

The Ecological Role of Elephants: Management Decision-making

Setting Thresholds of Potential Concern (TPCs) for KNP biodiversity outcomes for which elephants may act as drivers.

A trans-disciplinary approach that builds around modeling as a key tool.

BACKGROUND:

1. The Great Elephant Indaba indicated a need for more intense scientific stakeholder involvement.
2. Science stakeholder meeting, Luiperdkloof (March 2005).
3. TPCs defining the desired state of the KNP was evaluated by a smaller group of selected scientists in Sept 2005.
4. Finalized version after broader comment included with management plans at the end of 2006.
5. March 2006 Network meeting: discussion of data needs and modeling approaches to predict elephant densities leading to TPC exceedence.
6. Jan 2007 Skukuza Modeling workshop convened initiate process to develop models and finalise TPCs.

TPCs are structured to detect unacceptable change due to:

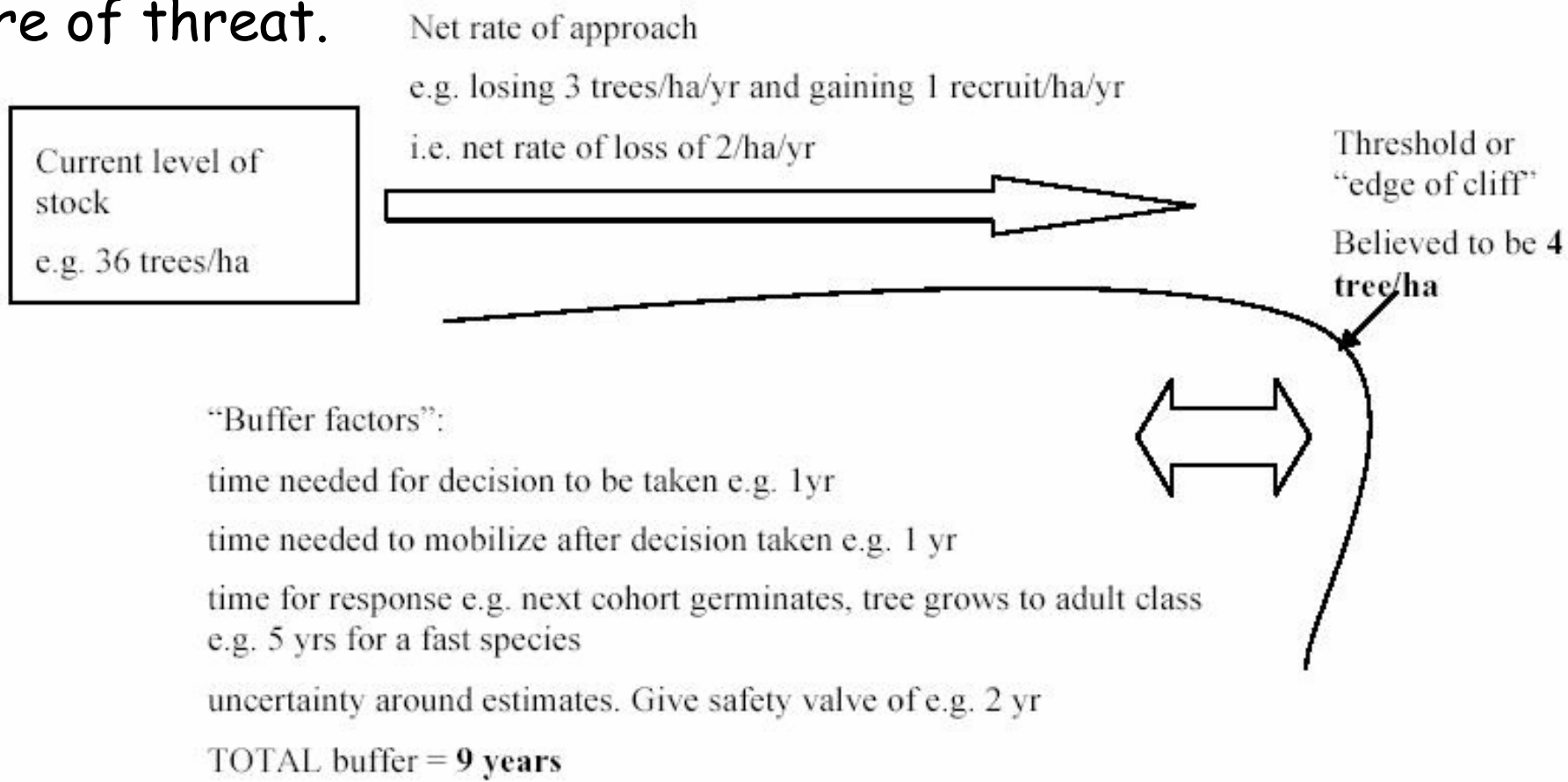
1. Loss of structural diversity in the woody and herbaceous component.
2. Loss of patchiness in the woody and herbaceous component
3. Loss of woody, herbaceous, large mammal, small mammal, bird and reptile diversity.
4. Loss of dominant and subdominant tree species.
5. Loss of characteristic tree species or loss of basal cover.
- 6. Loss of any specific component in the woody structure.**
7. Loss of basal herbaceous cover.
8. Loss of dominant and subdominant large herbivore species.
9. Counter trend behavior of wildebeest, kudu and waterbuck population dynamics.
10. Absence of a large herbivore from an analysis unit where it used to occur historically.
11. Loss in landscape function: nutrient cycling, infiltration and soil stability.

Setting of TPCs:

- 1. All biophysical TPCs should ideally relate
 - (a) to either the imminent danger of loss of a species, or
 - (b) to the flip of a system to an undesirable state.

(Flip = acknowledged possibility of a real transition to a state outside of our desired set of varying conditions).

- 2. The transition should be non-arbitrary and should present a real measure of threat.



TPCs have been developed for vegetation, herbivory, fire, species of concern and degradation (structure, function and composition).

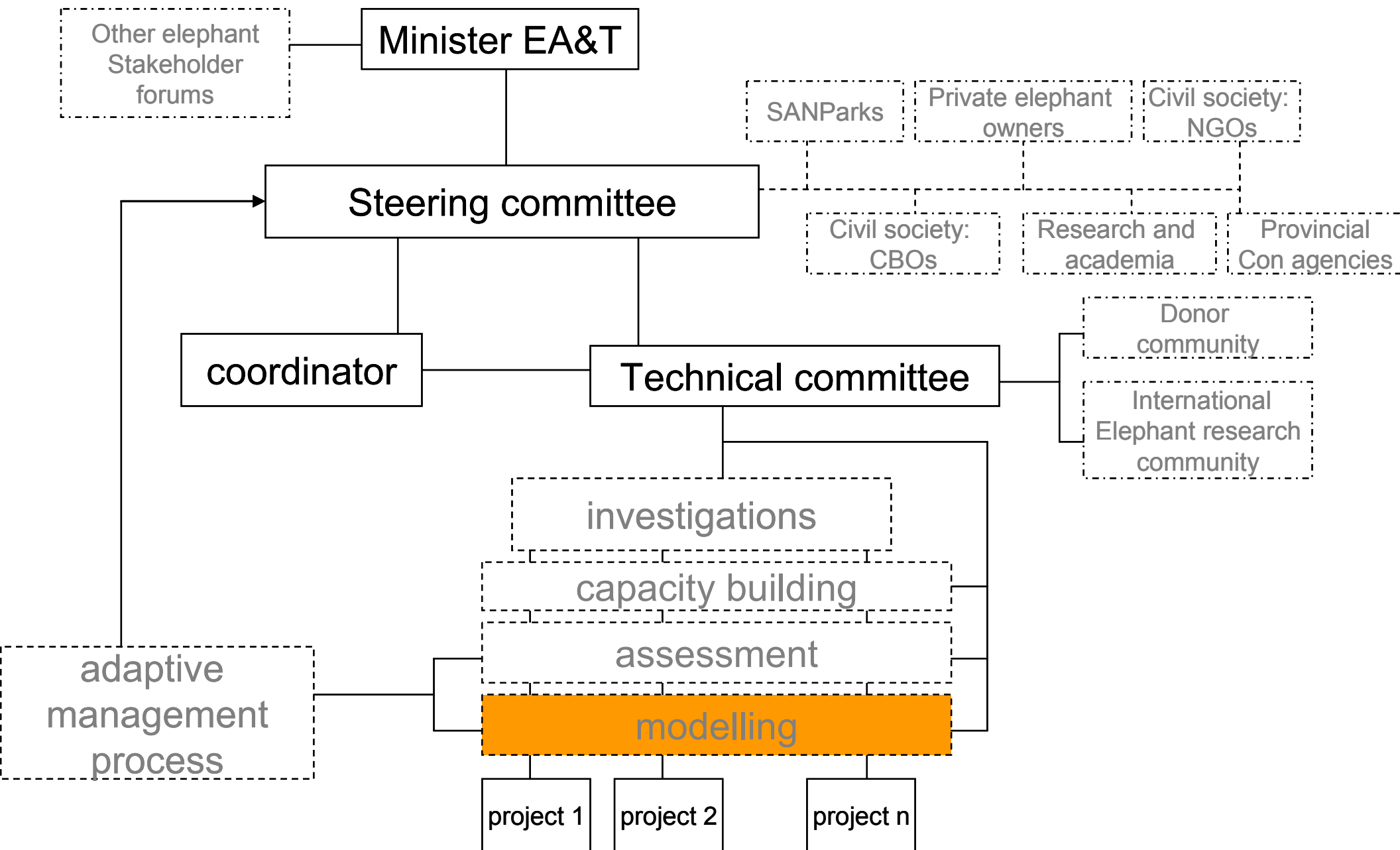
An overall TPC assessing the status of heterogeneity would be ideal.

Each TPC requires a theoretical threshold/benchmark against which to measure change and thus to guide the setting of a TPC.

Adoption of a rate-based approach to setting and evaluating TPCs in Kruger, taking into account the **modelled or predicted rate** of approach to a threshold and buffer factors predicting time lags to responses.

Where are we?

1. The TPCs for elephants are lagging - rivers TPC tried and tested, fire TPCs now in use, elephant TPCs not well formulated.
2. These are urgent in terms of the Socio-Political context (vis the Culling Debate).
3. TPCs (decision-making framework) critical for buy-in from Political - Social system, i.e. everyone has to believe in TPCs for intervention to be acceptable.
4. There are vast amounts of knowledge (KNP and elsewhere).
5. But not integrated to answer complex questions.
6. Modeling approach to provide predictive models, i.e. TPCs.
7. May provide a framework for "bold experiments of the National Elephant Research Programme: ~ Adaptive management.



Assessment

of Elephant Management in South Africa

- An **Assessment** is a formal process of evaluating information relating to an issue of social concern
- The first Elephant Assessment will take place this year
- Will be published as a book, ~13 chapters, covering wide range of relevant topics
- You can participate as a lead author, author, contributor or reviewer
- Kathleen Mennel is coordinator
kmennell@csir.co.za

Approach:

- Multipronged, but convergent on a few selected problems at a time:
- Simple to complex models;
- Multiple teams working simultaneously from different perspectives.
- Anyone who wants to participate is strongly encouraged.
- Empericists, modelers, hybrids, managers
- Sharing of knowledge, information, insights, data.

See minutes from January meeting for the details of where we are at (request from rinag@sanparks.org)

Example of questions

1. For the area of the Kruger National Park (~20 000 km²), at a spatial resolution of 10 x 10 km, can the model reconstruct the numbers and distribution of elephants over the period 1900 to 2000? Can the same model predict the density distribution 2000-2007 (for which data will be withheld for testing purposes).
2. For the granite landscape of Southern KNP, what is the shape of the long-term (50 year) tradeoff curve between elephant biomass density and tree cover percentage, for tall trees (>6 m), short trees (2-6m) and shrubs (0-2 m) of the following species: *Sclerocarya birrea*, *Acacia nigrescens*, *Combretum apiculatum*, and *Spyrostachis africana*.

April 2007: Activity initiation,
outreach to interested groups



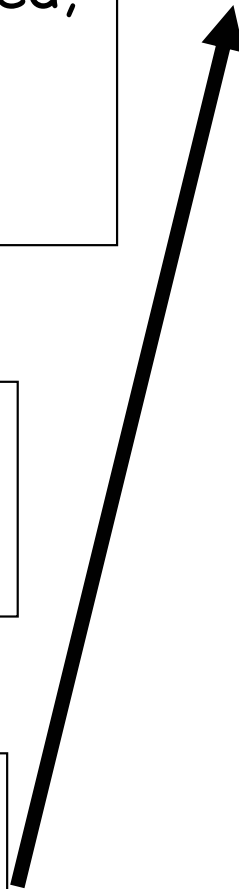
July 2007: First questions posed,
datasets specified,
groups registered,
coordinator appointed



April 2008: Second set of
questions generated at
KNP Network Meeting.



Jan 2008: First model
intercomparison workshop



2008: Integration with SA
Elephant Research Programme,
next questions posed,
new datasets developed.
Special issue published



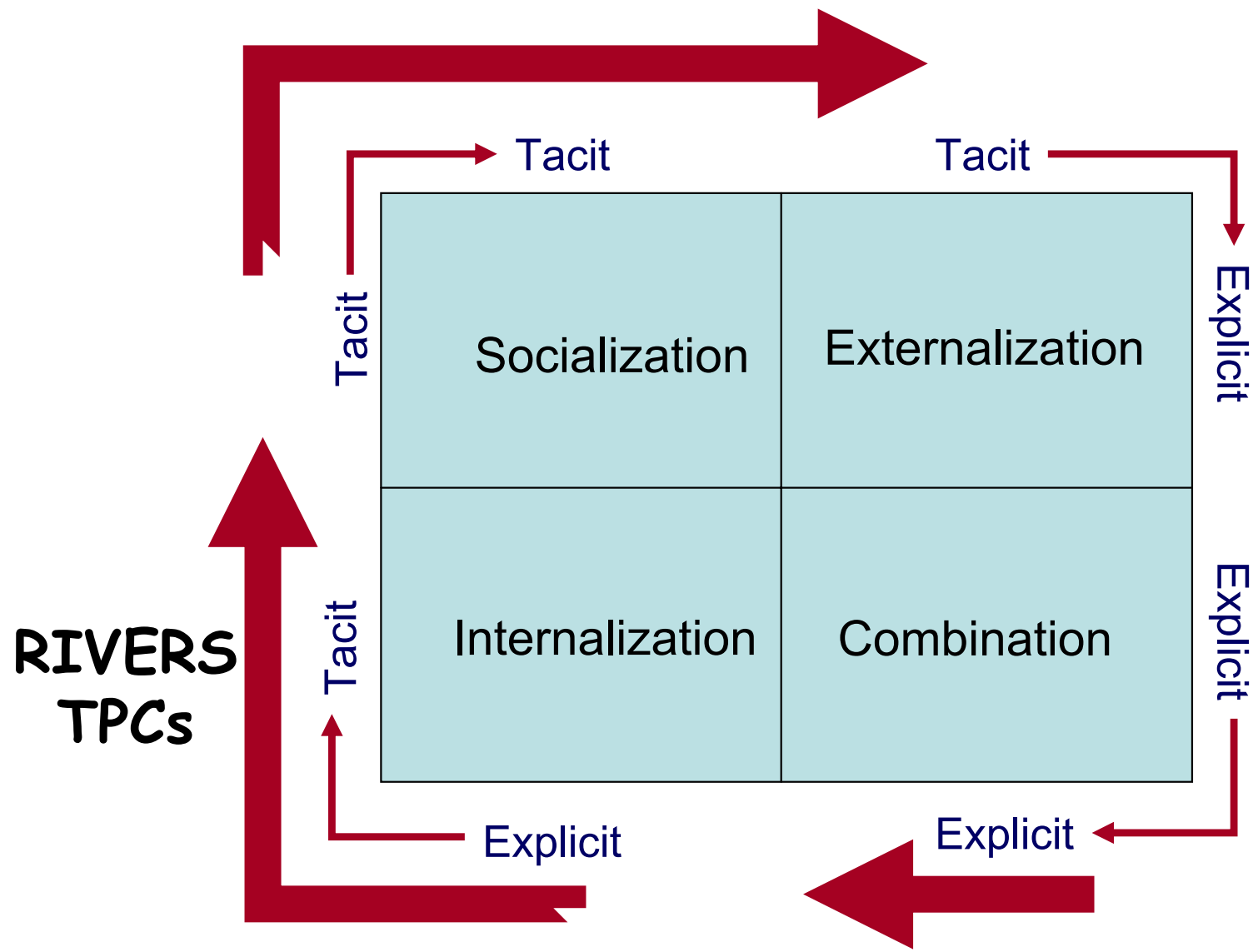
Jan 2009, 2010, 2011:
Second, third, fourth
model inter-comparison
workshops



2011: Development of
'Elephant Scenarios'
for the second
Elephant Assessment

Where are we?

ELEPHANT TPCs



Need to move from Tacit to Explicit (as individuals, groups, institutionally, nationally, internationally).

FIRE TPCs

Courtesy: Dirk Roux, Kevin Murray, and Ernita van Wyk, 2007 KNP Network Meeting.

Invitation to Participate

Please comment on the circulated Announcement as soon as possible but by 15th May at the latest. Comments to Rob Slotow (slotow@ukzn.ac.za)

Contacts

Interim activity leader: **Rob Slotow** (provide responses to this document, and ideas for the activity, to him) slotow@ukzn.ac.za.

Interim activity coordinator: **Rina Grant** (register your interest in being part of this group with her) rinag@sanparks.org

Interim data manager: **Judith Kruger** (enquiries about obtaining or providing data) judithk@sanparks.org