"Blue sky" Workshop: new ways of thinking about the West Coast ecosystem and how penguins interact with other elements

Friday 28 August 2015, Velddrif

Background

The marine ecosystem of the West Coast has undergone significant changes in both recent and distant past, with the numbers of breeding seabirds decreasing rapidly. Numbers of African Penguins in particular have decreased rapidly over the last ~ 50 years and at an increasing rate in the last decade. Current factors that contribute to the decrease in numbers include predation by seals, sharks and gulls, oil spills, and a lack of available prey. Huge effort is being expended in addressing these threats. Since 2008, additional effort towards addressing penguin conservation has focussed on the impact of the small pelagic fishery as a cause of the reduced availability of prey, through the islands closure experiment. Concerns have been raised that the approach is too narrowly focussed on fishing as a cause of these decreases, without considering other potential factors.

Disclaimer

The contents of this report reflect, broadly and in a summarised form, the discussions and interventions that were had at the workshop. They do not reflect a full scope of ideas, research, or data. Arguments presented here do not necessarily reflect the only views of participants, and while counter-arguments to some views are not presented, readers should be mindful that these do exist.

Aim

The aim of the meeting was for BirdLife to facilitate a closer working relationship between marine ecologists, government scientists, penguin/seabird researchers and fishing companies in order to provide new or alternate insights into the processes contributing to the penguin decline.

Process

A structured discussion took place with the following questions as a guide:

- Do the spawner and recruit survey estimates of biomass match (roughly) with your estimates of what stock availability is?
- How does fish availability change over time – is it predictable from day to day, week, month or not at all?
- What aspects of fish behaviour might be affecting catchability/availability (both by the industry and top predators)?
- Have there been changes in fish behaviour/catchability in the last decade?
- How do seabirds (particularly penguins) behave around vessels while fishing?
- What changes should be made (if any) to the way the fishery is managed to ensure long-term sustainability of the fishery?

- How do/might seals affect penguins? Other predators? Do we know where predators and/or competitors go, how penguins interact with these other species, and how to account for those influences in modelling penguin responses to fish availability?

Meeting summary

Comments and observations workshop attendees were summarised and grouped into 5 major topics:

1) Fishing boats - wildlife interaction:

- Fishermen observe that seals are the most common wildlife interaction with fishing vessels, with numerous seals following boats and disrupting fishing processes which fishermen find highly problematic. Fishermen are concerned that the seal population appears to be increasing unchecked and that seals are competing with both fishermen and penguins. However, seal census data indicate the population is not increasing and has been relatively stable since mid-1980's (see Annex 1), although they are expanding into new breeding sites.
- Fishermen observe that the most common fishing/seabird interactions are with cormorants and that gannet interactions are at times reduced as gannets have learnt to follow trawlers. Seals have also been seen to prey on gannets.
- Fisherman rarely/never observe penguins in proximity to fishing vessels. This may be due to attraction of large numbers of seals around vessels, which are predators of penguins. Fishermen also have not observed penguins in areas where seals are present (e.g. eastern side of Dassen).

2) Fish availability and behaviour:

- Fishermen suggest fish presence is extremely unpredictable and changes from day to day, week to week and longer time periods.
- There was acknowledgement that there does appear to be relatively good correspondence with fish abundance and spawner and recruit surveys.
- To find schools of fish, fishermen said they relied on:
  - within fleet communication (vessels exchange information, vastly increasing the collective search power of the fleet compared to individual vessels searching in isolation)
  - physical cues such as water colour (dark murky water is preferred), temperature (sardine prefer 15°C, while anchovy prefer 9-12° C), and
  - biological cues such as presence and feeding of seabirds (mostly cormorants)
- Although fish may still be present, fishermen have found that TACs are often not met as fish are not always catchable. Several observations as to why this may be or why this has changed include:
  - The main observation by fisherman was that fish are remaining deeper in the water column or at the ocean bottom at depths which fisherman (and similarly penguins) are not able to reach.
  - The fisherman suggested that the fish remain in schools in deeper depths during the day but at night migrated to the surface and spread out (ie. Not in schools), making catches much lower.

- Fishermen said there had been a change in the time of day that anchovy are caught (previously at night, now caught during the day).
- Small sardines school with anchovies but there are limits to how much sardine bycatch can be caught, thus placing constraints on how much anchovy can be fished.
- Possible reasons suggested for this include water temperatures, mixing depth of water, time of day, predators.

3) Effects of island closures and fishing locations:

- Anchovy TACs are not being met and fishermen are feeling the economic effects thereof. Fishermen feel this is due to changes in fish behaviour as well as a lack of congruency between fishable areas and areas open to fishing. The reduction in appropriate fishing areas has resulted in increased congregation of fishing vessels and intensity of fishing in those areas.
- Fishermen suggest that only a small portions of areas around the islands are actually fishable (±30%) due to eneven and rocky seabeds and that island closures prevent fishermen from accessing the small fishable areas.
- Several other fishable areas are closed to fishing e.g. 16 Mile Beach and shipping lanes. Fishermen feel that when islands are closed these areas should be open to compensate so that TACs can still be achieved.
- The general impression from fishermen is that 40% of fish pass through the closed areas, and therefore industry will lose 40% of its catch. In some years a large proportion of the TAC was caught in the areas that are now closed.
- Fishermen suggest that fishing around the islands does not compete with the penguins as penguins are able to access rocky areas around the islands which are not fishable to the vessels. Therefore do not believe fishing is responsible for impacting food availability to the penguins since their foraging and fishing ranges do not directly overlap.
- The general consensus from the fishermen was that overfishing is not occurring, since the TAC isn't even being reached. TAC is based on total biomass; therefore there should be fish available for penguins.
- However, it was pointed out just as fish are not available to fishermen due to changes in behaviour, this will also be the case for top predators such as penguins which cannot dive to great depths and do not feed at night.
- It was suggested by penguin biologists that overfishing needs to be considered on temporal scales, TACs are allocated for a year. If large amounts of fish available to penguins (and fishing vessels) are being removed from an area at an important time e.g. before breeding season, impacts on penguins would likely be high, compared to if small amounts are taken over a longer period.
- Fishermen were concerned with the amount of research and emphasis that is being placed on fishing effects in comparison to other threats to penguins (e.g. seal predation) and if as much investigation went into the other factors it may be that other threats are found to be responsible for the decline and not fishing.

- Penguin biologists responded that fish availability and competition from fishing is considered as a factor contributing to penguin decline along with several other factors (e.g. Oiling, climate, predation see Annex 2). One study on Robben Island indicated that improving food availability and mitigating the impact of oiling would have the highest beneficial impact on the Robben Island Penguin population. It is hoped the model will also be applied to other colonies to provide broader management perspectives (see Annex 2).

Way forward

- Short report of this workshop to be circulated
- BirdLife South Africa will follow up on the status report that has been prepared on the African Penguin Biodiversity Management Plan and circulate this, if possible, to all attendees
- Fishermen requested a report back regarding the timeframes and impacts of the island closure study. The situation is likely to become clearer by December 2015, at which time a report can be circulated.
- All workshop attendees would like improved communication between the industry, conservationists, government and scientists. The workshop is a first step towards this. BirdLife South Africa will follow up on this, potentially with smaller focus groups to look at specific problems and will try as much as possible to use fishermen's perceptions and understandings in future work.
- Suggestions to DAFF
    - Fishermen need to be adequately represented on pelagic working groups, not just managers of the industry, but people that are actually out at sea. (SA Fishing Union has so far not attended)
    - Fishery observer programme should be re-established for pelagic fishery

Additional Information

Please direct questions or comments, or additions to the content of the report to Taryn Morris (taryn.morris@birdlife.org.za) and Christina Hagen (christina.hagen@birdlife.org.za), or contact them on 021 419 7347. Additional information (including current bird and seal counts) or readings can also be provided.

Acknowledgements

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Annex 1

Seal population

Excerpt from Kirkman *et al.* 2012:

There was a significant northward shift in the distribution of the breeding population. This was largely attributable to events in the northern part of the population's range coinciding with Namibia, where seal numbers declined at most colonies in the south of Namibia while several new breeding colonies developed in the northern part of Namibia and one in southern Angola. Despite range expansion and the development of new colonies, the overall size of the population in 2009 was similar to that of the early 1990s, according to the pup count models."

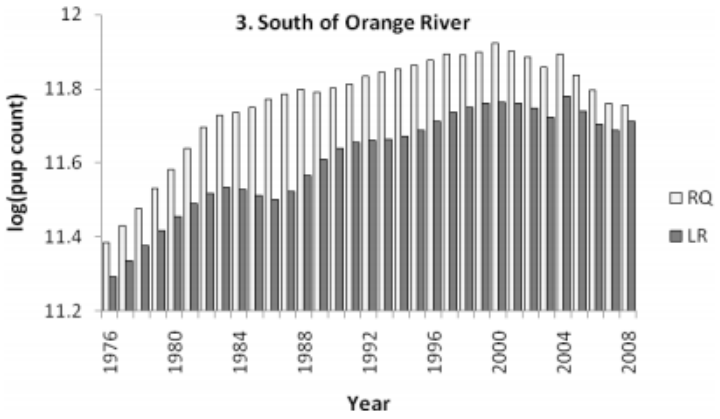

Figure 6 The sums of the predicted number of pups each year for the Cape fur seal breeding colonies in the entire region (1) and for all colonies to the north (2) and south (3) of the Orange River (northern and southern sub-populations, respectively) for 1976–2008, determined using weighted 95th quantile (RQ) and least squares (LR) regression models.

Annex 2

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A system dynamics approach to modelling multiple drivers of the African penguin population on Robben Island, South Africa

Florian Weller[a,*], Lee-Anne Cecchini[b], Lynne Shannon[a], Richard B. Sherley[a,c], Robert J.M. Crawford[c,d], Res Altwegg[b,e,f], Leanne Scott[b], Theodor Stewart[b], Astrid Jarre[a,f]

[a] Marine Research (MA-RE) Institute and Department of Biological Sciences, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa
[b] Department of Statistical Sciences, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa
[c] Animal Demography Unit, Department of Biological Sciences, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa
[d] Department of Environmental Affairs, Oceans and Coasts, Private Bag X2, Rogge Bay, Cape Town 8012, South Africa
[e] South African National Biodiversity Institute, Kirstenbosch Research Centre, Private Bag X7, Claremont, Cape Town 7735, South Africa
[f] Centre for Statistics in Ecology, Environment and Conservation, University of Cape Town, Private Bag X3, Rondebosch 7701, South Africa

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ABSTRACT

The African penguin (*Spheniscus demersus*) population in southern Africa has experienced rapid decline in the 20th century and as of 2010 is listed as "endangered" on the IUCN Red List. There is an urgent need for decision support tools to enable effective management of colonies. We present a system dynamics model of the penguin population on Robben Island, South Africa, that combines a demographic simulation with the modelling of multiple pressures including food availability and food competition by commercial fisheries, oil spills, predation by terrestrial and marine predators, and extreme climate events. The model is stochastic, stage-specific and resource-driven, and incorporates both well-defined, quantitative field data and qualitative expert opinion. Survival rates for eggs, chicks, immatures and adults were adapted from field data and an earlier model of this population to create a simulation of a stable population used in a variety of scenarios and sensitivity tests. The modelled population was found to be strongly driven by food availability and to a lesser degree by oiling and marine predation, while climate events and terrestrial predation had low impacts. Food biomass levels (small pelagic fish) in the penguins' foraging area around the island (used during nesting) and further afield (used during the rest of the year) had an equal influence in driving population development in the short and long run. The impact of short-term (three years) fishing restrictions currently being trialled around the island was found to be generally beneficial to the modelled population, but easily masked by food-driven variability in population growth. The model produced population dynamics similar to those observed in 1988–2009 when immigration and a plausible change in predation pressure during this period were simulated. The model is being extended to other colonies to provide tools for specific management decisions and to enable the study of meta-populations by modelling migration between colonies. Our results suggest that improving food availability and mitigating the impact of oiling would have the highest beneficial impact on this penguin population.

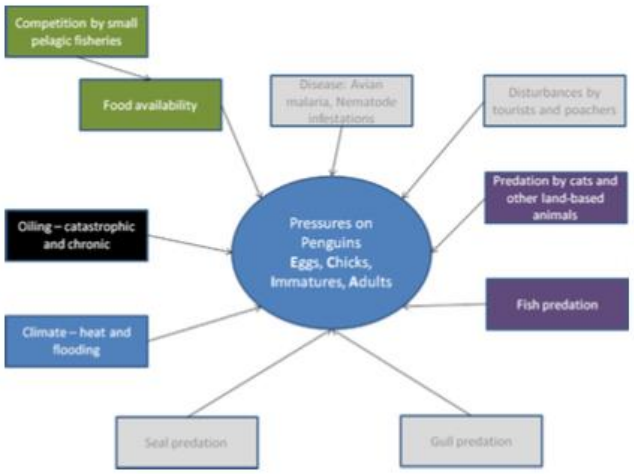

Fig. 3. Pressures acting on penguin populations. Greyed-out boxes represent pressures generally found to be acting on African penguin colonies, but not present (or present at unquantified, low levels) on Robben Island and not implemented in the model.