



Protocol for the rehabilitation of Greater One-horned Rhinoceros (*Rhinoceros unicornis*)

1. Wildlife Rehabilitation

Once distributed all along the terai grasslands in the foothills of Himalayas, the greater one-horned rhinoceros (*Rhinoceros unicornis*) is now restricted to few pockets in India and Nepal (Singh and Rao, 1984). Unlike the other two species of Asian rhinos, the greater one-horned rhinoceros has recovered from very low numbers in the past (Foose and Strien, 1997), thanks to the protection given by the governments of India and Nepal. The Kaziranga National Park (KNP), situated in the state of Assam, has the largest population of the species in India.

Due to increasing man-wildlife conflict and the floods that hit the state of Assam every year, instances of rhino calves getting left behind the wild is not uncommon. The aim of this protocol is to lay down in sequence the procedures involved in the rehabilitation of such rhino calves in the state of Assam.

Any healthy animal, rescued from the wild, is a potential candidate for return to the wild. Before they become permanently displaced, they can be released either immediately without stabilization or a few days later after stabilization in captivity. Once they become permanently displaced, they can be released only after long-term rehabilitation process.

Internationally, Wildlife Rehabilitation is an emerging discipline in the science of wildlife conservation, with both conservation and welfare issues being intricate components. The International Wildlife Rehabilitation Council defines Wildlife Rehabilitation as the treatment and temporary care of injured, diseased, and displaced indigenous animals, and the subsequent release of healthy animals to appropriate habitats in the wild (Miller, 2000).

CWRC: A rehabilitation centre near Kaziranga

Department of Environment and Forest, Government of Assam, Wildlife Trust of India (WTI) in partnership

with International Fund for Animal Welfare (IFAW) has been involved in the rehabilitation of displaced, injured and orphaned animals in Assam through the Centre for Wildlife Rehabilitation and Conservation (CWRC) near Kaziranga National Park of Assam, India. The centre has been established considering the impact of annual floods on the wildlife population in KNP and adjoining protected areas. The centre thus acts as a buffer between wilderness and lifetime care facilities like zoos, thereby giving displaced wildlife an opportunity to return to the wild.

Role of CWRC in rhino conservation

1. According to IUCN/SSC Action Plan on Asian rhinos, all the species of Asian rhinos have declined over the years due to habitat loss for agriculture and poaching (Foose and Strien, 1997). Of all the Asian rhinos, only the Greater one-horned rhinoceros has managed to stage a recovery, for otherwise it would have also been listed Critically Endangered (CR) in IUCN Red List Categories. The species is listed Endangered by IUCN and in Appendix 1 by CITES.
2. None of the rhinos taken to the zoos for exhibit and breeding purpose in India has contributed to the cause of either restocking or reintroduction programs. Rehab centres like CWRC are ideally placed to initiate restocking and reintroduction programs because of its location within the protected area limit. The rhinos in rehab centres like CWRC are better candidates for 'return to the wild' option than individuals placed or bred in zoos.
3. Considering the fact that infectious diseases like tuberculosis is endemic in most of India's zoos, rhinos in rehab centers stand a better chance of being a source population for reintroduction, restocking and range extension programs.
4. The IUCN Action Plan for Asian rhinos recommends that the one-horned rhinos are translocated and reintroduced into some

areas of Assam, Uttar Pradesh and West Bengal in its former range (Foose and Strien, 1997). The rhino specialist group has also recommended that 10 additional rhino reserves be established in different parts of Nepal and India to ensure the species' long term survival (Suwal and Shakya, 2000). With at least two rhinos calves being brought to the centre every year, CWRC would be ideally placed to provide a stock of rehabilitated rhinos for restocking and reintroduction programs in future.

5. One of the major impacts of rehabilitation projects is that it creates awareness amongst the public on the plight of the animals. The presence of a rehab centre, the translocation exercise and the news of the rhino being returned to the wild, all have a positive impact on the public's mind-set towards wildlife.

2. Hand raising techniques for rhino calves

This section of the protocol describes how rhino calves brought to the centre shall be hand-raised and rehabilitated until they are large enough to be moved to the field for acclimatization before release.

Attending to rhino calf emergencies

1. Only under the following circumstances that a rhino calf seen alone in the forest shall be considered in distress:
 - When the mother fails to turn up for a prolonged period of time and all efforts to locate the mother in the nearby areas, for reunion, fail.
 - When it is being carried away by flood waters.
 - When the calf is unable to move due to injury or illness.

(**Note:** One of the common reasons for rhino calves being abandoned or seen alone in the forest is due to injuries sustained during predator attack. Such calves should be ideally left unattended and only taken to captivity when the natural process of predation is disrupted due to human interference).

Housing and stabilization of rhino calves

1. Soon after arrival at the centre, the calf will be moved to the designated stabilization room meant for hand-raising rhino and elephant

calves. The stabilization room typically has indoor rooms and adjoining mini paddocks of about 50-100 square meters each.

2. The room shall be well ventilated for use in summer and well protected from cold weather in winter. The room will also have provision for heaters or UV lamps and fans. The flooring shall be concrete for easy drainage and frequent cleaning, but at the same time well padded with a thick bedding of straw. The bedding will be sun dried every day and the straw replaced.
3. An initial veterinary examination should check all health parameters, if necessary, additional expert opinion shall be called from nearest facility. It will also be advisable to get multiple veterinary advices.
4. While in captivity, the following parameters will be recorded: Age and sex of the calf, morphometrics like shoulder height, chest girth and front-foot circumference, body weight and dentition. These parameters will be recorded every month.
5. Rhino calves are not totally dependent on the 24 hours presence of keepers. They can be left unattended during feeding intervals once the critical period of first two to three months is completed.

Choice of milk formula

Rhino calves can be easily initiated to bottle-feeding. Being myopic, they can be easily drawn towards the feeding bottle and even taken for a walk to newer locations by making them follow the bottle.

- There are no commercial milk replacer available and though rhino milk composition is typically high in lactose and low in fat, they have been found to tolerate human formulas like Lactogen 2 (Nestle India, containing 18% fat of solids).
- If the calf is dehydrated, oral electrolytes will be administered first. The concentration of the milk powder per liter of water shall be gradually increased from mere 50 gms initially to even 150 gms per liter when the calf is 16-18 months of age.
- Depending on the age and body weight, the calf will be initially fed either on demand or every two hours and subsequently reduced to 3 hourly and 4 hourly intervals.
- Specially made rhino teats attached to a two or three litre bottle shall be employed for feeding rhino calves.

Vitamins (especially A, D, E and B-complex) and minerals supplements (especially Calcium and Phosphorus) shall be added to the milk formula as supplements.

Cereals and grams (moong crush and brown rice) will be added as supplements at three to four months of age.

Husbandry and keeper consideration

1. A high standard of hygiene will be maintained during the nursing period as the calves are prone to pick up infection particularly enteric infections. This would include:
 - a. Maintenance of personal hygiene of the keepers handling the calves. Employment of a separate set of personnel for food and milk formula preparation.
 - b. Frequent disinfection of the stabilization room and the adjoining paddock.
 - c. Daily cleaning of the kitchen or milk preparation area.
 - d. Sterilization of all feeding bottles, teats and other utensils after every feed.
 - e. Preparation of fresh milk formula for every feed and discarding the surplus.
2. Keepers who are attending to diseased animals at the centre shall not be allowed to handle or go near the new arrival. Moreover, all keepers will be regularly screened for infectious diseases like tuberculosis, hepatitis A and B and influenza and only those keepers who have passed these tests will be given responsibility of looking after the calf.
3. Once the calf has stabilized, it will be given a bath during hot hours of the day. As rhinos like to wallow, opportunities will be provided for the calf to wallow in muddy pools in the mini paddock itself.

Veterinary considerations

The family Rhinocerotidae does not have domestic equivalents unlike members of the order Artiodactyla. Most of the domesticated species being cloven-footed ungulates, not many infectious diseases are shared between livestock and rhino.

- All rhino calves shall be dewormed with a suitable broad-spectrum anthelmintic after two months of age. The stools or dung samples shall be tested every quarter for parasite ova for further deworming.
- Records from captivity indicate that rhinos are not usually vaccinated against any

infectious disease. If any vaccination is considered by the attending veterinarian, no modified live vaccines, especially those used against viral diseases of domestic animals, shall be employed. Rhino being a perissodactyle, the need for protection against *Clostridium tetani* shall be investigated.

- Pre-release treatment: The rhino will be checked for infestation with ticks, which may be a vector for insect-borne diseases. The endoparasite load will be evaluated by fecal examination and an appropriate anthelmintic will be administered if there is any evidence of severe infection. All pre-release treatments will be completed before one week prior to the transfer of the animal from the centre in order to prevent the drugs from masking the signs of disease and development of drug resistant organisms in the release environment (Woodford, 2001).
- Rhinos with permanent disabilities due to injuries/disease will not be considered for release. They shall be moved to permanent care centres or zoos.
- Serum samples will be subjected to neurological investigations to determine the prevalence of infectious diseases like tuberculosis and other diseases that may be considered important.

3. Stages of rehabilitation of rhinos

Weaning and *ex-situ* rehabilitation

Soon after stabilization in captivity, the rhino calves will be allowed to stay in the stabilization centre until they are 5 to 6 months of age. They will then be moved to a specially made *ex-situ* rehabilitation paddock until they are grown up for *in-situ* acclimatization...

- The paddock will be not be less than 1,000 square meters, fenced by bamboo poles protected by two or three lines of power fence inside to minimize damage to the structure. The paddock will also have a large shelter that is covered on three sides to protect the rhino from extremes of weather.
- Weaning at correct age facilitates in the breaking the bond between keepers and the animal. The rhino calves shall be weaned at the age of 18 months or even before.
- The animals will be introduced to fodder and concentrates during this period. The concentrate will comprise a mixture of gram and cereal fed daily.

Age/Durations	Stage	Plan	Features
	Remain with mother fals		
		To centre for hand-raising	
6 months	STABILIZATION PHASE	Nursery or Stabilization Centre	Emergency relief to the calf in distress Choice of appropriate milk formula Protection from extremes of weather
		Moved on foot to paddock	
3 months to 18 months	EX-SITU REHABILITATION	Paddock at CWRC	Feeding of fodder and concentrate Mixing with conspecifics of same age Weaning by 18 months of age
		Relocated to release site	
18 months to 4-5 years	IN-SITU ACCLIMATIZATION	Roma in the wild	Site selected in its distribution range Supplementary feeding for 1 month Monitoring animal behaviour
		Let open in the wild	
After 4 to 5 years	RELEASE TO THE WILD	Release site outside Roma	Radio-collared before release Monitored for a period of one year

- Unlike in the stabilization yard, contact with the keepers shall be further minimized to avoid imprinting and reduce dependency on humans.
- Wherever possible, two rhinos will be allowed to share the same paddock for companionship and social bonding.

Selection of site for *in-situ* rehabilitation

The acclimatization shall be conducted at the proposed site of release itself. The release could be for the purpose of reintroduction or restocking. The task of selecting a suitable site of existing rhino habitat in Assam for eventual release of the animal will be left to the team

headed by the Project Leader of CWRC and representatives from Dept. of Environment and Forests, Assam, Wildlife Trust of India and conservation biologists from outside if any. The suitability of the proposed site will be evaluated using a standard proforma which will eventually be signed by the team members. The following criteria would be taken into consideration in selecting the acclimatization and release site.

- The area selected shall fall within the present or past distribution range of the species.
- The area shall be free from anthropogenic pressures like cattle grazing. It should ideally be far away from human settlements.
- Any fencing activity shall cause minimum

disturbance to resident wildlife in nature, the site selected shall not have any resident rhino which may either get disturbed or displaced due to fencing activities.

- The chosen site shall be within a protected area and enjoy adequate protection by the Forest Department personnel.
- The site should be approachable to the rehabilitators from translocation and monitoring point of view.

Construction of the confinement paddock or *boma*

- The *boma* or the temporary captivity zone will encompass an area of not less than 3 acres, fenced with battery operated 7 feet high power fence consisting of 6 to 8 lines to prevent the entry of tigers, leopards and large herbivores. The enclosure shall have one or two gates, large enough to permit the entry of trucks for unloading the rhino.
- The *boma* will have all the necessary elements of a rhino habitat, viz swamp or water body for wallowing, adequate shade, and patches of tall and short grasslands in the middle for the rhino to rest at night.
- The *boma* will also contain elevated locations for the rhino to take refuge during during floods.
- A small camouflaged temporary field camp would be established near this confinement zone for the field staff to monitor the animal during the period of acclimatization.
- The animal will be in the *boma* for a period of one to three years until it is adequately habituated to the surroundings.

Relocation of the rhino from CWRC to release site

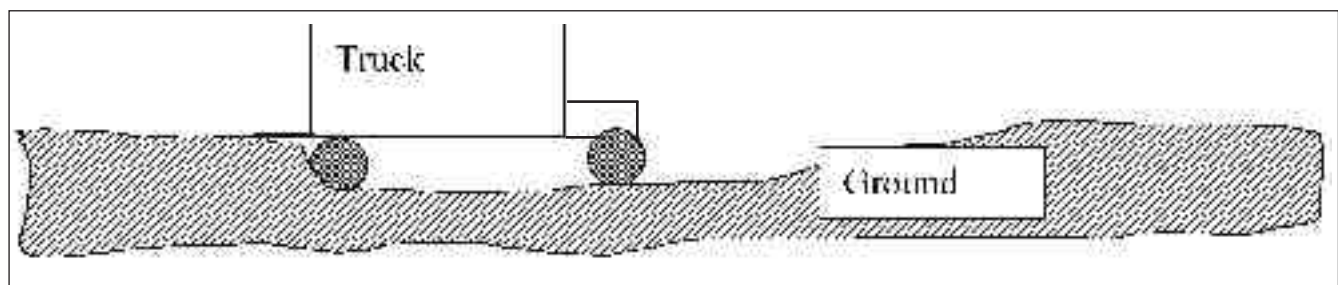
The relocation of hand-raised rhinos for restocking/reintroduction programs like the one being attempted at CWRC does not demand chemical capture as the animal can be lured into the truck directly. Captive rhinos have been made to walk directly into trucks (Suwal and Shakya, 2000).

Consequently the need for drug-immobilization and the special sledge often employed to move the heavy animal into the crate may not be required. Nevertheless, the operation still requires meticulous planning and preparation.

- The animal will preferably be radio-collared before it is loaded into the truck.
- Drug immobilization and the use of sledge and crates will be considered only if efforts to load the animal into the truck fail. Rhinos have been captured from the wild, translocated and released to newer areas as part of conservation reintroduction programs in India and Nepal (Singh and Rao, 1984; Suwal and Shakya, 2000). Invaluable experience has been gained from these chemical capture and translocation operations and they all have been well documented.
- The rhino will be habituated to the crate for a period of at least 30 days. The crate shall have vertical sliding doors on both ends and adequate number of strong hooks or rings on all sides for tying and fastening with ropes. The recommended size of the crate will be 1.6% of the body dimension of the rhino.
- The floor of the vehicle would be placed at ground level by digging a small portion of the approach road of the animal paddock (see illustration below). A similar trench will be prepared at the release site also for unloading the animal into the *boma*.
- Once loaded the animal will transported to the release site under mild sedation to prevent anxiety during transit.

Provision will be made, at the release site, for easy unloading of the animal. For this, a part of the soil will be dug so that the rear door of the truck can easily rest at the ground level (see illustration below). However, a crane will be employed to load the crate with the rhino into the truck.

- The vehicle will move at a speed not more than 40 km per hour. If the journey is long (more than 2-3 hours), the vehicle shall be



stopped every hours to thoroughly check the well being and comfort of the animal. The attending veterinarian and keeper shall accompany the animal in the truck to the release site.

- At least six captive elephants shall be kept standby at the unloading site to deal with emergencies.

***In-situ* acclimatization in the boma**

Though rhinos occasionally congregate in small groups in the same wallow or grassland, they are mostly solitary (Suwal and Shakya, 2000). *In-situ* acclimatization is therefore essential for a rhino to establish its home range in the wild. All rhinos will be subjected to a period of minimum one year of *in-situ* acclimatization in a large confinement or *boma*. If two rhinos were brought together in company during the *ex-situ* rehabilitation phase, both the animals will be moved to one single *boma* unit.

- A biologist will be appointed to monitor the rhino during the entire period of acclimatization. Monitoring would include behavioral observation and the presence of other wild mammals around the enclosure.
- For the first two weeks, the rhino will be fed with fodder and concentrates as supplementary food. This will be gradually phased out until the rhino becomes totally dependent on the grass and browse available in the wild.
- All rhinos will be radio-collared and old collars replaced before released from *boma*.
- After release, the animal will be monitored on a daily basis for a period of one year to record its movement pattern and habitat use.
- Steps would be taken to take the animal back to the *boma* if the survival of the animal is threatened by conspecifics, other sympatric species or poachers.
- The rehabilitation of rhino involves the following impending risks that are avoidable:
 - ⌘ The possibility of the animal getting swept along the streams or rivers during the annual floods.
 - ⌘ Temporary or permanent loss of contact with the animal after release as radio equipments may fail to work.
 - ⌘ The possibility of individuals getting hurt or killed by people when they accidentally wander into human habitations. Such problem animals will be captured, either for lifetime care or considered for release in a *boma* in a different place.
 - ⌘ The entire rehabilitation process will be

documented by written documents and video and still photography. Interim reports will be published on the progress of rehabilitation.

4. Legal permits for rehab and release

The greater one-horned rhinoceros enjoys a high level of protection under Wildlife (protection) Act, 1972. Following permissions from the Governments shall be obtained from the Central and State Governments during the period of rehabilitation.

1. To facilitate the process of obtaining legal permits from the state and central governments, the following documents will be submitted along with the proposal.
 - a. The protocol on rehabilitation of rhino
 - b. The following proformas duly signed by the Project Leader, Centre Manager, Veterinarian and other relevant authorities shall be submitted to the state and central governments for obtaining the permission for translocation and release.
 - i. **Site selection:** The site selection criteria have already been listed before..
 - ii. **Biological and behavioral considerations:** A careful assessment of the level of habituation of the animal, namely its ability to compete for food and space in the wild shall be determined before and after the *in-situ* rehabilitation. Rhino being a candidate for release after a prolonged period of *in-situ* acclimatization, this assessment is more relevant when done before the animal is released from the *boma*.
 - iii. **Veterinary considerations:** The various veterinary protocols to be met under this document have also been dealt before. Permission will be obtained from the Chief Wildlife Warden (CWW) of Assam for the establishment of rehab station comprising the *boma* and monitoring facility in the wild. Prior written permission will also be obtained from the CWW and CZA for the transportation of the animal from the centre to the *in-situ* acclimatization *boma*.
2. All the permission letters, either to the state or central government, shall be routed through the Project Leader.
3. All rehab centres come under the mandate of the Central Zoo Authority (CZA) of the Ministry of Environment and Forests

(MoEF). CWRC has been registered under CZA and all rescues of Schedule I and Schedule II (part 2) animals are being informed to CZA.

4. No rhino shall be moved to the *boma* without the permission of the Assam Forest Department and no animal shall be released

to the wild without the written permission of the MoEF, Government of India.

5. Use of radio-telemetry in wildlife requires the permission of the Ministry of Telecommunications. No rhino shall be radio-collared without the permission of this ministry.

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