

Aliens

the invasive
species bulletin

Newsletter of the IUCN/SSC Invasive Species Specialist Group

ISSUE NUMBER 33 ▲ 2013



100th of the worst



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FRONT COVER PHOTO

Salvinia mat

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Salvinia youngsters up close

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EDITORIAL

At the start of my second quadrennial as chair of the IUCN SSC Invasive Species Specialist Group we are at the start of an exciting phase in the activities of the group: the revision of the Global Invasive Species Database is almost completed; we have redesigned our newsletter, as you can see from the issue you hold in your hands; and I think I can say that we have an increasingly recognised role at the global level, as confirmed by the very fruitful collaborations we are having with key global institutions, including in particular the Secretariat of the Convention on Biological Diversity. We have also had important results in terms of communicating invasive species issues to the public, as shown by the success of the campaign to select the new 100th species to be included in the ISSG list of '100 of the World's Worst Invasive Species'; details of the campaign were published in *Nature* and are reported in this issue. The success of ISSG and the many positive results we have achieved in these past years have only been possible thanks to the efforts of all the members of our group, and the wider community of subscribers and supporters of the groups work. So I take this chance to thank all ISSG members for their continued commitment to support the work we do. I would also like to take the opportunity to welcome new members of the group, who I am sure will help us in strengthening our global role in the struggle against the effects of biological invasions and for achieving Aichi Target 9 by 2020.

Indeed it takes time – in some cases a very long time – before we see the results of our efforts, as some of the stories reported in this issue show well. I just realised that the first issue of *Aliens*, dated back to 1995 reported articles on: the program to eradicate goats from Aldabra island, Seychelles, in the Indian Ocean – the second largest atoll in the world; risks related

of the presence of the grey squirrel in Italy; and problems related to the presence of the Ruddy duck in Britain. In this issue you can read of the successful completion of goat eradication in Aldabra, some partly encouraging news from Italy – where the trade of the grey squirrel has been finally banned (although the removal of this highly invasive species still faces strong public opposition) – and, in a previous newsletter we have reported on the successful eradication of the Ruddy duck from Great Britain, which is now almost completed.

If successes in the management of invasive species take a long time to realise, influencing policy can be even slower. In this issue you will read that the European Commission has finally adopted a proposal for an EU regulation on invasive species, eventually responding to a commitment taken over six years ago. The proposed legislation follows the European Strategy on invasive species, on which I have worked since 1999, with Clare Shine – another very active ISSG member –; this was adopted by the Council of Europe 10 years ago. So, I think I can say that the new legislation is partly the result of the efforts of ISSG. We are committed to continue working with European institutions in the following years to try and influence the complicated process of approval of this proposed legislative tool.

Let me say that the only lesson we should learn from these stories is that we should never give up, and that with the enthusiasm and commitment that have always characterised our community, we can achieve important results, even if this can take a long time.

Piero Genovesi, ISSG Chair

GENERAL DISCLAIMER

All material appearing in *Aliens* is the work of individual authors, whose names are listed at the foot of each article.

Contributions are not refereed, as this is a newsletter and not an academic journal. Ideas and comments in *Aliens* are not intended in any way to represent the view of IUCN, SSC or the Invasive Species Specialist Group (ISSG) or sponsors, unless specifically stated to the contrary. The designation of geographical entities do not imply the expression of any opinion whatsoever on the part of IUCN, SSC, ISSG or sponsors concerning the legal status of any country, territory, or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.



short-term challenge is to develop legal and economic instruments, which are currently being worked out by the policy makers. The second challenge is to fill in the legal instruments with the help of combining scientific efforts when it comes to integrating and linking different databases, web portals and other data collections and including evidence based science. Furthermore the workshop addressed 4 issues: how to make the best prioritisations when it comes to regulations and management plans; how to balance our efforts with other stakes such as climate change and economy; future challenges when a similar species but genetically different from the original species becomes invasive and outcompetes the original species; how to build upon existing surveillance and monitoring systems such as citizen science.

When it comes to prioritisation for regulations and management plans, the recommendation was that scientists need to work on baselines to be able to compare the different (damaging) impacts. Work should be done on systematic data collection for empirical evidence of the risk assessments and how and when species changes or have changed from being a low risk species to a high risk species. Emphasis should be on collecting a burden of proof. Policy however should focus on the precautionary principle, but also on the regulations of already existing invasions (e.g. regional black (forbidden)/grey (monitored)/white (allowed) species lists).

With regard to balancing our efforts with other stakes 4 recommendations were formulated: 1) Focus on observatories and collecting evidence (evidence-based science) on impact on socio-economy, biodiversity, ecosystem functioning; 2) Because future risk assessments are difficult, we need to focus on documented risks in closely related and/or demographically/ecologically similar species (Evidence-based science) and work on the precautionary principle. Evidence-based science can furthermore help in scenario work for future risk assessments; 3) Work on strengthening existing ecosystems and make/keep them resilient and robust so they can 'defend' themselves against IAS; 4) Do not allow the introduction of alien species for the mere purpose of replacing natives as this amounts to a natural experiment with unforeseeable and unnecessary risks.

The discussion on out-competition and becoming invasive, it was decided that it is important to distinguish between natural movement of a species and the deliberate/artificial introduction of a species in a certain area. But insight is needed into what is 'genetic pollution' and when it occurs. Is losing ge-

netic variability harmful? We need to indicate what is happening in nature anyway and anyhow and keep in mind the adaptation capacity of native populations.

The participants also agreed not to (mis)use citizen science as a general and easy data collection tool but that we should work out specific targeted potentials within the big box of 'citizen science' and concentrate on those. However the effect of public involvement is poorly investigated and largely unknown and therefore long-term studies are necessary. Also studies on how public opinion is influenced are needed.

The session on Target 5 – addressing the problem of Invasive Alien Species – resulted in 9 recommendations as described above. For the specific formulation of the Target 5 recommendations and for information on the recommendations of the other 5 EU targets session, please look at <http://www.alter-net.info/outputs/conf-2013>.

() ALTER-Net brings together 26 leading scientific institutes from 18 European countries. They share the goal of integrating their research capability to assess changes in biodiversity, analyse the effect of those changes on ecosystem services and inform the public and policy makers on the issues at a European scale. Originally funded by the European Union's Framework VI program to stimulate a collaborative approach, ALTER-Net is now operating independently. See www.alter-net.info for more information.*

JISKA VAN DIJK
Norwegian Institute For Nature Research

Red-whiskered bulbul eradicated from Aldabra

In July 2013, the Seychelles Islands Foundation (SIF) completed their second invasive species eradication on Aldabra Atoll in less than a year when staff caught a single introduced red-whiskered bulbul *Pycnonotus jocosus* that has eluded capture efforts for almost a year.

The red-whiskered bulbul and a small population of introduced Madagascar fodies were discovered in the remote Takamaka area of Aldabra in March 2012. Both species are thought to have colonised from the nearby island of Assumption, where they were introduced from Mauritius in the 1970s. Assumption now hosts large populations of both species and eradication





Team Leader of Takamaka Eradication, Terence Mahoune, with the red-whiskered bulbul on Aldabra. Photo: J. Raguin

efforts there aimed to eliminate the threat of their introduction to Aldabra's avifauna.

Since then, an intensive eradication programme has been launched with the support of UNESCO Emergency Funding. Initial activities focussed on observations and setting up a field base in the area from which a permanent eradication team could be based. Following this, full-time eradication of the two species was started in January 2013. Although there appeared to be only a single red-whiskered bulbul, the bird proved extremely difficult to catch, despite targeted efforts. Eventually, in mid-July 2013, the SIF team of Terence Mahoune and Jeremy Raguin identified where the bird was roosting and managed to catch it in a mist-net. They subsequently confirmed that there were no other red-whiskered bulbuls present. Following the successful feral goat eradication in 2012 (see

article in this issue), the capture of this bird marks another invasive species eradication success for SIF. Aldabra was thought to be one of the largest tropical islands in the world with no introduced bird species prior to the discovery of red-whiskered bulbuls and Madagascar fodies at Takamaka. Re-gaining and maintaining Aldabra's status of free of introduced birds in the long-term, however, depends on further eradication successes on both Aldabra and Assumption.

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Goats eradicated from Aldabra Atoll

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MARC JEAN-BAPTISTE, WILNA ACCOUCHE, JOEL SOUYAVE,
PHILIP HAUPT AND FRAUKE FLEISCHER-DOGLEY

On 3rd August 2012, history was made for Aldabra Atoll, the Seychelles and for international conservation, when the last feral goat (*Capra hircus*) on Aldabra was shot.

The shooting of the last goat marked the end of eradication efforts which had lasted for more than 25 years, and an intensive programme for the previous 5 years. Several approaches were applied across the years. The most successful, and the key to eliminating this species from Aldabra, was the hormone-supplemented sterile Judas-goat technique, pioneered by Taylor et al. in the Hawaiian islands (Taylor & Katahira, 1988).

The introduction of feral goats to islands worldwide has caused widespread ecosystem degradation and biodiversity loss (Taylor & Katahira, 1988, Campbell et al, 2007, Cruz et al, 2009). On Aldabra Atoll, goats were introduced before 1878 and within 50 years there were reports of thousands on the atoll (Stoddart, 1981). When the Royal Society arrived in 1967, goats were present on all four main islands of Aldabra (Grande Terre, Picard, Malabar and Polymnie) as well as a smaller lagoon island (Ile Esprit) (Stoddart, 1981). Viewed as a major threat to Aldabra's endemic biodiversity, elimination of the goats rapidly became a priority for the Seychelles Islands Foundation (SIF), the management authority of Aldabra (Fig.1).

SIF came into being under legal decree in 1979 with a specific mandate to manage and protect Aldabra. Aldabra became a UNESCO World Heritage site in 1982 and, several years later, SIF was also assigned responsibility for the Seychelles' second UNESCO World Heritage Site, the Vallée de Mai. SIF has been responsible for both sites since 1989.

The first targeted control programme initiated by SIF was in 1987–1988. Coblenz et al. (1990) showed that goats were altering plant species composition and slowing the regeneration of natural vegetation as well as reducing shade cover and forage for giant tortoises (*Aldabrachelys gigantea*). During this period, 883 goats were eliminated by shooting: 814 from the largest island of Grand Terre, 61 from the second largest island of Malabar and eight from Aldabra's third largest island, Picard.

Then, in 1988, an eradication programme using the Judas goat method was applied for the first time. This method was developed and first used by Taylor and Katahira (1988) and uses radio-transmitters attached to leather collars, which are then fitted to goats (Fig.2). These goats are known as 'Judas' goats, which are then tracked and monitored. The method exploits the social and gregarious nature of feral goats. Goats will associate closely with each other and Judas goats in the group

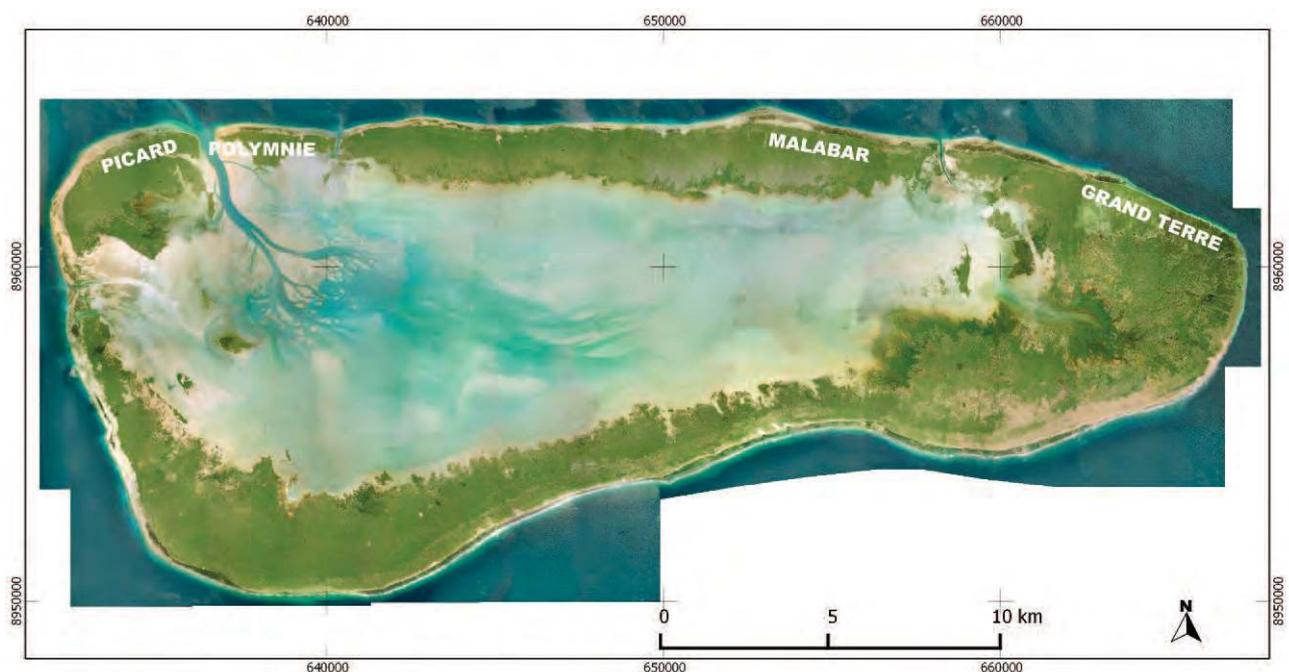


Figure 1 - Map of Aldabra Atoll. Copyright: SIF



Figure 2 - Judas goat fitted with radio telemetry collar
Photo: Rainer von Brandis

can be tracked to allow non-Judas associates to be eliminated (Taylor and Katahira, 1988; Campbell, 2007). The Judas goats themselves are not shot and will go on to associate with other goats so the process is repeated. Using this method, 28 Judas goats were created and by 1995, goats had been eradicated from all islands of Aldabra except Grand Terre (Fig. 1), where it was estimated that 84 remained (Rainbolt & Co-blentz, 1999). A follow-up effort was then conducted in 1997, when a further 106 goats were culled on Grande Terre (SIF unpublished data) but not eliminated. Between 2000 and 2005, approximately 250 goats were shot on a non-targeted opportunistic basis using conventional hunting methods (von Brandis, 2007).

In 2006, planning began for a concerted effort to complete the eradication programme using recent advances in Judas goat methodology (von Brandis, 2007). At that time, it was estimated that approx. 100–200 goats remained on eastern Grand Terre (von Brandis, 2007) and there were not thought to be goats outside this area. After substantial planning and preparation, the field programme began its intensive 5-month period in August 2007 with a team of four staff, including the project manager, two additional hunters and a veterinarian. Selected male and female Judas goats were immobilised with tranquiliser darts and then prepared for active Judas goat service following Campbell et al.'s (2004) method. This includes sterilisation of both sexes, hormone treatments of females to induce abortions in pregnant females and oestrus in non-pregnant females, and additional hormone implants of females to increase oestrus by 6–16 times. Radio-telemetry collars with a battery life of 2–3 years and a range of 1–10 km were also fitted (Campbell et al, 2005). Judas goats were woken up



Figure 3 - SIF Aldabra rangers learning to use telemetry equipment.
Photo: SIF



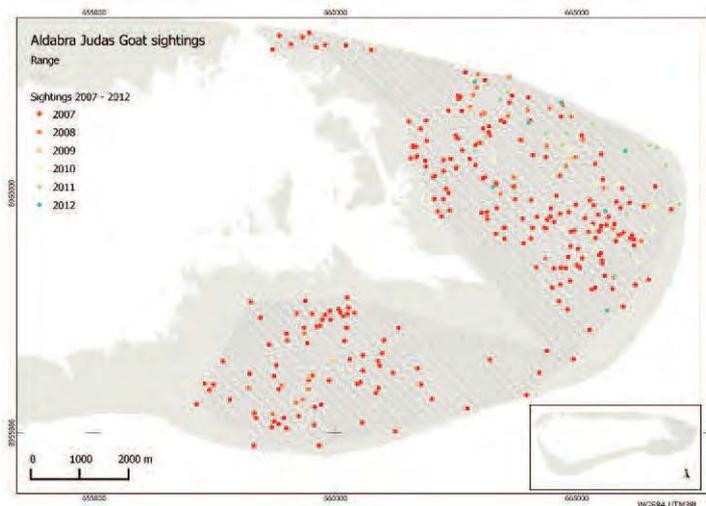


Figure 4 - Map of Judas goat range on Grande Terre 2007 - 2012

with a reversal agent and monitored for several days until they were behaving normally and associating with other goats again.

Associations of Judas goats with other Judas goats were split up by recapture and relocation or elimination of one of the pair. By the end of the intensive period, 202 more goats (or almost equal sex ratio) had been shot by the eradication team and six Judas goats remained for follow-up monitoring (von Brandis, 2007). The home range of the Judas goats had increased substantially in size as the goat population reduced (von Brandis, 2007). Of the eliminated goats, 49% were below the age of 15 months, indicating that the population had been in a state of sharp increase (von Brandis, 2007).

With the intensive Judas goat establishment and hunting programme drawing to a close, the importance of monitoring and continued surveillance was emphasised. One vital part of the intensive programme was to train several local SIF staff from the Aldabra research team in the use of telemetry gear and tracking. It was proposed for SIF staff to monitor the Judas goats for 2 years on a monthly basis since eradication was not possible to confirm before completion of the monitoring programme. The aim of the monitoring was to locate any remaining associate goats after the end of the main eradication effort as it was expected that there were still some non-Judas goats present on Aldabra.

Although a two year period of monitoring effort was stipula-

ted to ensure completion of the eradication, the remaining six Judas goats were actively monitored by SIF staff on a monthly basis for more than four years following the end of the intensive hunting effort (from late 2007 until early 2012). Staff went on monthly 3-5 day long field trips to Eastern Grand Terre to track the Judas goats and eliminate further associate goats, as well as searching other areas for signs of goats. From the end of the hunting phase in December 2007 to the end of the eradication in 2012, a further 21 goats (excluding Judas goats) were shot by the team with the majority (17) shot in 2008.

One complication was the draining of the battery life of all Judas goat radio-transmitters throughout 2009.

It had been anticipated that the eradication would have been completed by this point but with goats still being shot, albeit at a low level, it became essential to fit new collars in order to continue the monitoring programme. Re-collaring requires additional skills in wildlife darting, so an external short-term consultant was recruited to initiate this effort and train staff in darting and processing of darted goats. This was successful and by October 2010, four Judas goats had received new collars.

The last two non-Judas goats were shot in March 2010 (Currie, 2010). The Judas goats continued to be monitored monthly and in 2011, in addition to the monthly monitoring trips, on-foot searches of areas other than the Judas-goat frequented region were undertaken to check for signs of goats. No signs were found. In September 2011, one of the two female Judas goats was intentionally shot to stimulate searching behaviour in the males who had to become attached to her. In December 2011, after seeing no associate goat for 1 year and 9 months, an aerial survey was conducted by the Indian navy. Their main objective was to scan the eastern Grand Terre region and assess whether more than five collared goats were present (van de Crommenacker, 2011). The helicopter survey identified and photographed four goats, all of which were later identified as Judas goats.

With the helicopter survey complete and no sightings of non-Judas animals for almost 2 years, it was decided in early 2012 that it would be necessary to give the eradication the final stamp of approval via external verification. Thanks to funding from the European Union for an invasive alien species project,

two consultants were hired to eliminate all but one of the remaining four Judas goats and to cover Grand Terre on foot searching for signs of goats (Fig. 4). The consultants stayed for a total of 9 weeks on Aldabra from January to March 2012 and covered more than 1000 km on foot. They found no signs of goats other than those linked to the Judas goats. Three of the four remaining Judas goats were then shot to remove confusing signs of goat presence, and the last goat, J8 (because it had been the most effective Judas individual), was left alive, and then monitored 3 months later to determine whether he had managed to seek out any other animals. In June and July 2012 J8 was tracked and it was confirmed that it was alone, so the decision was taken to eliminate it as the last goat on Aldabra. Finally, on 3rd August 2012, J8 was tracked and shot, marking the end of feral goat inhabitation on Aldabra and the completion of an eradication attempt that had lasted for more than a quarter of a century.

Conclusions and lessons learned

A total of 2,344 goats were shot over the 25-year period. This success has been an important achievement for the conservation of Aldabra but many lessons have been learnt in the process, which can be summed up as follows:

- Judas goat techniques using radio transmitting technology have been an extremely effective tool to remove feral goats from Aldabra Atoll.
- The programme has been expensive, long lasting, and faced many logistical challenges owing to the remoteness of Aldabra
- The success stemmed from a collaborative group effort, which involved many SIF staff (from all Aldabra staff on the ground to administration staff in the office) at various levels, including, trackers, hunters, darting, field skills, logistical arrangements, tactical strategy and project coordination in addition to external consultants.
- Detailed protocols, in field observation data, and reports play an important role in documenting eradication, and providing information driving strategy and management
- In field, high quality, on-the-job training of local staff has been an essential component of the project. Such a long-term project can only be sustained and afforded when in-house and local staff are present and dedicated to maintain

the effort

- The relatively high staff turnover resulted in more local staff being trained and participating in this successful project
- Attention to detail and forward planning is essential – in our case, the batteries of the radio transmitters could have run flat, resulting in the loss of the Judas goat advantage in the field. If this detail was missed, or if we were unable to locate the Judas Goat in time success may have been harder to achieve. We were lucky that this was not the case.
- Early preparation and expectation of problems is essential, especially when dealing with firearms and other sensitive equipment such as telemetry gear and darting items.
- Pre-eradication surveys of the vegetation and other aspects of the biodiversity in goat-invaded areas would have been very useful in assessing the impacts post-eradication
- Funding should be sought at a later stage to support final completion of the eradication.
- Bringing the eradication to an end took longer than expected, but external verification by several methods (aerial helicopter survey, intensive on-foot search) helped to successfully close the project and confirm its success.
- Most importantly, prioritisation and commitment by the organisation(s) involved has been the key factor in ensuring the success of this eradication by ensuring staff and equipment resources, as well as full logistical support, are provided.

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