

STEPS TOWARDS THE DEVELOPMENT OF AN INVASIVE ALIEN SPECIES RESEARCH PROGRAMME

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1. BACKGROUND:

The vision of the South African National Parks is that national parks will be the pride and joy of all South Africans. In achieving this, the mission is to acquire and manage a system of national parks that represent the indigenous wildlife, vegetation, landscapes and significant cultural assets of South Africa for the pride and benefit of the nation.

The KNP's mission is to maintain biodiversity in all its natural facets and fluxes and to provide human benefits in keeping with the mission of the South African National Parks in a manner which detracts as little as possible from the wilderness qualities of the Kruger National Park. The invasions of alien species in the national parks clearly bedevil these mission statements.

The threats posed are even more considerable when placed in the context of the realities faced. The KNP covers an area of nearly two million hectares, has seven major rivers flowing through it, all with their origins in the escarpment to the west of the KNP, and which are invaded with a wide range of invasive species. Further, a list of approximately 370 alien plant species has already been identified in the KNP, increasing annually and costing approximately R 5 million per annum on control.

From the statements of strategic intent (mission statements), the objectives for the KNP are broken down into finer objectives in a tree approach, with the alien impact objectives falling under the ecosystem management objectives. See http://www.parks-sa.co.za/conservation/scientific_services/scientific_services.html for further details.

In an effort to prioritise the management actions and needs of management, a number of Alien impact objectives have been defined and are stated below. These objectives are currently under review in the KNP five yearly objectives and management review process and are likely to be altered to varying degrees. The main change will be the inclusion of all invasive species under the alien impact objectives as well as the re-aligning of the higher level objectives to provide for a more holistic approach to invasive species management in the KNP.

The current alien impact objective is stated as follows: To anticipate, prevent entry, eradicate or minimise the influence of non-indigenous organisms so as to maintain the integrity of native biodiversity.

Alien refers to: not indigenous to that landscape or area. Notions of naturalization will not be taken into account. Certain non-invasive alien organisms will be tolerated (e.g. biological control agents, certain lawn in rest camps, approved pets)

1. Strategic sub-objective: To evaluate the overall scale of threat of Invasive alien species on the KNP; to assess the organisational and infra-structural

capacity in relation to realistic needs, and to muster the necessary resources to address any short-fall.

2. Prevention sub-objective: To anticipate imminent or potential risks of entry of invasive alien species into the KNP and set-up effective mechanisms to prevent such entry. This can be facilitated by:

Establishing an effective communication network to access and provide information on potential threats and appropriate prevention and control mechanisms (e.g. PPRI, NBI, Academic institutions, ARC, Commercial forestry industry, Provincial Nature Conservation bodies, Governmental departments, Agro-chemical companies).

Establishing and maintaining a comprehensive risk-analysis statement of major invasive alien species threats.

Developing and implementing effective mechanisms to prevent entry of invasive alien species. Tools include legal and park policy instruments, obtaining co-operation from neighbours and staff and education.

3. Eradication sub-objective: To plan and implement eradication and/or control campaigns for invasive alien species already within the KNP.

- Assess the relative threat of each alien species present in the KNP on indigenous biodiversity, including their amenability to control, areas currently and likely to be invaded and meaningfully allocate resources to be able to address the threat.
- Plan, develop, implement and measure specific control programmes to counter each threat identified under the above goal. (Potential tools include fire, mechanical, chemical, biocontrol, habitat management, education and influencing attitudes, legal and integrated methods)

4. Prohibit/discourage sub-objective: Prohibit the use of invasive alien species and discourage the establishment or utilitarian/recreational use of especially water intensive species in developed areas. In rest camps the only species currently allowed to establish are *Dactyloctenium australe*, *Stenotaphrum dimidiatum* and *S. secundatum* as lawn species.

Annually inspect all developed areas (villages, camps etc) for presence of alien species and have these removed where feasible.

5. Research sub-objective: Develop an understanding of the practically relevant aspects of specific invasive alien species and their control, usually in the following areas:

Autecology of alien species, especially reproduction and dispersal

Their effect on biodiversity

Efficacy of control measures, including cost effectiveness and environmental acceptability

Environmental impact of control operations and practical recommendations to improve the basis of control.

6. Awareness sub-objective: To promote an awareness of the long-term dangers of invasive alien species by influencing perceptions of staff and the general public, in such a way as to achieve willing active support for counter measures.

2. OBJECTIVES OF THIS DOCUMENT:

With the movement of the Invasive Alien Species Unit into the Scientific Services fold, emphasis must be placed on rectifying the shortfall in research and monitoring of invasive alien plants and other invasive or potentially invasive species. Although a few projects are currently registered (see table 1) and there is interest in a few other potential projects, the scope for research on all facets of invasive species in natural and protected (in terms of sites being protected from development etc, over the long term) systems is enormous. Ideally the development of a robust, long-term, co-ordinated and focussed programme, similar in design to the KNP Rivers Research Programme, should be strived for. However, the pool of potential collaborators is probably not as large and the possibilities of funding for alien research projects are only now slowly opening. However, with interest from stakeholders, such as those represented at the KNP Invasive Alien Species Advisory Group, a small co-ordinated research programme is feasible with the commitment and support of outside institutions. Single projects, while still useful in providing answers to many of management's problems and satisfying academic and other training requirements, often require more effort for less return than a number of projects working in collaboration to answer a particular set of key questions.

The IAS research programme is hoped to be a collaborative and co-operative endeavour with partnerships including the SANParks and various institutions, some of which are currently registered as project holders in the KNP. These include the University of Cape Town, University of Pretoria and the Plant Protection Research Institute.

Therefore, the objective of this document is to provide a framework for research in the KNP on IAS and attempt to formulate further research in a co-ordinated and structured manner. Further, it aims to provide potential researchers with the objectives of KNP IAS research and hopefully attract researchers to answer some of the questions we have. It aims to provide a position statement for the management of IAS in the KNP.

3. PROPOSED KNP IAS RESEARCH PROGRAMME AIMS AND OBJECTIVES:

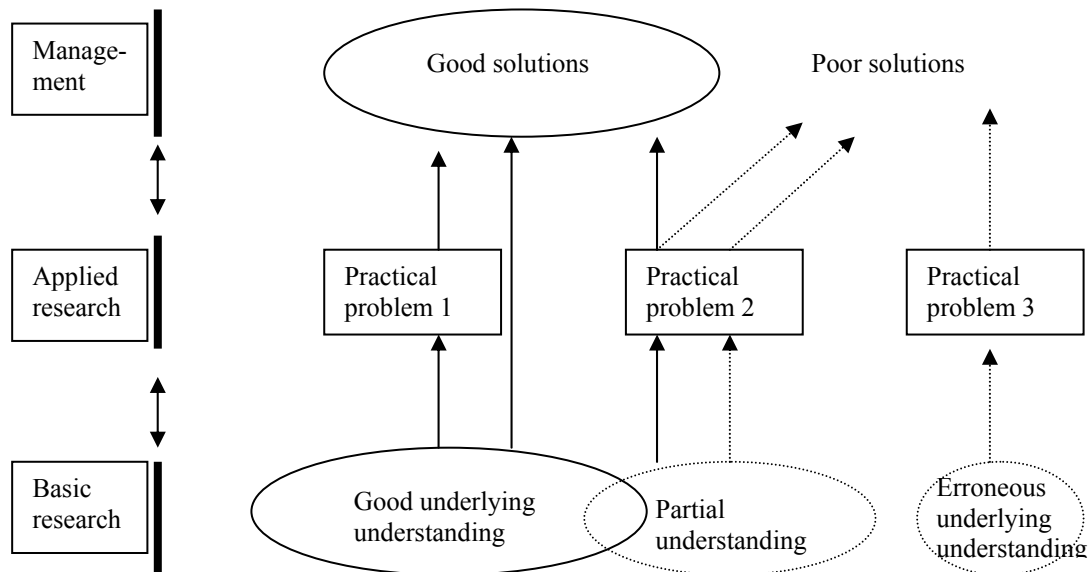
The fundamental purpose of the programme is to address problems and concerns to the KNP and thus assist in promoting and developing a co-ordinated research programme which will provide a clearer understanding of the dynamics of alien species invasions.

The programme will therefore aim:

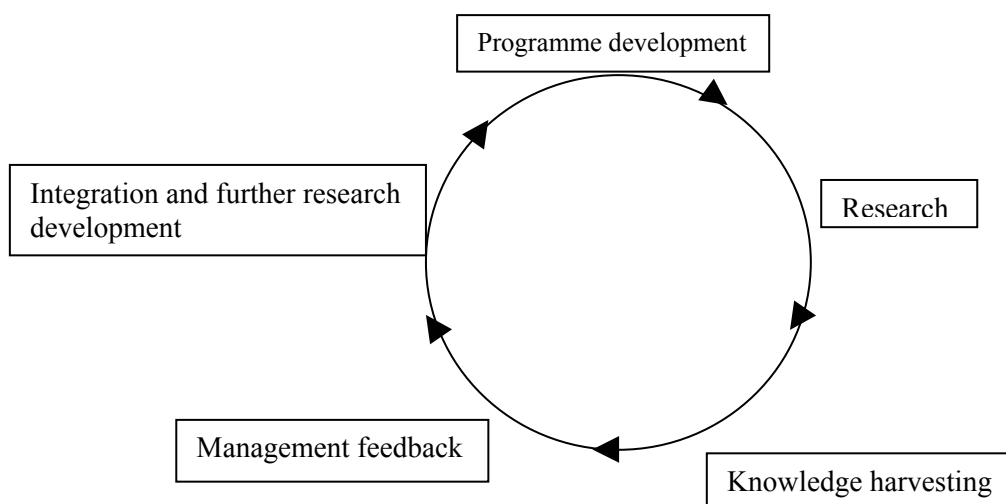
To promote and develop a co-ordinated research programme which will provide a clearer understanding of the dynamics of alien species invasions by:

- (a) providing insights into the impacts of IAS on the biodiversity and heterogeneity of the KNP, and
- (b) providing knowledge on developing and maintaining long-term sustainable control techniques.

The KNP is interested in management-orientated practical research, while still allowing room for important fundamental research and an ability to satisfy the needs of students' academic requirements (as captured in fig. 1 below-redrawn from Biggs, In Press).



The programme has also identified the need to ensure that knowledge learned through the programme is fed back into management and furthers the aims of the management programme. In an effort to address this, several phases have been identified and may be done in various means, as indicated in fig. 2 below (such as workshops, for project holders to provide feedback and management suggestions)



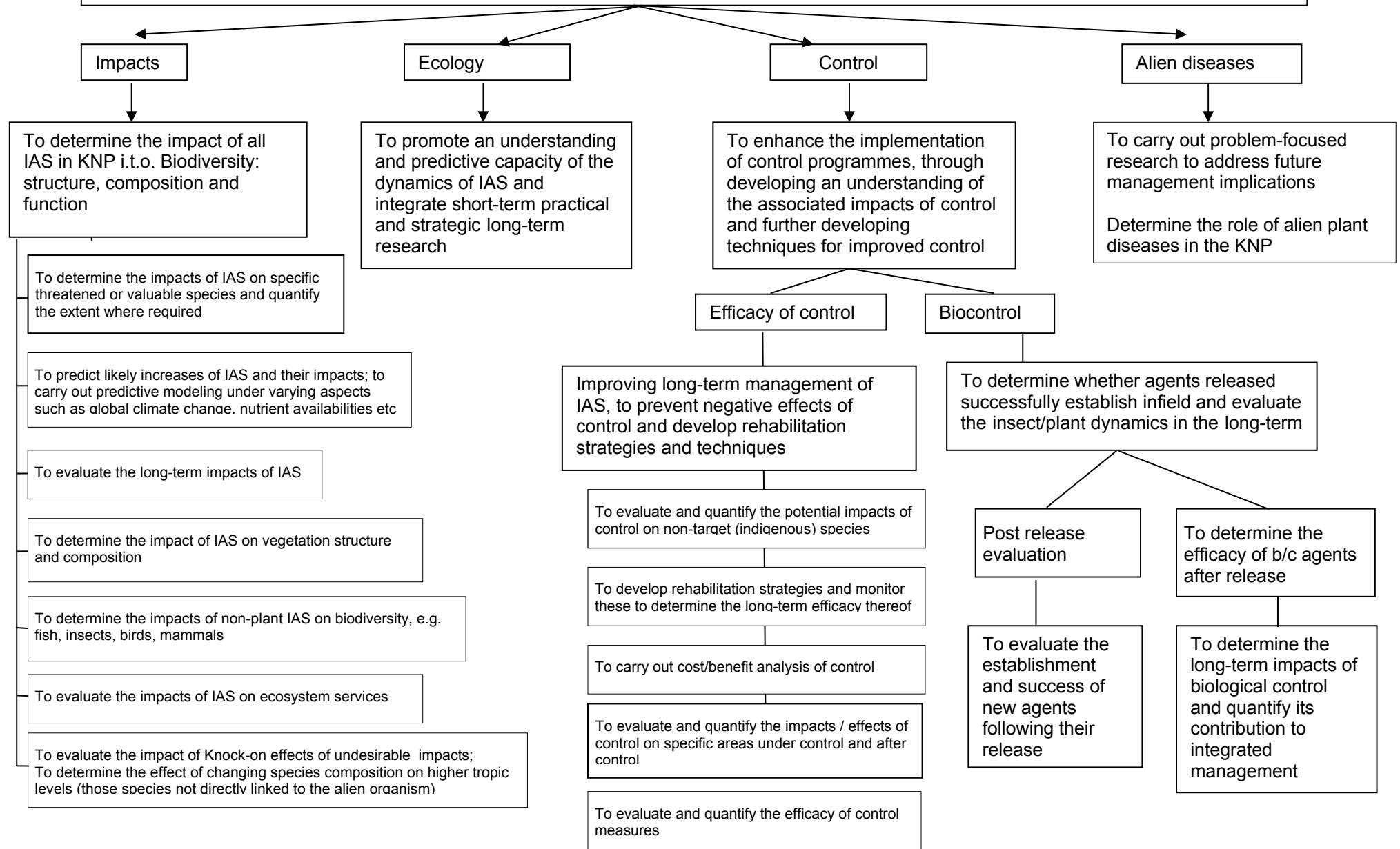
4. PROPOSED RESEARCH THEMES AND PROGRAMME STRUCTURE:

A number of themes can immediately be identified and linked directly to the KNP objectives hierarchy (See figure 3 below). Further than only satisfying the research sub-objective, there is substantial scope for projects to address other KNP objectives, although this may move away from the more alien plant ecology/plant interaction research.

Figure 3:

KNP IAS SECTION RESEARCH PROGRAMME

To promote and develop a co-ordinated research programme which will provide a clearer understanding of the dynamics of alien species invasions by;
Providing insights into the impacts of IAS on the biodiversity and heterogeneity of the KNP, and
Providing knowledge on developing and maintaining long-term sustainable control techniques



5. FUNDING AND LOGISTICS:

Unfortunately the KNP is not in a position to actively fund research projects, and will rely on research partners who wish to participate in such a programme to source funding required. The KNP can however provide some logistical support (scale of this dependent on direct relevance of research projects to KNP). However, as is well known, collaborative and well-defined, structured programmes, can often leverage funding far more easily than single, stand-alone projects. In this manner the KNP can through this proposed research programme lobby for funding which can be utilised by registered projects within the programme.

For information on the: KNP objectives hierarchy; Application for registration of a research project; Registering a research project in the KNP and Working as a researcher in KNP, please visit:

http://www.parks-sa.co.za/conservation/scientific_services/ss_Ropportunities.html
or email the Science Liaison Officer (ThembiK@parks-sa.co.za).

For information on the KNP IAS section please visit:

http://www.parks-sa.co.za/conservation/scientific_services/ss_alienbiota.html

6. PROGRAMME MANAGEMENT:

The roles of the various portfolios are defined as follows:

Science Programme manager: IS & RI:

The SPM (currently Llewellyn Foxcroft) is the KNP project co-ordinator for all projects registered with the KNP under the invasive alien species programme (excluding veterinary and specific entomological research). The incumbents function is to ensure that co-operation amongst all participating entities is transparent and that the stated goals of the programme are being met.

KNP Science liaison officer:

The science liaison officer (currently Thembi Khoza) is responsible for the administration involved in registering the projects, database management of projects, providing the documentation needed for registration, following up annual reports and arranging entry permits, accommodation, guards etc.

7. SUMMARY:

The KNP provides an excellent and untapped opportunity for studying the effects and impacts of IAS in natural systems. Further, it provides opportunity to monitor the impact of control programmes, determining the efficacy of such programmes and further development. In a co-ordinated framework, the KNP IAS research programme will allow scientists to explore these and other

aspects of the biological invasions, while contributing to KNP management efforts.

8. CONTACT DETAILS:

Should you be interested in becoming involved in the KNP IAS research programme, please contact:

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9. REFERENCES

BIGGS, H.C. In press. Promoting ecological research in National Parks- A South African Perspective. Ecological Applications.

Table 1: Past and current projects:

*Dragt J.	1986	Breeding between the African wildcat and domestic cat in the Kruger National Park.
Cilliers, C.; Strydom G, Zeller D.	1987	Biological control of <i>Pistia stratiotes</i> (Water lettuce).
*Cilliers C.J.	1990	Biologiese beheer van wateronkruid
Erasmus, D.J., Maggs, K.A.R, Biggs, H.C., Zeller, D.A. & Bell, R.S.	1993	The Brighton crop protection Conference- Weeds-1993: Control of <i>Lantana camara</i> in the Kruger National park, South Africa, and subsequent vegetation dynamics
Moran, V.C.; Hoffmann, J.H.	1993	Evaluation of biological control of <i>Opuntia Stricta</i> in the Kruger National Park 1992 -1996.
*Vogel, A. & Pick, F.	1993	The fate of MSMA in sour prickly pear (<i>Opuntia Stricta</i>).
*Zeller, D.A.; Myburgh, R.; Erasmus, D.J. & Heydenrich, J.C.	1993	The fate of MSMA in sour prickly pear (<i>Opuntia stricta</i>).
Moran, V.C., Hoffmann, J.H & Zeller, D.A.	1994	Interference by baboons in the biological control and management of <i>Opuntia stricta</i> in the KNP.
**Cilliers, C.; Strydom G, Zeller D.	1996	Short- and long- term control of water lettuce (<i>Pistia stratiotes</i>) on seasonal water bodies and on a river system in the Kruger National Park, South Africa. <i>Hydrobiologia</i> 340: 173-179.
Lotter WD.	1996	Seed germination of <i>Opuntia stricta</i> in the Kruger National Park.
Kryger, P.	Started 1997, Current	Penetration of the Cape honeybee into the wild African honeybee population of the KNP.
Fourie, N.	1998	The effect and distribution of diverse number of natural enemies on water hyacinth <i>Eichornia crassipes</i> on Engelhardt dam in the KNP.
**Hoffmann J.H., Moran V.C. and Zeller D.A.	1998	Evaluation of <i>Cactoblastis cactorum</i> (Lepidoptera: Phycitidae) as a biological control agent of <i>Opuntia stricta</i> (Cactaceae) in the Kruger National Park, South Africa. <i>Biological Control</i> , 12: 20-24.
**Hoffmann J.H., Moran V.C. and Zeller D.A.	1998	Long-term population studies and the development of an integrated management programme for control of <i>Opuntia stricta</i> in Kruger National Park, South Africa. <i>Journal of Applied</i>

		<i>Ecology</i> , 35: 156-160.
**Lotter W.D. and Hoffmann J.H.	1998	An integrated management plan for the control of <i>Opuntia stricta</i> (Cactaceae) in the Kruger National Park, South Africa. <i>Koedoe</i> , 41: 63-68.
**Lotter, W.D., Thatcher, L., Rossouw, L., Reinhardt, C.F.	1999	The influence of baboon predation and time in water on germination and early establishment of <i>Opuntia stricta</i> (Australian pest pear) in the Kruger national Park. <i>Koedoe</i> 42(1): 43-50.
**Reinhardt, C.F., Rossouw, L., Thatcher, L., Lotter, W.D.	1999	Seed germination of <i>Opuntia stricta</i> : implications for management strategies in the KNP. <i>S. Afr. J. Bot.</i> 65(4) 295-298.
*Maggs, KAR.	1999	Investigation of vegetation changes along the Sabie River.
**Foxcroft LC. & Hoffmann J.H.	2000	Dispersal of <i>Dactylopius opuntiae</i> (Cockerell) (Homoptera: Dactylopiidae), a biological control agent of <i>Opuntia stricta</i> (Haw.) Haw. (Cactaceae), in the Kruger National Park. <i>Koedoe</i> 43(2): 1-5.
Mac Fadyen, S., Cilliers, C.J.C., Foxcroft, L.C. and Martin, B.W.	Started 2001, current	Basic phenology, seed viability and longevity of <i>Pistia stratoites</i> .
Foxcroft, L.C.	Started 2001, current	Factors influencing the distribution and abundance of <i>Opuntia stricta</i> and associated <i>Cactoblastis cactorum</i> in the KNP.
Leroy, M.	Started 2002, current	Changes in vegetation composition on the Sabie River in the Kruger National Park, after the February 2000 flood.
Reinhardt, C.F.	Started 2002, current	Interference potential of the invasive alien plant <i>Parthenium hysterophorus</i> with indigenous plant species, in the Kruger National Park
Erasmus, D.J., Maggs, K.A.R, Clayton, J.N.G. & MacIntyre, J	?	Economics of chemical control of <i>Lantana camara</i>
Foxcroft, L.C., Henderson, L., Nichols, G. and Martin, B.W.	Paper in prep	A revised list of alien plants for the Kruger National Park.
Hoffmann, J.H., Moran, C. & Zimmermann, H.G.	Cont from previous project, Current	Biological control of <i>Opuntia stricta</i> in Kruger National Park.

* indicates that no documents or reports are to be found in the KNP records, only a mention at some stage that such a project was registered
** indicates published work that emanated from the projects.

Although all efforts were made to follow-up on all projects in the KNP related to alien plants, documents are not always complete, or could not be traced at all. Further, should you have any information on certain projects please send copies to the IAS section. Should any project have been left out please alert the section so the records can be rectified.