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Animal Welfare 2010, 19: 481-499
ISSN 0962-7286

A survey of wildlife rehabilitation in South Africa: is there a need for improved management?

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Abstract

The focus of wildlife rehabilitation is the survival of the individual animal, often leading to rehabilitators being in conflict with government wildlife officials, who regulate the industry and whose focus is on the security of entire wildlife communities. In South Africa, wildlife rehabilitation has been the focus of recent attention from the general public, government and academics, due mostly to the development and adoption of norms and standards for the management of primates. Our study was initiated to provide the first survey of rehabilitation centres in South Africa. Questionnaires were returned by 65% known rehabilitation centres in South Africa, including all nine Provinces, through which several thousand injured, diseased and orphaned animals pass each year. It is clear there is a need for rehabilitation centres in South Africa. However, due to a lack of scientific research on the efficacy of rehabilitation methods for care and release, and minimal post-release monitoring, wildlife rehabilitation techniques and protocols have been based on work experience and subjective intuition. In conjunction with a lack of funds, there may be negative impacts on individual animal welfare and survival, as well as on conservation efforts for wildlife communities. Similar issues have been documented in other regions of the world. In the authors' opinion, centralisation of wildlife rehabilitation to national or provincial government is a necessity. Furthermore, it is suggested that guidelines of minimum standards should be developed in consultation with experienced rehabilitators, veterinarians and conservation scientists; to be enforced by trained and dedicated conservation officials.

Keywords: *animal welfare, conservation, government, minimum standards, South Africa, wildlife rehabilitation*

Introduction

Wildlife rehabilitation is defined as the treatment of injured, ill and orphaned wild animals, under temporary care, with the goal of releasing them back into their natural habitat (Trendler 1995a; Anon 2008a). It is often seen as playing a vital role in conservation and increasing the public awareness of animal welfare issues (as reviewed by Kirkwood 1992; Trendler 1995a; Aitken 2004). Others, however, believe wildlife rehabilitation can have negative impacts on conservation. For example, it could divert money away from habitat protection (as reviewed by Kirkwood 1992) and when rehabilitated animals are released it could place wild populations at risk (eg disease and genetic pollution) (as reviewed by IUCN 2000; Measures 2004; Soorae 2005). Therefore, there is a dichotomy in opinion, whereby rehabilitators focus on the individual animal and government wildlife officials focus on the security of entire wildlife communities (Dubois 2003; Aitken 2004).

Differences in perceptions between wildlife officials, who issue and enforce permits, and rehabilitators, were examined in Canada to determine whether this would prevent effective communication and co-operation between these groups (Dubois & Fraser 2003a). Both saw the main goals of rehabilitation as caring for injured and orphaned wildlife until release, or if necessary, euthanasia, as well as educating the public to prevent these problems in the future (Dubois & Fraser 2003a). However, additional contributions mentioned by rehabilitators (eg contributing to wildlife conservation and research), were not acknowledged by officials (Dubois & Fraser 2003a). Both groups stated that the main impediment to rehabilitation was a lack of funding, while only rehabilitators mentioned the lack of support and acknowledgement by government as an additional impediment (Dubois & Fraser 2003a). Contrasting views were also apparent in the role played by enforcement in rehabilitation, where rehabilitators believed that the issue and control of permits was not strict enough, while wildlife officials thought that there was enough enforcement, but agreed that some permit applications were approved without inspection, and officials were generally not qualified to assess quality of care at centres (Dubois & Fraser 2003b).

https://doi.org/10.1017/S0962728600001962 Published online by Cambridge University Press

Jointly, the International Wildlife Rehabilitation Council (IWRC) and National Wildlife Rehabilitators Association (NWRA) in the USA created minimum standards for wildlife rehabilitation in an attempt to increase the post-release success of rehabilitated animals by providing standards and guidelines for their care, and preparation for their release (Miller 2000). Guidelines for all aspects of the rehabilitation process are emphasised, starting from admission of the animal (eg intake records), health checks, disease control, housing requirements and decisions around release (Miller 2000). This document has been adopted by a number of US states as permitting guidelines (Miller 2000); and has been used by Western Australia to develop its own minimum standards (Anon 2008b). However, an attempt by the IWRC and NWRA to have a certification programme, where completion would mean that the person has "met minimum knowledge standards set by peers in the field" (Gurso 2006); has been opposed by some rehabilitators (Kosch-Davidson *et al* 2006).

In addition to welfare implications, non-compliance with established minimum standards could potentially result in the loss of useful information. An example is the general lack of adequate record-keeping by centres (eg Fajardo *et al* 2000; Dubois & Fraser 2003c), which makes it hard to assess the successes or failures of rehabilitation methods (Trendler 1995a; Miller 2000). Similarly, because post-release monitoring is rarely done (eg in Spain: Fajardo *et al* 2000), success of a release cannot be determined (Verdoorn 1995; IUCN 2000), and the rehabilitation process modified accordingly (Clark *et al* 2002; Beringer *et al* 2004). Even if releases are monitored, there is disagreement as to what defines 'success', whereby a release could have 90% mortality, but be deemed successful in terms of breeding and loss of dependence on humans in the surviving animals (Borner 1985). A primary factor contributing to a lack of post-release monitoring is its low funding priority (Kirkwood & Sainsbury 1996; Lloyd 1999; Dubois & Fraser 2003c). Rehabilitation centres are not supported by local government, and thus are dependent on their own money (Jacobs 1998), or money made from merchandise sales, memberships, public relations functions, charitable private donations (including bequests) (Kunz 1995) or corporate sponsorship (Reynolds 1995). Furthermore, most funding is normally spent on food for animals, housing, medication, and veterinary care (Trendler 1995b; Jacobs 1998), as well as on staff salaries (Kunz 1995).

Wildlife rehabilitation in South Africa was started by nature conservation agencies in the 1950s, but by the late 1980s rehabilitation became a low priority for conservation and it moved into the private sector (Carr 1995). A few years later, the first wildlife rehabilitation conference was held, where minimum standards for care (Trendler 1995a) and release (Verdoorn 1995) were presented, as well as plans to form a 'Rehabilitation Council' (Lockwood 1995). This has been the only national rehabilitation conference and, to-date, nothing has come to fruition, until recently. The conservation authority, Ezemvelo KwaZulu-Natal Wildlife (EKZNW) has developed three documents pertaining to wildlife rehabilitation, namely *Ex Situ Wild Animal Management Policy, Norms and Standards for Care and Management of Ex Situ Vervet Monkeys* Cercopithecus aethiops *in KwaZulu-Natal*, and *Norms and Standards for the Management of Primates in KwaZulu-Natal*. The latter document (Anon 2008c) was recently adopted by the Board of EKZNW. The documents were developed in consultation with various stakeholders after many public meetings. Following these meetings, it became a permit requirement for those wanting to rehabilitate primates in KwaZulu-Natal to complete and pass a course on captive indigenous primate care and management.

During the meetings mentioned above, the apparent conflict in opinion between wildlife conservation officials and wildlife rehabilitators encouraged the inauguration of our study. Our study aimed to provide the first assessment of rehabilitation centres in South Africa, in terms of numbers, the species rehabilitated, pre- and post-release protocols, and economics, to determine the necessity of adoption of primate (and possibly others) norms and standards, and their likely enforcement.

Materials and methods

All rehabilitation centres in South Africa are required to obtain a permit from the provincial government. Depending on the province, these need to be renewed annually or every few years, and include specifications on the species that can be rehabilitated. Rehabilitation centres need to keep intake records, which are requested by some provinces to be sent to the permit officers on an annual basis. Presently, only four out of nine provinces have any guidelines to assist decision-making surrounding permit applications and release of rehabilitated animals.

The permit officers for each of the nine provinces in South Africa were contacted in December 2006 for a list of all their registered rehabilitation centres. The founder or senior rehabilitator from each centre was contacted by telephone or email. The purpose of the survey was explained and they were then asked whether they would be willing to fill out the questionnaire. Due to logistical restrictions, personal visits were made to most of the centres based in only five of the nine provinces (Western Cape, KwaZulu-Natal, Gauteng, Mpumalanga, and Limpopo). Personal visits were made to ensure questionnaires were answered and to objectively verify their responses. Although there are other organisations that receive wild animals for rehabilitation, including animal welfare organisations (eg SPCA), zoological gardens and aquaria, these were not included in the survey because they are not strictly designated as rehabilitation centres under South African law. Wildlife sanctuaries were also excluded, because they are not permitted to release any animals.

The questionnaire (see Appendix 1) was designed to probe rehabilitation in South Africa in as broad a manner as possible, such that there were 48 questions in total. It included a cover page stating the purpose of the study, that

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https://doi.org/10.1017/S0962728600001962 Published online by Cambridge University Press

Table 1 Number of centres in each province, how long they have been in existence and answers by rehabilitators to where their centre is based. Note that some rehabilitators were based out of more than one centre, such that the number given for this question is not representative of the number of rehabilitators (n), but how many times an option was selected (S).

Question	Options given in the questionnaire (a-m) or additional answers given	S (%)
1) Number of centres in each province (n = 63)	Eastern Cape	4 (6)
	Free State	3 (5)
	Gauteng	11 (17)
	KwaZulu-Natal	20 (32)
	Limpopo	7 (11)
	Mpumalanga	1 (2)
	North West	3 (5)
	Northern Cape	1 (2)
	Western Cape	13 (21)
2) Number of years centre has been in existence (n = 38)	1–5 years	13 (34)
	6–15 years	15 (39)
	16–25 years	7 (18)
	26–40 years	3 (8)
3) Location of centres (n = 39)	a) Small holding	13 (30)
	b) Private home	16 (37)
	c) Municipal land	3 (7)
	d) Other (game reserve, farm, private landholding eg vineyard)	11 (26)

confidentiality is guaranteed, and the main researcher's contact details. There were six sections, entitled: 'General', 'Animal intake', 'Records', 'Housing', 'Release', 'Post-release', 'Finance' and 'Concluding remarks'.

Most questions were structured with answers listed as multiple choice, where one could select as many options as was wanted, and included the option, 'other', for rehabilitators to add their own information if they felt the options given were not suitable. They were also encouraged to expand on their answers. These two reasons, as well as some rehabilitators not answering all the questions, resulted in sample sizes not being reflective of the number of respondents. Thus, the number of rehabilitators that responded to the question is represented as 'n', while 'S' is used to signify the number of times an option was selected. Some questions and sections are not presented in this paper, and not all the answers that were given by the respondents for a question are listed. Only the most common answer for the 'other' option is reported. Differences in responses were assessed using percentages.

Note that the answers given by rehabilitators when asked to list five common species coming into their centre, were grouped according to animal class (ie bird, mammal, reptile). For each class, animals were placed into a category. Categories for mammals and reptiles were derived from orders or sub-orders, whereas birds were placed into categories used by the rehabilitators themselves. Several sources were used to identify order and family names for birds (Hockey *et al* 2005), mammals (Skinner & Chimimba 2005), and reptiles (Alexander & Marais 2007).

Results

Rehabilitation centres

Sixty-three registered rehabilitation centres in South Africa were contacted. Most of these centres occurred in KwaZulu-Natal Province (Table 1). Over 65% (n = 41) of questionnaires were returned, with responses from all nine provinces. Most centres had been in existence for 6–15 years (Table 1) and most were based in private homes (Table 1). Some centres operated out of more than one property.

Goals, impediments, minimum standards and permits

The most common goals of wildlife rehabilitation (Table 2) were listed as releasing animals back into the wild, and caring for incapacitated wild animals. The main problem in obtaining these goals (Table 2) was listed as a lack of money.

When asked whether rehabilitation centres would benefit from guidelines for minimum standards for wildlife rehabilitation, most said yes (83%, n = 34), mainly "to prevent ignorance causing unprofessional and inhumane rehabilitation". However, many of these respondents also gave reasons against having guidelines. Combining these reasons with those given by respondents who replied 'no' to benefiting from guidelines (17%, n = 7) (Table 2), the main reasons were because "most people have this knowledge", "they are doing a good job within their limitations", and there is the "problem of who establishes the standards".

When asked whether the issuing and enforcement of permits was "important and functioning correctly" (option

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Table 2 Answers by rehabilitators to questions on goals and impediments to wildlife rehabilitation, minimum standards and permit conditions. Note that as a result of there being no limitations on the number of times an option could be selected, the column S refers to the number of times each rehabilitator (n) selected an answer.

Question	Options given in the questionnaire (a-m) or additional answers given	S (%)
1) Goals of wildlife rehabilitation (n = 41)	(a) Caring and helping of injured/orphaned wild animals	36 (23)
	(b) Manage interaction between animals and people	20 (13)
	(c) Education to prevent these problems in the future	29 (19)
	(d) Releasing animals back into the wild	37 (24)
	(e) Wildlife conservation	26 (17)
	(f) Other (eg animals away from untrained people; captive breeding and release of endangered reptiles)	6 (4)
2) Main problems in obtaining these goals (n = 41)	(a) Lack of money for facilities/supplies/staff	29 (17)
	(b) Lack of trained staff	11 (6)
	(c) Lack of government support and subsidy	20 (11)
	(d) Inadequate media coverage	9 (5)
	(e) Public picking up animals unnecessarily	22 (13)
	(f) Public keeping wild animals irresponsibly	24 (14)
	(g) Lack of knowledge of post-release survival	11 (6)
	(h) Lack of norms and standards for rehabilitation centres	10 (6)
	(i) Strict permit conditions	11 (6)
	(j) Lack of available release habitat	14 (8)
	(k) High post-release mortality	3 (2)
	(l) Lack of research	9 (5)
	(m) Other (eg legislation not supportive, seemingly no need for us, too many animals coming in, lack of harmony with rehabbers)	5 (1)
3) Minimum standards		
Reasons for (n = 20)	Ignorance results in unprofessional and inhumane rehabilitation (eg species treated incorrectly, inadequate disease control)	13 (54)
	Standardise procedures from all centres (bring new ideas, information is shared) and make decisions easier	6 (25)
	Lower morbidity and mortality of releases (eg ensuring released in right areas)	3 (13)
	People with wrong agenda (eg hoarders) prevented from rehabbing	2 (8)
Reasons against (n = 13)	Most people have/should have this knowledge and doing a good job within their limitations	4 (24)
	Problem is who establishes the standards (need experienced rehabbers who understand the constraints)	4 (24)
	Not enough wildlife officials to monitor and they are not experienced (they need guidelines)	3 (18)
	It won't work because of rehabbers' egos and own agendas	2 (12)
	Guidelines but not enforcement, because of costs involved and subjective issues (eg euthanasia)	2 (12)
	It won't work because each species would need its own guideline	2 (12)
4) Permits are not being enforced properly/are a hindrance (n = 26)	Unsuitable people are issued/re-issued permits, do not notice if don't comply, because wildlife officers do not know enough about rehabilitation	9 (26)
	Not enough officers/impractical to enforce, not inspected frequently enough	4 (12)
	Permit conditions inappropriate/impractical/too general	7 (21)
	Too many people (especially public) have wild animals without permits	3 (9)
	Well established rehabbers are continuously harassed	2 (6)
	Other (eg personal agendas in permit office, conservation act not strong enough, different rules apply to different species, not focusing on animal traders/zoos)	9 (26)

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Table 3 List of animals given by rehabilitators when asked to list five common species coming in to their centres, where the column S lists the number of centre (out of n = 39) who listed the species.

Animal class	Order/group	Animals included (Common name, Family name)	S (%)
Mammal	Order Hyracoidea	Rock hyrax (Procaviidae)	1 (1)
	Order Lagomorpha	Scrub hare (Leporidae)	2 (3)
	Order Rodentia	Porcupine (Hystricidae)	3 (4)
	Order Primates	Galago (Galagidae), Chacma baboon (Cercopithecidae), Vervet monkey (Cercopithecidae)	20 (26)
	Order Chiroptera	Bat (various)	2 (3)
	Order Carnivora	Genet, Civet (Verridae); Mongoose, Suricate (Herpestidae); Jackal, Wild dog (Canidae); Otter (Mustelidae); African wildcat, Black-footed cat, Cheetah, Leopard, Lion (Felidae)	25 (33)
	Order Erinaceomorpha	Hedgehog (Poaceae)	6 (8)
	Order Ruminata	Bushbuck, Reedbuck, Duiker (blue and grey) (Bovidea)	15 (20)
	Unknown	Unknown species of mammals	2 (3)
Bird	Unknown	Unknown species of birds	9(18)
	Garden birds	Doves (Columbidae, order Columbiformes), Hadeda ibis (Threskiornithidae, order Ciconiiformes)	7 (14)
	Water birds	Geese, Duck (Anatidae, order Anseriformes)	3 (6)
	Owls	Spotted eagle owl, Wood owl (Strigidae), barn owl (Tytonidae) (all order Strigiformes)	11 (22)
	Crows	Corvidae, order Passeriformes	1 (2)
	Raptors	Eagles, Hawks, Kite (yellow-billed, black-shouldered), Goshawk, Buzzard, Vulture (Accipitridae), Secretary bird (Sagittariidae), Falcons, Kestrel (Falconidae), (all order Falconiformes)	18 (35)
	Sea birds	Cormorant (Phalacrocoracidae), Penguin (Spheniscidae) (both order Ciconiiformes)	2 (4)
Reptile	Reptiles	Unknown species	3 (13)
	Order Chelonia	Terrapin (Pelomedusidae) and Tortoise (Testudinidae)	7 (30)
	Order Squamata, Sub-order Serpentes	Snake (Various)	6 (26)
	Order Squamata, Sub-order Sauria	Chameleon (Various), Monitor (Various), Lizard (Various)	6 (26)
	Order Crocodylia	Crocodile (Crocodylidae)	1 (4)
Amphibian	Order Anura	Frog (Various)	1 (n/a)

A), "could be important, but not being enforced properly and permit conditions not strict enough" (option B), or "not useful and even a hindrance to doing rehabilitation" (option C), out of those who responded (n = 40) most chose option B (56%, n = 21), but emphasised that issuing and enforcement of permits "is important" and "permit conditions are strict enough". Only a few rehabilitators responded to option A (27%, n = 11) and option C (17%, n = 8). The main reason given for choosing option B and C was that "unsuitable people have permits or are re-issued permits" (Table 2), while the reason given for option A (n = 11) was that rehabilitation "needs control or standards" (ie "not everyone should be rehabilitating animals").

Animal intake

There was an estimated annual intake total of 16,289 animals and an average intake of 418 (± 134) animals per annum admitted to 39 of the 41 surveyed rehabilitation centres across South Africa, with a range of 3–3,600 animals. Taking into account these rehabilitation centres, birds were most commonly admitted, 83% (347 [± 120]) per annum, followed by mammals, 12% (50 [± 15]), and reptiles, 4% (18 [± 5]). The mammals listed were from eight different orders and 13 families, with mammals from the order Carnivora being the most common (33%); while birds came from seven orders and eleven families, with raptors being the most common

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Table 4 Answers by rehabilitators to questions on the species rehabilitated, fate of non-rehabilitated species, the presence of a veterinarian, health checks conducted at the centre and quarantine policy. Note that as a result of there being no limitations on the number of times an option could be selected, the column S refers to the number of times each rehabilitator (n) selected an answer.

Question	Options given in the questionnaire (a-i) or additional answers given	S (%)
1) Reason for your centre not rehabilitating all species (n = 34)	We are a specialist centre (eg because increase chance of survival, it is a permit condition)	14 (38)
	The centre does not have the capacity (eg for large animals)	11 (30)
	Rather send to specialists (eg because they have experience)	7 (19)
	Do not rehabilitate exotic species	4 (11)
	Not allowed to release tortoises after rehabilitation (provincial government stance)	1 (3)
2) How do you deal with species that you do not rehabilitate (n = 37)	(a) Accept and transfer to another rehabilitation centre	30 (64)
	(b) Accept and euthanase these animals	4 (9)
	(c) Do not accept and refer to another rehabilitation centre	13 (28)
3) Do you have a veterinarian at your centre (n = 38)	(a) Yes, permanently	3 (8)
	(b) No	27 (71)
	(c) Sometimes	8 (21)
4) What health/disease checks do you do? (n = 34)	Feather/skin/coat condition	6 (8)
	Disease (eg salmonella, trichomoniasis, mange)	11 (15)
	Parasites (internal and external)	21 (28)
	Psychological (eg changes in behaviour, lethargy)	5 (7)
	Body condition (including weight, any injuries)	12 (16)
	Stools (eg diarrhoea present)	6 (8)
	Appetite	5 (7)
	If recovering from treatment	3 (4)
	Other (eg deworming, check for bumblefoot, condition of teeth, veterinarian does check)	5 (7)
5) Under what circumstances do you quarantine? (n = 31)	On arrival	19 (54)
	When disease suspected	10 (29)
	On advice from veterinarian	5 (14)
	Permit condition	1 (3)

group (35%); and reptiles came from three orders and seven families, with reptiles from the order Chelonia (30%) being the most common (Table 3). There was one centre that accepted frogs.

Only two out of 41 centres said that they rehabilitate all animal species, while those who did not (n = 39) stated that it was mainly as a result of specialising (Table 4). Most of the centres that were brought an animal species by the public that they did rehabilitate, would accept the animal and transfer it to another centre (Table 4), but often the decision would depend on the species.

Health checks

Most centres did not have a permanent veterinarian (Table 4). However, most (87%, n = 34) centres performed frequent health checks, compared with 8% (n = 3) who never did and 5% (n = 2) who sometimes did. The health checks (Table 4) were mainly for parasites (internal and external). Most centres had a quarantine policy (82%, n = 31), generally on an animal's arrival, while those that did not quarantine (18%, n = 7), generally believed they did not need to, as the individuals were housed separately anyway.

Record-keeping

Most rehabilitation centres kept records (93%, n = 37), and the three that did not responded that "there was no need" and had "never been requested for it". Most rehabilitation centres believed that they could make improvements to their recording system or the way it processes the data from the records (73%, n = 27), mostly because "there is always room for improvement", including changes from hard copy to computerised records. Those that did not believe they needed improvement (27%, n = 10) mostly stated that their methods were "good enough", but some stated that they "saw no reason to do so because no one would use it".

Pre-release

Most rehabilitation centres individually marked the animals in some way for identification while at the centre and/or post-release (60%, n = 24), compared with 40% who did not (n = 16). The most common method of

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Table 5 Answers by rehabilitators to questions on non-releasable animals and criteria for euthanasia. Note that as a result of there being no limitations on the number of times an option could be selected, the column S refers to the number of times each rehabilitator (n) selected an answer.

Question	Options given in the questionnaire (a-i) or additional answers given	S (%)
1) When would you not release an animal into the wild (n = 18)	a) It is an exotic species	18 (20)
	b) There is no suitable habitat for release	13 (15)
	c) It is blind/deaf	16 (18)
	d) It has only one leg/one wing	16 (18)
	e) It cannot walk/fly	15 (17)
	f) Other (eg imprinted/humanised, endangered species [for breeding])	10 (11)
2) If an animal cannot be released into the wild do you: (n = 34)	(a) Euthanase	18 (20)
	(b) Transfer to a sanctuary or zoo	23 (26)
	(c) Give to permit-keeping members of the public	7 (8)
	(d) Kept at your centre for education purposes	16 (18)
	(e) Kept at your centre for breeding purposes	10 (11)
	(f) Kept at your centre for rearing young	11 (13)
	(g) Other (eg other breeding programmes, falconry)	3 (3)
3) If your centre euthanases animals, when would you do this? (n = 38)	(a) When the animal has non-repairable injuries	34 (50)
	(b) There are no resources to care for the animal	1 (1)
	(c) The animal is an exotic species	3 (4)
	(d) The animal is a common species	0 (0)
	(e) The animal is in poor condition	3 (4)
	(f) Problem animals	3 (4)
	(g) Potentially diseased	10 (15)
	(h) Heavily infested with ecto- and endoparasites	1 (1)
	(i) Other (eg untreatable/infectious disease, no chance at having a pain-free life, will not have a good quality life, vet's recommendation, injured common species)	13 (19)
4) If your centre does not euthanase, what is the reason? (n = 6)	(a) Public opinion	0 (0)
	(b) Centre's policy ('It is our last resort')	4 (64)
	(c) Permit regulations	0 (0)
	(d) Funding sources	0 (0)
	(e) Lack of resources to perform euthanasia ('Veterinarian euthanases')	2 (33)

marking was using leg-bands on birds. Other methods included ear-tags on mammals, radio-collars, microchips, shaving sections of fur, markings on wings (tags or windows cut into primaries), using dye, and cable-ties. Those that did not mark all animals, mostly stated that it was not needed (eg data not used), while others stated it was not practically possible, the current methods were not suitable and they "never thought about it". Two respondents reported that they had received birds that were injured due to ill-fitting bird bands.

To the question "when would you not release an animal into the wild" (Table 5), most responses were "if it is an exotic species". If the animals could not be released into the wild (Table 5), most would transfer it to a sanctuary or zoo. Several respondents made it clear that they would only send it to a sanctuary and not to a zoo as stated in the original option. Most centres euthanased animals (Table 5) when the animal had non-repairable injuries. Most additional answers to this question included that euthanasia was only performed "if no other choice", when the animal has "absolutely no chance at having a pain-free existence" or "no chance at a good quality life in captivity" (Table 5). One rehabilitator never had to have an animal euthanased, as the individual "either survives and thrives or dies". Other centres stated that they generally did not euthanase animals as that was the policy of the centre (Table 5).

Release

Several methods were listed by rehabilitation centres for how animals were prepared for release (Table 6), but it mainly involved placement in a different pen, which was more natural and bigger than the other enclosures, and getting them fit (increasing muscle mass) by forced exercise. Characteristics used to judge whether an animal was fit for release (Table 6) were mainly that the individual was able to fend for itself in the wild, and was healthy, but also included whether it was flying and/or walking properly and whether it was not human-imprinted.

https://doi.org/10.1017/S0962728600001962 Published online by Cambridge University Press

Table 6 Answers to questions on how rehabilitators prepare an animal for release and judge whether an animal is fit enough. Note that as a result of there being no limitations on the number of times an option could be selected, the column S refers to the number of times each rehabilitator (n) selected an answer.

Question	Answers given	S (%)
1) How do you prepare an animal for release? (n = 31)	Placed in a different pen to live (mimic release environment, bigger, natural)	10 (20)
	Get them fit, eg via falconry, flight cage, forced to swim	9 (18)
	Break bond with human (eg reduce contact, correct socialisation)	6 (12)
	Soft release	6 (12)
	Receive indigenous food	4 (8)
	Healthy	4 (8)
	Transferred to another centre which releases	3 (6)
	Live trained	3 (6)
	Depends on species	3 (6)
	Interspecies communication	2 (4)
	Nothing really	1 (2)
2) What characteristics do you use to judge whether an animal is fit for release? (n = 41)	Able to fend for itself in wild (eg anti-predator behaviour, foraging efficiently)	24 (23)
	Healthy (especially good body mass, no parasites)	22 (21)
	Flying/walking properly (including wounds/injuries healed)	13 (12)
	Not imprinted/humanised/socialises correctly with conspecifics	12 (11)
	Fit enough (eg judged via falconry)	11 (10)
	Behaviour/psychological health (eg if alert)	7 (7)
	Good muscle/coat/feather condition	4 (4)
	Good cohesion of group	3 (3)
	From experience	3 (3)
	Old enough	3 (3)
	Get go ahead from veterinarian	2 (2)
	It will leave site	2 (2)

Table 7 Answers by rehabilitators on post-release monitoring. Note that as a result of there being no limitations on the number of times an option could be selected, the column S refers to the number of times each rehabilitator (n) selected an answer.

Question	Options given in the questionnaire (a-k) or additional answers given	S (%)
1) Reasons for monitoring (n = 11)	Whether the rehabilitation technique was successful (eg animal is not human-imprinted, injuries have healed)	10 (77)
	Monitor movement (eg if problem animals return to original site)	2 (15)
	It is the established norm for the species	1 (8)
2) If not currently doing so, would you start to monitor if you had: (n = 12)	(a) More money for monitoring equipment/petrol to get to sites/staff to monitor	6 (38)
	(b) Knew more about how and what to monitor to determine whether a release was a success	5 (31)
	(c) Other (No)	5 (31)
3) How do you find and identify the animals you release? (n = 29)	(a) Natural markings on the animal	20 (33)
	(b) Markings placed onto the animal (eg ear-tags/freeze-branding)	19 (31)
	(c) Radio-telemetry (on collars/harnesses)	11 (18)
	(d) I just know when I see the animal	11 (18)
	(e) Other	0 (0)

Post-release

Most rehabilitation centres, 68% (n = 26), had monitored their rehabilitated animals after they had been released into the wild, mainly to determine whether the rehabilitation technique had been successful (Table 7), compared with 32% (n = 12) who had never monitored. Those that had not monitored generally said that they would start (Table 7) if greater funds were available. Duration of monitoring was largely dependent on the species or individual, compared with other factors, such as practicality of monitoring (eg

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https://doi.org/10.1017/S0962728600001962 Published online by Cambridge University Press

Table 8 Answers by rehabilitators on success indicators. Note that as a result of there being no limitations on the number of times an option could be selected, the column S refers to the number of times each rehabilitator (n) selected an answer.

Question	Options given in the questionnaire (a-k) or additional answers given	S (%)
1) What would constitute a successful release? (n = 35)	(a) A certain percentage of animals remain alive after a certain time	27 (35)
	(b) Released animals breed successfully	28 (36)
	(c) Released animals stay in one area	10 (13)
	(d) Other (eg successfully integrated into wild, feed successfully)	12 (16)
2) How many out of a released group survive for a success? (n = 32)	(a) 100%	3 (9)
	(b) 75%	11 (34)
	(c) 50%	5 (16)
	(d) Any survival	13 (41)
3) What percentage of your releases were successful (n = 36)	(a) 100%	5 (14)
	(b) 75%	7 (19)
	(c) 50%	3 (8)
	(d) 25%	2 (6)
	(e) Don't know, no post-release monitoring is carried out	11 (31)
	(f) Depends on species	6 (17)
	Additional answer: 80–90%	2 (6)
4) What factors resulted in the successful releases? (n = 30)	(a) Age of animal	19 (12)
	(b) Wild bred	19 (12)
	(c) If applicable: age and sex structure of the group	12 (7)
	(d) Soft release (supplementary feeding and/or holding cage)	16 (10)
	(e) Hard release	7 (4)
	(f) Time of year, ie food and water availability	21 (13)
	(g) Suitable habitat	24 (15)
	(h) Good support of landowners	17 (11)
	(i) Lessons learnt from previous releases	22 (14)
	(j) Other (eg initial disease/injury, individuals released back to troop)	4 (2)
5) What factors resulted in the unsuccessful releases? (n = 26)	(a) Age of animal	12 (11)
	(b) Captive bred (included if human-imprinted)	15 (14)
	(c) If applicable: age and sex structure of the group	6 (6)
	(d) Soft release (supplementary feeding and/or holding cage)	3 (3)
	(e) Hard release	7 (7)
	(f) Time of year, ie food and water availability	14 (13)
	(g) Unsuitable habitat	12 (11)
	(h) No support from landowners	14 (13)
	(i) First release of this animal species	8 (8)
	(j) Natural disaster (eg flood/drought)	11 (10)
	(k) Other (eg illegal hunting, number of predators in the area)	4 (4)

declining signal strength of radio-telemetry). Duration given varied from one week to several years. Most animals were found using natural markings on the animal (which includes scars) (Table 7).

A release was generally seen as having been successful (Table 8) if released animals bred, or if a certain percentage of animals remained alive after a certain time. Out of a released group, most rehabilitators said that any survival would constitute a success (Table 8), because "even if a few survive, it is at least saving the life of those few". Most rehabilitators (52% of n = 23 who responded) felt that post-release timeperiod in which to judge 'success' was species-dependent, resulting in a period between 1 week and > 2 years.

Most rehabilitators did not know how many of their releases were successful or they thought that 75% of their releases were successful (Table 8). A successful release was described as mainly resulting from a suitable release habitat and having learnt lessons from past releases (Table 8), while unsuccessful

https://doi.org/10.1017/S0962728600001962 Published online by Cambridge University Press

Table 9 Funding sources and expenditure of rehabilitators (n) from their annual budget and hypothetical expenditure of a large donation, where expenditure is ranked from 1 (spend most on) to 10 (spend least on).

Question	Options given in the questionnaire (a-j) or additional answers given	n (mean ± SEM)	n (median)	Range
1) Funding (n = 36)	(a) Public donations	11 (± 3)%	n/a	0–50
	(b) Private donor	10 (± 3)%	n/a	0–60
	(c) Corporate sponsorship	3 (± 1)%	n/a	0–25
	(d) Government subsidy	0	n/a	0
	(e) Own money	76 (± 6)%	n/a	0–100
2) Budget (n = 32)	(a) Food for animals		2	1–10
	(b) Housing of animals, especially lights and electricity		3	1–10
	(c) Repairs to housing		5	2–10
	(d) Veterinary procedures		4	1–10
	(e) Equipment		6	1–10
	(f) Staff salary		4	1–10
	(g) Release of animals-transport		7	2–10
	(h) Post-release support (food/shelter)		9	2–10
	(i) Post-release monitoring		10	3–10
	(j) Rescues		5	1–10
3) Donation (n = 30)	(a) Food for animals		4	1–10
	(b) Housing of animals, especially lights and electricity		2	1–8
	(c) Repairs to housing		3	1–10
	(d) Veterinary procedures		6	1–10
	(e) Equipment		3	1–10
	(f) Staff salary		8	1–10
	(g) Release of animals-transport		7	2–10
	(h) Post-release support (food/shelter)		8	2–10
	(i) Post-release monitoring		8	1–10
	(j) Rescues		6	1–10

releases were mainly caused by the animal having been captive bred (or human-imprinted), it was the wrong time of year, and there was a lack of support from landowners (Table 8).

Finances

Most rehabilitation centres were financed using the rehabilitators' own money, while public donations, private donor, and corporate sponsorship each accounted for less than 12% (Table 9). When asked to rank various expenditures, most of the money was spent on food for animals, while the least amount was spent on post-release monitoring (Table 9). When given a hypothetical large donation to spend on the same items as listed in the previous question, most said that they would use this money for animal housing; and the least amount would be spent on post-release support and monitoring (Table 9).

Comments

The comments given by the 35 respondents who wanted feedback or results from the survey, in general, stated that they would like to see a network develop between rehabilitators, in order that they may learn from each other without repeating the same mistakes; they also wanted to increase the success of rehabilitation by having it become more professional through standard methodology and having species-specialist centres; they also hoped for acknowledgement by their local governments in the work they were doing, while others wished for financial support from government or any other willing sponsor.

Discussion

Views were obtained from a range of rehabilitation centres across South Africa, from specialist centres dealing with a few animals a year, to large generalist centres that receive up to 3,600 animals. Similarly, centres that started relatively recently and those in existence for many years were represented. In general, the results of the survey suggest that rehabilitators want their field to become more professional (through minimum standards and enforcement), but lack of communication between rehabilitators, lack of experience and empathy by wildlife officials, and lack of money are the main obstacles to this being achieved. In the authors' opinion, these factors may result in the welfare of rehabilitated animals being compromised.

The perceived lack of experience and empathy of wildlife officials resulted in rehabilitators generally regarding wildlife officials with antagonism, where they issued state-

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ments such as "unsuitable people are issued or re-issued permits" because "wildlife officers do not know enough about rehabilitation". Dubois and Fraser (2003a,b) showed that Canadian rehabilitators voiced similar views, in particular: that the rehabilitation guidelines used by wildlife officials were of a low standard, that centres were not adequately inspected and reports of unpermitted or unethical rehabilitators were not addressed. It is then not surprising that rehabilitators are cautious of having these officials involved in the development and enforcement of minimum standards. Most rehabilitators believed that standards would be beneficial, but they were concerned with their practicality. One suggestion was to have experienced rehabilitators involved in the process of development. This seems to have worked for the development of the minimum standards in the USA (Miller 2000) and guidelines for raptor rehabilitation by the Western Cape Raptor Rehabilitation Forum (Curtis & Jenkins 2002). This forum includes representatives from rehabilitation centres, Cape Nature Conservation, the SPCA, the local university, the Cape Falconry Club and local veterinarians and its aims were to form a network of skilled rehabilitators and veterinarians; to develop a protocol for raptor rehabilitation; and collate data from rehabilitated raptors (eg cause of injuries) (Curtis & Jenkins 2002). However, these two documents are not enforced, which may have resulted in their general 'acceptance' by the rehabilitator community. Furthermore, when the author, KW, attended meetings discussing the *Norms and Standards for Care and Management of Ex Situ Vervet Monkeys* Cercopithecus aethiops *in KwaZulu-Natal,* it was clear that there were several disagreements within the rehabilitator community, such as the inclusion in the documents of advice of certain rehabilitators, over others. Similarly, rehabilitators in the survey stated that "rehabbers egos and personal agendas" would prevent minimum standards from being used, which echoed the view of some Canadian rehabilitators who would prefer to "do (their) own thing" (Dubois & Fraser 2003a). Clearly, there is a need for an inclusive forum to develop minimum standards, but it seems that without enforcement (by competent wildlife officers) these will be ignored. However, the enforcement of guidelines for euthanasia, the rehabilitation of non-native species, and the use of non-releasable wildlife, might be problematic, as these are seen as sensitive and contentious issues in wildlife rehabilitation (Holcomb 1995; Dubois & Fraser 2003b).

In Canada, the veterinarians that were surveyed believed that rehabilitators were generally reluctant to euthanase (Dubois & Fraser 2003b). It seems that the situation is similar in South Africa, as there was a preference of South African centres to place non-releasable animals in captivity at a sanctuary or retain at the centre for education, breeding, or surrogacy purposes rather than to euthanase them. When seen in light of the goals of rehabilitation, namely "caring and helping of injured, ill and orphaned animals", "releasing animals back into the wild" (Table 2; Anon 2008a), and "educating the public to prevent these problems in the future" (Table 2; Dubois & Fraser 2003a), there does seem to be a need for non-releasable animals as surrogate mothers or for education. However, the build-up of non-releasable animals in captivity, "zoos under the guise of public education" (Dubois & Fraser 2003b), may be harmful to animal welfare (Curtis & Jenkins 2002). Conversely, guidelines for determining whether an animal can be released should not be less stringent in an attempt to avoid euthanasia (Hall 2005) or to reduce the numbers in captivity. Releasing animals that are unprepared for life in the wild may result in needless suffering and death (Waples & Stagoll 1997; IUCN 2000; Hall 2005). In essence, rehabilitators could be causing needless suffering, despite their best intentions. As a result, minimum standards and enforcement are needed for decisions regarding the use of non-releasable animals and rehabilitation of exotics. For decisions regarding euthanasia, it would be best to have a veterinarian or veterinary nurse based permanently at the centre. A veterinarian and veterinary nurse are also qualified to determine whether an animal is healthy (during care or before release), which would lessen possible welfare issues as well as the probability that a diseased individual is released into the wild.

Preparing and determining whether an animal is ready for release have been described in various guidelines; means of doing this include whether the animal is healthy (IUCN 1998; Baker 2002) and has regained fitness (Verdoorn 1995; Miller 2000; Hall 2005). This was similar to that described by rehabilitators, but they also included factors such as "interspecies communication", and knowing when an animal is fit for release "from experience" and "if it leaves". In addition, even with universal methods, limited research has been done to determine whether these preparations or characteristics are the most effective predictors of survival post-release. Exceptions, such as those on the benefits of live prey and flight aviaries on rehabilitated barn owls (*Tyto alba*) (Fajardo *et al* 2000); and the potential of various physical (eg weight) (Mathews *et al* 2006) and psychological characteristics (eg human imprinting) (Beringer *et al* 2004) as predictors of survival post-release, need to be assimilated into minimum standards for rehabilitation. These standards should also incorporate the results from other translocation studies, such as reintroductions (ie establishing a species in an area it used to exist; IUCN 1998). This literature includes results on training captive-bred animals to avoid predators (see review by Griffin *et al* 2000), and which factors (eg habitat suitability) resulted in successful releases (Griffith *et al* 1989). Similar success factors were identified by rehabilitators and included "learning from previous releases", which would entail post-release monitoring. Although 68% of the rehabilitators had done some monitoring, it is clearly not a priority as rehabilitators currently and hypothetically would spend the least amount of money on post-release monitoring. Minimal post-release monitoring due to limited funding has also been documented in Spain (Fajardo *et al* 2000), the UK (Kirkwood & Best 1998) and Canada (Dubois & Fraser 2003c). In summary, even though there is a need for high-quality empirical data from scientific investigations to objectively support the clearly defined objectives of wildlife rehabilitation, it is undermined by a lack of funding.

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Lack of funding was cited as a main impediment to the goals of rehabilitation in South Africa, mirroring the thoughts of Canadian rehabilitators (Dubois & Fraser 2003a). Food and housing for animals were listed as main expenditures by South African rehabilitators, while housing and repairs to housing as priority expenditures if given a donation. Listing "repairs to housing" in the latter question suggests that this is a luxury expenditure compared to the more urgent need of feeding animals, which may have implications for animal welfare. This problem is almost certainly a result of large numbers of animals being admitted to the centre, as well as home-based centres unable to obtain necessary funding. Some potential solutions would be to have a centre specialise in a certain taxon or species, limit the number of animals admitted according to the space that is available at the centre (and so transfer to other centres or euthanase), and have home-based centres linked to larger ones. For instance, a rehabilitator specialising in raptors may get 36 animals admitted over two years (Visagie 2008), compared with a non-specialist receiving over 2,000 animals (Dubois & Fraser 2003c) where, based on their resources and space, it may not be possible to provide adequate and humane care to all and adequate preparation for release. Without norms and standards, lack of funding could have serious repercussions for animal welfare, particularly if poorly staffed and equipped rehabilitation centres are allowed to continue to operate.

Furthermore, a lack of funding limits rehabilitators from determining whether a release has been successful, and whether modifications in rehabilitation techniques are needed (Beck *et al* 1994; Lockwood 1995; Kleiman 1996; Hall 2005) as they do not generally monitor rehabilitated animals after release. However, because any survival out of a released group was seen as a success, echoing the sentiment that "these animals would almost certainly have died were it not for human intervention" (Reeve 1998), or that survival of young, wild animals reaching reproductive maturity is generally low (Kirkwood 2000), it may not seem important to monitor. Conversely, were it not for human intervention, those individuals would not have had to go through stress and fear of captivity and possible pain of healing (BWRC 1989 in Kirkwood 1992). It is, therefore, imperative to ensure that a successfully rehabilitated animal be at no greater disadvantage to living in the wild than its wild conspecifics of similar age, gender and status (IAAWS 1992). Similarly, improved welfare of a released individual must not compromise the welfare of other individuals living in the release habitat (Kirkwood & Sainsbury 1996). Maximising welfare for all animals may be achieved through improved communication between rehabilitators and wildlife officials and a better management framework for wildlife rehabilitation.

Even though the conservation department in government wants to ensure biodiversity is unharmed and protected, it has largely ignored wildlife rehabilitation, apart from issuing and revoking permits in an attempt to control these practices. This involvement is insufficient for two main reasons. Firstly, according to the IUCN (2000), the release of confiscated animals (which applies to rehabilitated animals) should generally not take place, except in specially managed circumstances, due to the possible negative effects on wild conspecifics living in the area (Caldecott & Kavanagh 1983; Griffith *et al* 1993; Kleiman 1996; IUCN 2000), and on entire wildlife communities. Wildlife rehabilitation has thus switched from a practice that affects individual survival to affecting conservation. Secondly, conservation agencies need to value rehabilitation, since rehabilitators are relieving the government of additional responsibility, given that the management of all wild animals is part of their mandate (Carr 1995); and rehabilitation may actually get the public interested in conservation, through education and empathic response to addressing the plight of an afflicted individual (as reviewed by Kirkwood 1992; Aitken 2004). Rehabilitation of endangered individuals even has direct benefits to conservation (Kirkwood 1993). Exploring this common ground between wildlife rehabilitators and wildlife officials has been started by EKZNW in South Africa, while similar documents (eg Miller 2000; Anon 2008b) may provide a base for this exploration elsewhere in the world. This co-operation is certainly possible, but through both parties being objective and considerate of each other's needs, and to persevere in this effort, as the alternative may be to ban wildlife rehabilitation all together. South Africa may be ready for the second national Wildlife Rehabilitation Conference to be held, in an attempt to further explore this co-operation.

Animal welfare implications

Wildlife rehabilitation satisfies the natural human desire to rescue animals in distress (Lloyd 1999) and to counterbalance the harm that humans have caused (Jacobs 1998; Kirkwood & Best 1998; du Toit 1999). Unfortunately, this does not always mean that the animals benefit. Limited research on the optimum methods of preparing or deciding whether an animal of a particular species is ready for release, and limited post-release monitoring, means that these decisions are based largely on intuition. Furthermore, rehabilitators in this study and in Canada knew of other rehabilitators that were providing inadequate care to animals (Dubois & Fraser 2003b). For these reasons, the authors' suggest that rehabilitation in South Africa (and possibly throughout the world) needs to become the responsibility of government, so that lack of finances, knowledge, and experience, together with lack of communication and co-operation between rehabilitators do not get in the way of animal welfare. It is also suggested that the control of wildlife rehabilitation be centralised at national or provincial level in government, where at least one or more people (per province in South Africa) are designated and trained to implement this, perhaps with the help of wildlife-or conservation-orientated non-government organisations (NGO). It is imperative that minimum standards are enforced by competent, knowledgeable conservation officers in government or hired from private NGOs, otherwise animal welfare may be compromised, and rehabilitators are unlikely to co-operate with regulations. In addition, as attempted by EKZNW and by the private reha-

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https://doi.org/10.1017/S0962728600001962 Published online by Cambridge University Press

bilitation organisations in the USA (IWRC and NWRA), completion of certification programmes in wildlife rehabilitation needs to be enforced. In return, the government needs to subsidise the post-release monitoring of rehabilitated wildlife, as post-release monitoring is the only method to determine whether rehabilitation of an individual was successful. EKZNW initiated the post-release monitoring of rehabilitated vervet monkeys (Wimberger *et al* 2009), so that the results could be used as a benchmark for future releases by inclusion in the *Norms and Standards for the Care and Management of Ex Situ Vervet Monkeys* Cercopithecus aethiops *in KwaZulu-Natal*. EKZNW also initiated the post-release monitoring of rehabilitated Babcock's leopard tortoises, (*Stigmochelys pardalis babcocki*) (Wimberger *et al* 2010), to test an EKZNW release protocol that aims to increase the probability that the release of rehabilitated leopard tortoises is successful, while minimising risks to biodiversity. Not only could conservation scientists be involved in the post-release monitoring, but they could also conduct further research into which preparations and characteristics are most likely to predict survival of rehabilitated animals post-release. Furthermore, both conservation scientists and wildlife officials could analyse annual intake records from centres for trends that may be useful for conservation efforts (Drake & Fraser 2008). Rehabilitators could then focus their money on buying food, housing and medicines, so that they can continue to serve the community by rehabilitating individual wild animals.

Acknowledgements

We are grateful to the rehabilitation centres and sanctuaries that returned their questionnaires, and especially those that provided further detailed comments to the questions. Those rehabilitation centres and sanctuaries that allowed personal visitations are thanked. We are also thankful to the permit officers for providing us with a list of rehabilitation centres in their Province. We thank the four anonymous reviewers for their constructive comments to the manuscript.

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https://doi.org/10.1017/S0962728600001962 Published online by Cambridge University Press

Appendix 1 Questionnaire

Name of the Rehabilitation Centre:
Year centre was established:
Permit no:
Web URL (homepage)
Your name:
Your role at the centre:

Section A: General

1 According to your centre, what are the goals of wildlife rehabilitation?

(a) Caring and helping of injured/orphaned wild animals

(b) Manage the interaction between animals and people

(c) Education to prevent these problems in the future

(d) Releasing animals back into the wild

(e) Wildlife conservation

(f) Other (please specify below):

2 According to your centre, what are the main problems in obtaining these goals?

(a) Lack of money for facilities/supplies/staff

(b) Lack of trained staff

(c) Lack of government support and subsidy

(d) Inadequate media coverage

(e) Public picking up animals unnecessarily

(f) Public keeping wild animals irresponsibly

(g) Lack of knowledge of post-release survival

(h) Lack of norms and standards for rehabilitation centres

(i) Strict permit conditions

(j) Lack of available release habitat

(k) High post-release mortality

(l) Lack of research

(m) Other (please specify below):

3 Do you think that rehabilitation centres would benefit from guidelines for minimum standards for wildlife rehabilitation, eg standards for cleaning, disease control, caging, euthanasia, release criteria and record keeping?

(a) Yes

(b) No

Please provide a reason:

4 Do you think that the issuing and enforcement of permits is:

(a) important and functioning correctly

(b) could be important, but is not being enforced properly and permit conditions are not strict enough

(c) not useful and even a hindrance to doing rehabilitation

Please provide a reason:

Section B: Animal intake

5 What is your approximate annual intake of animals (mammals, birds and reptiles)?

6 Please list 5 main causes that result in animals being brought to your centre:

7 Do you mark (eg with numbered rings) the animals that you get into the Centre?

(a) Yes

(b) No

(c) Sometimes

Please provide a reason:

If applicable, how do you mark the animals?

8 Besides marking (if applicable), what are the other first steps that are taken when an animal is admitted to your Centre?

9(a) Are there any animal species that your centre does not rehabilitate?

(a) Yes

(b) No, we accept and treat all species

If you answered 'yes', please list the species and please provide a reason:

9(b) What are the 5 main animal species that you get into your centre

9(c) How do you deal with species that you do not rehabilitate?

(a) Accept and transfer to another rehabilitation centre (please specify below)

(b) Accept and euthanase these animals

(c) Do not accept and refer to another rehabilitation centre (please specify below):

10(a) When would you NOT release an animal into the wild:

(a) it is an exotic species

(b) there is no suitable habitat for release

(c) it is blind/deaf

(d) it only has 1 leg/1 wing

(e) it cannot walk/fly

(f) other (please specify below):

10(b) If an animal cannot be released into the wild, do you:

(a) euthanase

(b) transfer to a sanctuary or zoo

(c) give to permit-keeping members of the public

(d) kept at your centre for education purposes

(e) kept at your centre for breeding purposes

(f) kept at your centre for rearing young

(g) other (please specify below):

11 If you keep non-releasable animals at your centre, please specify which species and your reasons why this species:

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12 If your centre euthanases animals, when would you do this?

(a) When the animal has non-repairable injuries
(b) There are no resources to care for the animal
(c) The animal is an exotic species
(d) The animal is a common species
(e) The animal is in poor condition
(f) Problem animals
(g) Potentially diseased
(h) Heavily infested with ecto- and endoparasites
(i) Other (please specify below):

13 If your centre does not euthanase animals, which of the following are applicable reasons:

(a) Public opinion
(b) Centre's policy
(c) Permit regulations
(d) Funding sources
(e) Lack of resources to perform euthanasia

14 Do you have a veterinarian at your Centre?

(a) Yes, permanently
(b) No
(c) Sometimes

Please can you provide her/his name:

15 Do you do any ongoing health/disease checks on the animals at your Centre?

(a) Yes
(b) No
(c) Sometimes

If you answered 'yes' or 'sometimes', what do you check for?

16 Do you have a quarantine policy?

(a) Yes
(b) No

If you answered 'yes' under what circumstances (eg always on arrival)?

Section C: Records

17 How many years has your centre been keeping records?

18(a) Does your facility record information of ALL animals coming in?

(a) Yes
(b) No

18(b) If you answered 'no', what is the reason?

(a) Too many animals coming in
(b) It isn't important for some animals
(c) Time is wasted and records are not even used
(d) Other (please specify below):

19(a) What information do you record?

(a) General name of the animal (eg tortoise)
(b) Species of animal (eg leopard tortoise)
(c) History of animal given by the person bringing it in
(d) Location of animal given by the person bringing it in
(e) Diagnosis of animal brought in
(f) Individual medical records
(g) Where the animal is placed at centre
(h) Date and location of released animal
(i) If the animal has died at the centre
(j) If the animal has been transferred to another facility
(k) Other (please specify below):

19(b) Which species don't you maintain post-admittance records for and why?

20 Do you think that your centre can make improvements to its recording system and/or the way it processes the data from the records?

(a) Yes
(b) No

Please provide a reason:

Section D: Housing

21 Where is your rehabilitation centre situated?

(a) Small holding
(b) Private home
(c) Municipal land
(d) Other (please specify below):

22 Do you have multi-species enclosures (eg hadedas and doves in one cage)?

(a) Yes
(b) No
(c) Sometimes

Please provide a reason:

23 Do you separate animals according to gender?

(a) Yes
(b) No
(c) Sometimes

Please provide a reason:

24 Do you separate animals according to age?

(a) Yes
(b) No

Please provide a reason:

25 Do you have any other criteria that you use to separate animals?

(a) Yes
(b) No

Please provide a reason:

Section E: The release

26 How do you prepare an animal for release (eg placed in different pen)?

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27 Do you sterilise any animals before they are released?

(a) Yes

(b) No

Please provide a reason:

28 What characteristics do you use to judge whether an animal is fit for release (eg looks healthy)?

29 How do you choose a suitable release site?

(a) The area is within the normal range of the species

(b) Close to where the animal came from

(c) Away from humans

(d) Where the animal will be accepted by the landowners

(e) Suitable habitat for the species

(f) Other (please specify below):

30 Do you soft-release all the animals at your Centre? (ie keeping animal in holding cage at release site and/or supplementary feeding after release for a period of time). If not, please proceed to question 33.

(a) Yes

(b) No

If you do it for some species only, please provide the name of the species and reason:

31(a) If you use a holding/hacking cage to release an animal into the wild, do you do it because it:

(a) keeps the animal in the release area

(b) if applicable, it keeps the group of released animals together

(c) allows it to adjust from stress of transport

(d) allows it to adjust to new sights/sounds/smells of release area

(e) its in guidelines that we have

(f) other (please specify below):

31(b) Do you keep all species in the holding cage for the same time period?

(a) Yes

(b) No

An average, for how long?

31(c) What are the factors you think should be taken into consideration when determining how long the animal should be kept in holding cage for?

(a) Whether species is solitary or social

(b) Whether species is mammal/bird/reptile

(c) Whether species is predator/prey

(d) Whether animal is healthy

(e) How long the animal had been in captivity for

(f) Other (please specify below):

32(a) If you supplementary feed an animal after release, do you do it because it:

(a) keeps the animal in the release area

(b) if applicable, it keeps the group of released animals together

(c) allows the animal to get used to the indigenous vegetation in area

(d) eases the adjustment to being outside of captivity

(e) its in guidelines that we have

(f) other (please specify below):

32(b) Do you supplementary feed all species for the same timeperiod?

(a) Yes

(b) No

An average, for how long?

32(c) What are the factors you think should be taken into consideration when determining how long the animal should be supplementary fed?

(a) whether species is solitary or social

(b) whether species is mammal/bird/reptile

(c) whether species is predator/prey

(d) how healthy the animal is

(e) how long the animal had been in captivity for

(f) other (please specify below):

33 If it is relevant, why do you hard release some animals (ie no holding cage at release or supplementary feeding after)?

(a) less expensive than soft release

(b) the animals do not need to be soft released

(c) to lesson their reliance on humans

(d) other (please specify below):

Section F: Post-Release

34(a) Do you monitor animals after they have been released?

(a) Yes

(b) No

If you answered 'yes', which species do you monitor and why?

34(b) If you answered 'no', would you begin monitoring if you had:

(a) more money for monitoring equipment/petrol to get to sites/staff to monitor

(b) knew more about how and what to monitor to determine whether a release was a success

(c) other (please specify below):

35 Does the timeperiod for post-release monitoring vary between species?

(a) Yes

(b) No

An average, for how long?

36 How do you find and identity the animals you release?

(a) Natural markings on the animal

(b) Markings placed onto the animal (eg ear-tags/ freeze-branding)

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(c) Radio-telemetry (on collars/harnesses)
(d) I just know when I see the animal
(e) Other (please specify below):
If applicable, please specify the markings you use:

37 What do you record once you have found the animal?
(a) Whether animal is alive/dead
(b) Its behaviour
(c) What it is eating
(d) Its location
(e) Other (please specify below):

38 What would constitute a successful release?
(a) Certain % of animals remain alive after a certain time
(b) Released animals breed successfully
(c) Released animals stay in one area
(d) Other (please specify below):

39(a) How many animals out of a released group would have to survive for the process to be considered a success?
(a) 100%
(b) 75%
(c) 50%
(d) Any survival

39(b) Would you take the species of the animal into consideration when judging how many animals have to survive for the process to be considered a success?
(a) Yes
(b) No
Please provide a reason:

39(c) Would you take the age of the animal into consideration when judging how many animals have to survive for the process to be considered a success?
(a) Yes
(b) No
Please provide a reason:

40 Does the timeperiod after which you consider a release to be successful vary between species?
(a) Yes
(b) No
An average, for how long?

41 On average what percentage of your releases do you consider to be successful? If you don't know please indicate.
(a) 100%
(b) 75%
(c) 50%
(d) 25%
(e) I don't know, we don't do any post-release monitoring
(f) Depends on the species (please specify below):

42 What factors resulted in the successful releases?
(a) Age of animal
(b) Wild bred
(c) If applicable: age and sex structure of the group
(d) Soft release (supplementary feeding and/or holding cage)
(e) Hard release
(f) Time of year, ie food and water availability
(g) Suitable habitat
(h) Good support of landowners
(i) Lessons learnt from previous releases
(j) Other (please specify below):

43 What factors resulted in unsuccessful releases?
(a) Age of animal
(b) Captive-raised
(c) If applicable: age and sex structure of the group
(d) Soft release (supplementary feeding and/or holding cage)
(e) Hard release
(f) Time of year, ie food and water availability
(g) Unsuitable habitat
(h) No support from landowners
(i) First release of this animal species
(j) Natural disaster (eg flood/drought)
(k) Other (please specify below):

Section F: Finance

44 How much of your annual funding comes from the following (please provide a relative percentage or actual value):
(a) Public donations
(b) Private donor
(c) Corporate sponsorship
(d) Government subsidy
(e) Own money

45 Is some of your funding restrictive (eg donated money only used for certain species/staff funding)?
(a) Yes
(b) No
Please provide a reason:

46 How much of your current annual budget is spent on the following items? Please rank the following in order from 1–10 (1 = spend most on, 10 = spend least on):
(a) Food for animals
(b) Housing of animals, especially lights and electricity
(c) Repairs to housing
(d) Veterinary procedures
(e) Equipment
(f) Staff salary
(g) Release of animals-transport
(h) Post-release support (food/shelter)
(i) Post release monitoring

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(j) Rescues

47 If you were given a large donation, how would you spend this money? Please rank the following in order from 1–10 (1 = spend most on, 10 = spend least on):

(a) Food for animals

(b) Housing of animals, especially lights and electricity

(c) Repairs to housing

(d) Veterinary procedures

(e) Equipment

(f) Staff salary

(g) Release of animals-transport

(h) Post-release support (food/shelter)

(i) Post release monitoring

(j) Rescues

Section G: Lastly

48 What feedback and/or results would you like from this survey and/or comments?

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