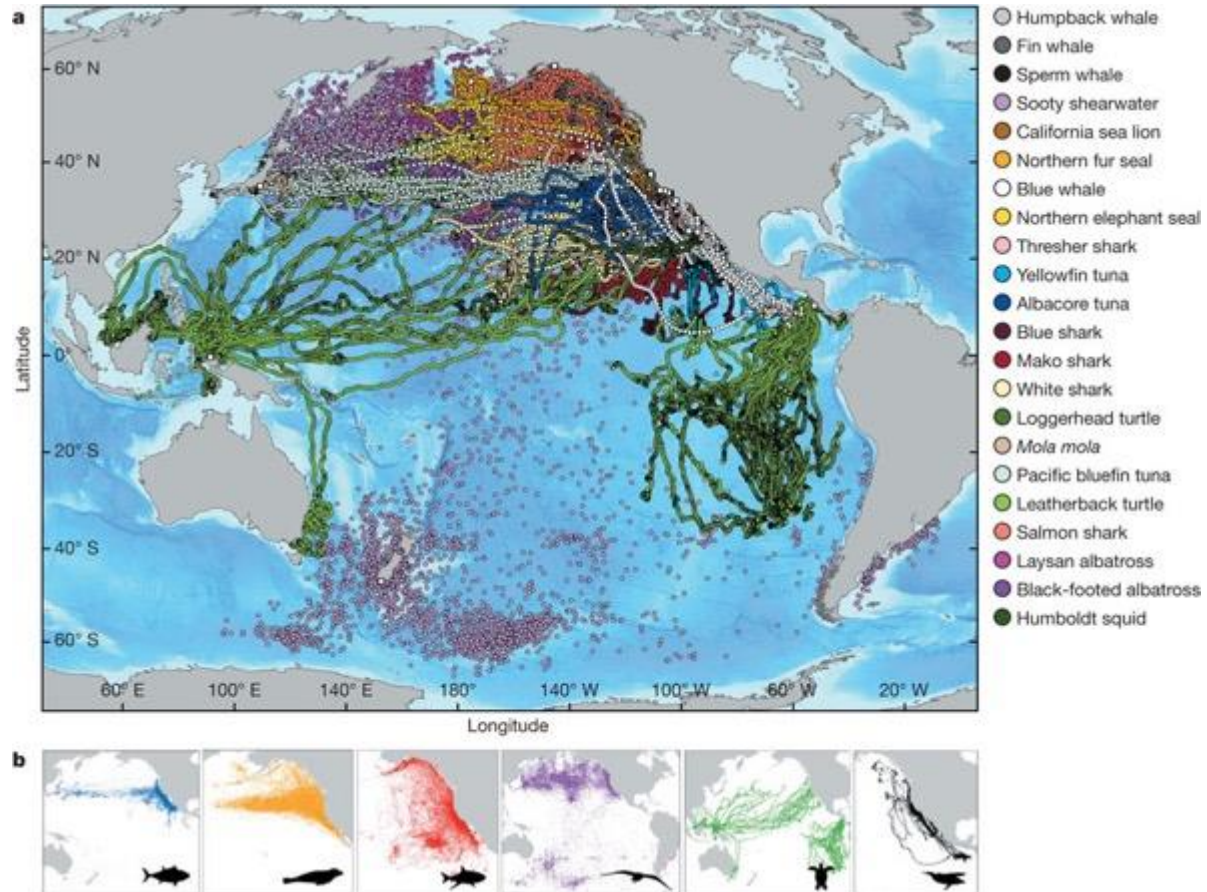
Some sharks are more scary than others...



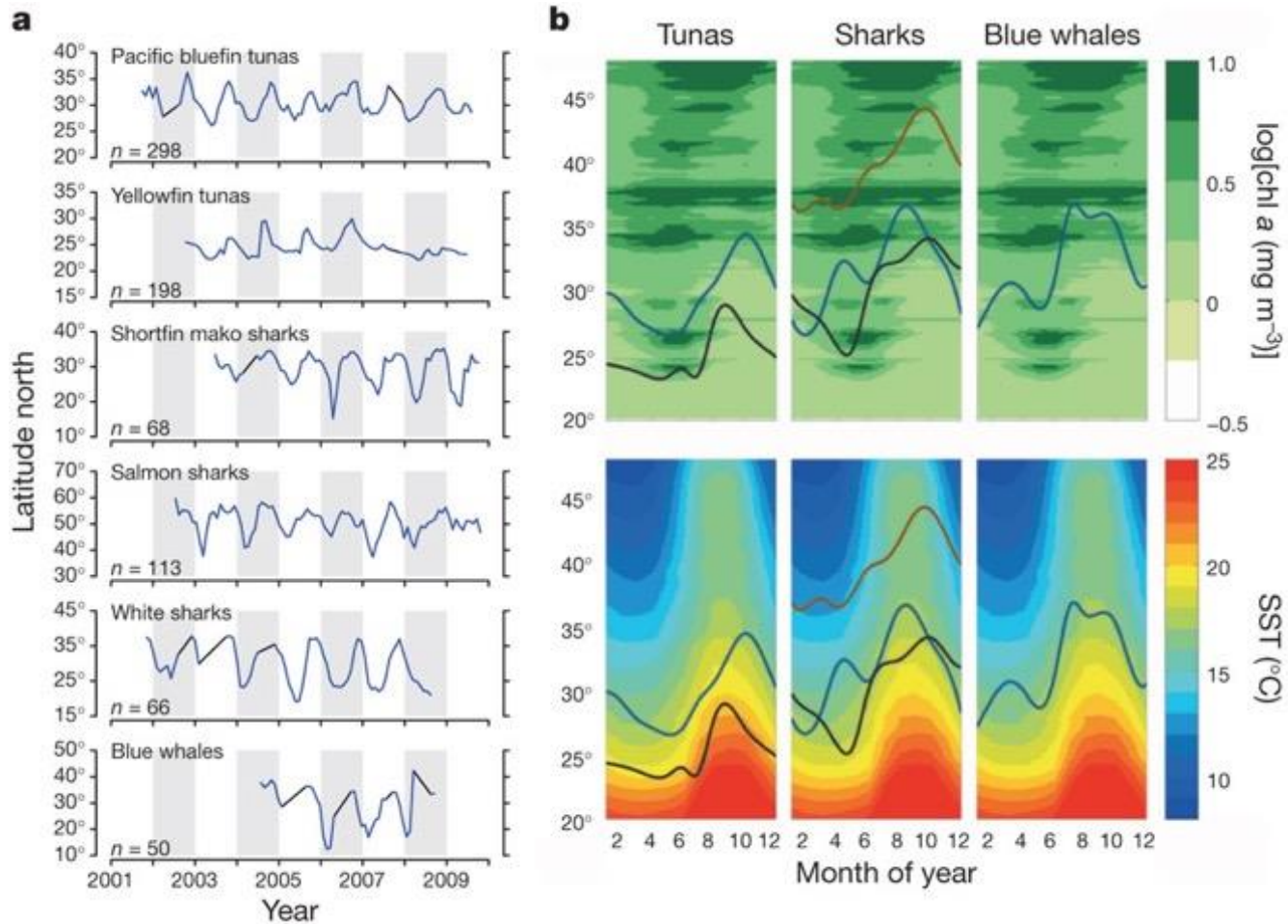
Early results... big differences in movement



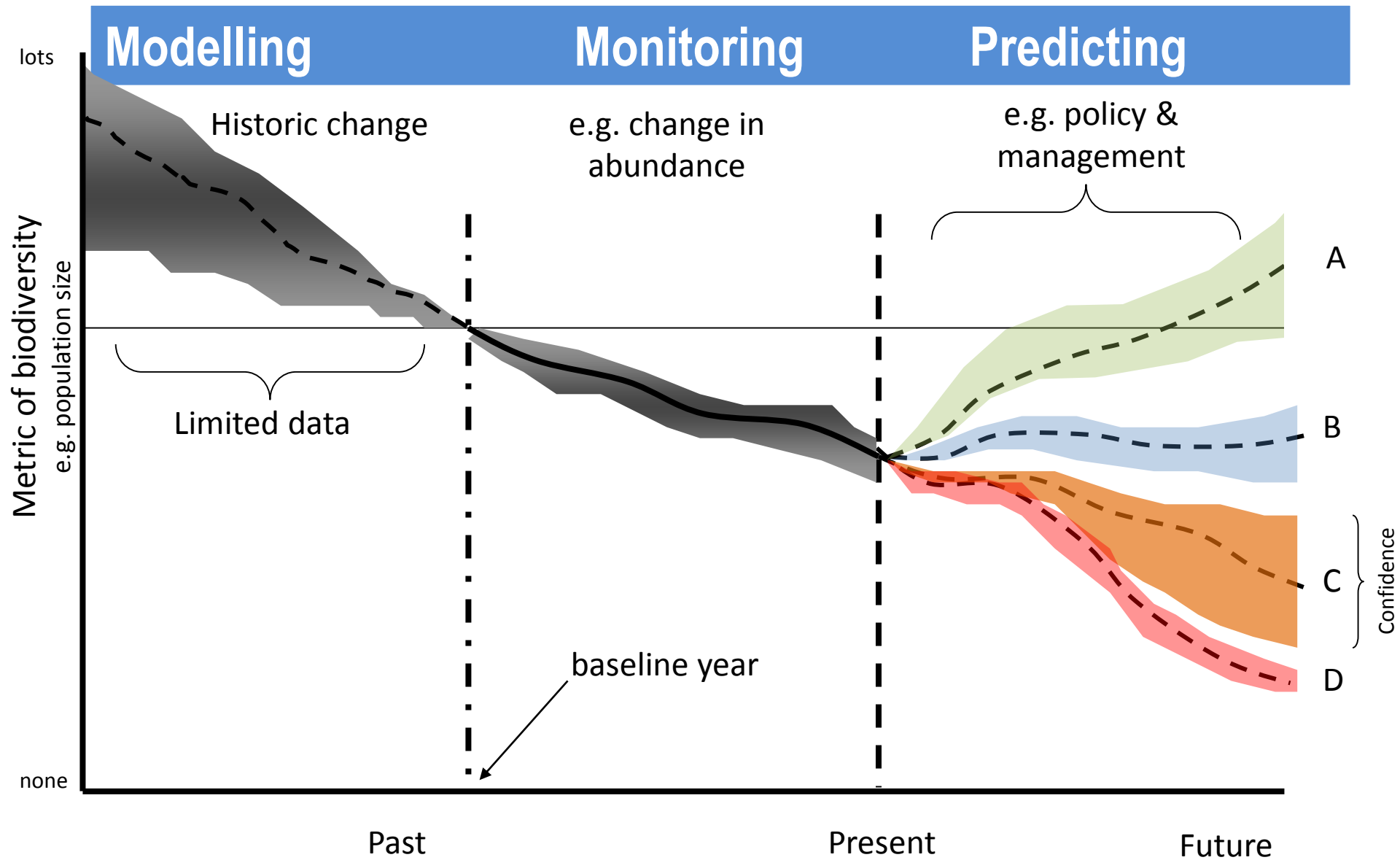
Tracking different species



Environmental drivers of movement



Understanding global biodiversity change



Questions?

Collaborators:

Liberia: Zoological Society of London, Fauna & Flora International,
Liberian Forest Development Authority

Antarctic: Penguin Lifelines, University of Oxford

Chagos: David Curnick, Zoological Society of London

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Esmée Fairbairn Foundation, WWF, CAFF, Darwin

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