

Guide to Safe Rescue and Release of Stranded Ganges River Dolphins



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गंगे



TSA
INDIA

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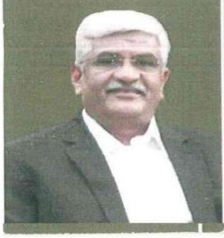
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एक कदम स्वच्छता की ओर

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भारत सरकार
Minister for Jal Shakti
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07 SEP 2021

MESSAGE

The Ganga River system nurtures a diverse group of aquatic life. However, increasing human population, developmental activities and dependency on natural resources have led to severe degradation of river ecology and biodiversity that it supports. Ganges River Dolphin (*Platanista gangetica*) is an integral part of the Ganga ecosystem. Their population is in danger due to various threats including stranding in the vast network of irrigational canals or smaller tributaries leading to reduction in their overall population.

I am glad to know that Turtle Survival Alliance (TSA) India, Department of Environment, Forest and Climate Change, Government of Uttar Pradesh & National Mission for Clean Ganga is coming out with a publication on "Guide to Safe Rescue and Release of Stranded Ganges River Dolphins".

This document is a reflection of the Ministry of Jal Shakti's commitment for conservation of Ganges River Dolphins including the plan for their rescue. This document provides guidelines for safe rescue and release of Ganges River Dolphins entailing seven years experiences of the same. I am sure that this document will be of great value to front line forest staff, scientific community and other stakeholders throughout the entire range states of Ganges River Dolphins. I again congratulate the concerned for preparing this important document, which will go a long way in conserving India's National Aquatic Animal.



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Message

Ganges River Dolphin is the indicator of healthy aquatic system, conservation of this charismatic species is crucial to the welfare of the riverine ecosystem of the Ganaga Basin. Acclaimed as the “Tiger of the Ganges” this endangered species is in dire need of help. Identifying the multitudinous threats, Dolphin Action Plan was prepared to implement several strategies to address the threats to the species and its habitat and ensure long term protection and conservation of the species. With a view to provide maximum protection to this endangered species Government of India had declared Ganges River Dolphin as the National Aquatic Animal of India and Project Dolphin was initiated in the lines of Project Tiger and Project Elephant.

I am happy to note that Turtle Survival Alliance (TSA) India, Department of Environment Forest and Climate Change Department Government of Uttar Pradesh (UPFD) & National Mission for Clean Ganga (NMCG), is bringing out the publication “Guide to Safe Rescue and Release of Stranded Ganges River Dolphins”.

This document is a reflection to the government commitment to the protection of each individual of dolphins. This document aligns with the government’s Dolphin Action Plan and concerted actions of CMS CoP 2020 which suggested the development of rescue protocol on stranding of dolphins and associated data collection and monitoring.

I am confident that this document will facilitate towards efficient implementation and strengthening of rescue, rehabilitation of Ganges River Dolphins in India. I again congratulate the team for their efforts to document the critical on ground approaches to successful rescue operation through this publication


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Message

India is endowed with remarkable biodiversity harbouring 7-8% of world recorded species in its diverse ecosystems and habitats that are distributed in varied but unique biogeographic zones. Its biodiversity richness is well reflected in the fauna of not only the terrestrial ecosystems, but also the aquatic ecosystems. India occupies the ninth position in terms of freshwater mega biodiversity. The Ganges River Dolphin found in Ganga Brahmaputra River System is considered as National Treasure of India. Known as an apex animal the species thrones at the top of the food chain. The Ganges River dolphins (have also been granted “non-human personhood” status by the Government of India, making India the first nation in the world to recognize their unique intelligence and self-awareness. The estimated population size of Ganges River Dolphins is about 2000-3000 with India having largest population. However, given the fragmentation of our rivers due to physical barriers like barrages and dams, dry season habitat further reduced by diversion of water, many of the sub population have shrunk and become isolated. Thus, protecting each individual of this species is very important should be prioritized by each range state.

The state of Uttar Pradesh is crisscrossed by Ganges rivers and its tributaries further to meet the need of the ever-increasing population and network of canals are in operation where dolphins get stranded usually after monsoon as the water starts to reside. Uttar Pradesh Forest and Wildlife Department is at the forefront to ensure survival of each such individuals and conjointly with Turtle Survival Alliance India’s Rescue Unit the state have successfully rescued and released 24 dolphins over the past seven years. This document “Guide to Safe Rescue and Rehabilitation of Stranded Ganges River Dolphins” developed by UPFD, TSA India and NMCG would be integral to protecting each stranded individual where multiple stakeholders will work together. The rescue techniques suggested herein is robust, replicable and already time tested in the field. The primary goal of this document is to provide a doable protocol for responding to stranded dolphins and associated data collection and monitoring. I am hopeful that this document will be adapted widely at local state and national level.

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Message

Often known as the “Tiger of the Ganges”, the Ganges River Dolphin is an indicator of healthy and clean aquatic ecosystem. This charismatic megafauna is distributed in the Ganges-Brahmaputra and Meghna river systems of India and part of our natural aquatic heritage. As a flagship species, its conservation requires greater efforts along the lines of that provided to the tiger and the elephant. Once present in tens of thousands, the Ganges River Dolphin has dwindled abysmally owing to direct killing, habitat fragmentation by dams and barrages, indiscriminate fishing and pollution of the rivers.

The state of Uttar Pradesh has one of the largest strongholds of the species in India. The state is actively involved in conservation and on ground protection of the species. Government of Uttar Pradesh and partners have conducted several scientific surveys to enumerate the population status of the species alongside capacity building and out-reach of local stakeholders.

Turtle Survival Alliance India jointly with Uttar Pradesh Forest and Wildlife Department have launched a unique rescue initiative for Ganges River Dolphins, currently a standalone effort in the country. This document “Guide to Safe Rescue and Release of Stranded Ganges River Dolphins”, has been derived from 7 years on-ground experience of saving stranded dolphins in Uttar Pradesh. I urge users and other range states to come together and test the field methodologies we have gathered in Uttar Pradesh and provide their feedback so we can enrich the present document.

I send my best wishes to UPFD and TSA team which was involved in this effort and bringing out this key document for species conservation.

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Message

With population estimates of around 4000 individuals, India has the largest population of Ganges river dolphin, nearly 80% of what is found in the subcontinent. Despite its iconic national & international status, its population and habitat range have decreased significantly in recent decades. This alarming decrease is primarily due to human activities, particularly those resulting in river fragmentation, lower water levels, poaching and noise pollution, as well as pollution from agriculture, mining, domestic sewage and industrial effluents. This calls for strong recovery objectives, institutional collaborations and projects with on ground actions and time bound deliverables.

On the recommendation of the Standing Committee of the National Board of Wildlife, Government of India, the Hon'ble Prime Minister Narendra Modi, in his address to the nation on the occasion of 74th Independence Day on 15th August 2020, announced the launch of 'Project Dolphin', along the same lines as that of the Ministry's successful 'Project Tiger' and 'Project Elephant'. Concurrently, the government is also poised towards developing conservation and management action plans and welcomes any on-ground implementation or conservation actions aligned to the objectives.

I am pleased to acknowledge this essential document by the Department of Environment, Forests and Climate Change, Government of Uttar Pradesh and Turtle Survival Alliance-India Program entailing their experiences and learnings from rescue operations for stranded Ganges river dolphins in the Sharda-Sarju canals, conducted over the last seven years. This 'Guide to Safe Rescue and Release of Stranded Ganges River Dolphins' was much needed to facilitate the capacity building of frontline forest and wildlife staff, conservationists, researchers as well as likeminded organizations for efficient implementation and strengthening of rescue, rehabilitation and associated research on Ganges river dolphins in India.

This document is also a testimony of Turtle Survival Alliance-India's long-standing efforts towards effective conservation of freshwater fauna across the country.

(Mr. Pawan Kumar Sharma)



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The IUCN Cetacean Specialist Group (CSG) consists of volunteer experts from across the world who are committed to the conservation and study of cetaceans (an aquatic group of mammals comprising whales, dolphins and porpoises). For nearly 70 years, the CSG has been instrumental in assisting IUCN in devising and implementing conservation projects, organizing task forces and making policy recommendations to safeguard threatened cetacean species.

Freshwater cetaceans are one of the most threatened groups amongst cetaceans and therefore they are some of the highest-priority species for conservation action. After the extinction of the Yangtze River Dolphin (Baiji) at the start of this millennium, all the remaining river dolphins and porpoises are red-listed by IUCN as either Endangered or Critically Endangered.

One significant threat to dwindling populations of Ganges river dolphins (*Platanista gangetica*) comes when individuals become confined in the vast network of irrigation canals built across the Gangetic Basin in Northern India. The Turtle Survival Alliance India Program's Dolphin Rescue Unit is the only organization in India that is equipped for, and experienced in, rescuing stranded Ganges river dolphins.

Drawing upon their experiences and learning since they first began dolphin rescue operations in 2013, the team have amended and fine-tuned their procedures over the years and they now have a clear and distinct methodology. This rescue manual is meant to take the unit's hard-won expertise to another level by creating a single repository of vital information that can be applied to helping save Ganges dolphins across their range. With only a few freshwater populations of cetaceans existing on two continents, the availability of such resource material should be seen as another step along the path to building up experience and developing or reinforcing conservation strategies to conserve these unique animals.

Randall R. Reeves, Chair of IUCN SSC Cetacean Specialist Group

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Foreword

The Gangetic River Dolphin (*Platanista gangetica gangetica*) is an endangered freshwater cetacean spread across rivers of India, Bangladesh and Nepal. Dwindling population can be attributed to habitat destruction and fragmentation due to physical barriers leading to population isolation. Gangetic River dolphin has been very important for National Mission for Clean Ganga (NMCG) for conservation, in addition to maintaining ecological flows, restoring biodiversity value and sustained ecosystem services.

On the recommendation of National Ganga River Basin Authority (NGRBA), the Gangetic dolphin was declared as National Aquatic Animal of India in 2009. Considered as mascot of healthy aquatic system this species also considered as “Tiger of the Ganges”, is presently one of the most endangered species. The Hon’ble Prime Minister announced the government’s plan to launch a Project Dolphin in his Independence Day Speech 2020. It will be on the lines of Project Tiger, which has helped increase the tiger population. NMCG also celebrates 5th October every year as the National Ganga River Dolphin Day. NMCG has been working in collaborative partnership with several agencies like WII, WWF, TSA, CIFRI and IUCN for Biodiversity conservation.

The Dolphin Action Plan recommended a number of actions to ensure long term survival of dolphins in the rivers of India. The action plan also focuses to reducing incidental mortality of Gangetic dolphins through rescue and release efforts over entire Ganga Basin. Among the myriad of threats faced by the Gangetic River Dolphin in India, frequent stranding of dolphins within the extensive canal systems has been a major concern. Stranded dolphins eventually die in these canals if not rescued in time due to a number of factors like rapidly receding waters, heat stroke, accidental drowning, and intentional and unintentional harm by fishermen.

Dolphin Rescue Unit of Turtle Survival Alliance (TSA) India Program, in collaboration with Environment Forest and Climate Change Department Government of Uttar Pradesh (UPFD), is currently the only organization in India equipped and experienced in rescuing stranded freshwater dolphins. NMCG recognises TSA India as a partner institution for achieving the goal of “Aviral” and “Nirmal” Ganga through long-term research work on aquatic fauna.

“Guide to Safe Rescue and Release of Stranded Ganges River Dolphins” synthesizes 7-year experiences of best practices, providing tried and tested methods culled from experiences of rescue of the Ganga River Dolphins over the years, involving national and international professionals. This manual is augmented with photographs, illustrated diagrams and specific action to be taken towards successful rescue operations of stranded Dolphins. I am sure, this guide will serve as a toolkit of proven techniques, much needed for efficient implementation and strengthening of rescue, rehabilitation and associated research on Gangetic River Dolphins all across their distribution range.

Rajiv Ranjan Mishra



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Preface

Found throughout the Ganges-Brahmaputra-Meghna and Karnaphuli-Sangu River Systems of Nepal, India and Bangladesh, the Ganges river dolphin (*Platanista gangetica gangetica*) is a global priority species and India's National Aquatic Animal. This charismatic megafauna also happens to be an indicator of healthy aquatic systems.



However, they face a plethora of threats that have resulted in their dwindling population. This can be attributed to habitat destruction and fragmentation due to presence of manmade barriers like barrages and dams. Furthermore, stranding incidences in various irrigation canals and river branches, accidental entanglement in fishing gears, poaching for meat and oil along with the deliberate or accidental killings of dolphins in Uttar Pradesh, Bihar and West Bengal add to this.

Post monsoon some individuals of *P.gangetica gangetica* tend to move into irrigation canals or smaller tributaries and rivulets, where the current is relatively weak. Dolphins that get stranded can rarely successfully return back to the main channel of the river due to the architecture of the barrage gates, subsequently resulting in them either being killed by locals or dying due to unsuitable conditions like low water levels, lack of water flow and reduced feeding opportunities in the canals if not rescued in time. A safe capture and translocation method was established in Uttar Pradesh to rescue such dolphins and return them to their original habitats. Since 2013, Turtle Survival Alliance India and Environment Forest and Climate Change Department Government of Uttar Pradesh conjointly have been involved in 24 dolphin rescue operations. Using our seven years' worth of experience and knowledge of best practices used in rescue operations and through research, we have created this manual with the intent to share our expertise on how to properly execute a rescue operation. We hope that this manual can provide technical knowledge and good practices to follow in the field for the forest department staff and other agencies who deal with Ganges river dolphin rescues in their range habitat. Furthermore, with the release of this manual, we hope to decrease the risk of injury and stress faced by the animal during a rescue while increasing their chances of post-release survival.

Director
Turtle Survival Alliance India Program

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Glossary

AMBU bag: Artificial Manual Breathing Unit (AMBU) is a self-inflating bag resuscitator used to provide positive pressure ventilation in an event that the animal is unable to breathe adequately.

Appendage: A projecting body part like the rostrum, pectoral, dorsal fins or the fluke in a dolphin.

Blowhole: An opening serving as a nostril located at the top of a dolphin's head.

Calf: A young and dependent offspring of a cetacean, sometimes also referred to those born in the previous years.

Cetacean: Any member of an entirely aquatic group of mammals commonly known as whales, dolphins, and porpoises.

Coordinates: (As in Latitude and Longitude), refers to a pair of values specifying the geographical location of any position on the surface of the Earth.

CPR: Cardiopulmonary Resuscitation is an emergency procedure for artificial ventilation to restore spontaneous blood circulation and breathing in case of cardiac arrest.

Dorsal fin: The fin located on the back (top) along the midline of the dolphin.

Echolocation: A physiological process to locate distant objects (or prey) using sound waves reflected off the object(s)/prey back to the emitter (animal; in this case, a dolphin). It is used for orientation, avoiding obstacles, procurement of food and social interactions.

Entanglement: Any instance where the animal gets wrapped in lines, nets or other materials of anthropogenic origin around its body. Here, it is an overarching term for when the animal becomes encircled, trapped, or tangled in a net.

Flippers: A term generally referring to a broad, flattened limb of an animal adapted to an aquatic lifestyle. Here it is used to refer to the front limbs of a dolphin.

Flukes: Also tail; used to refer to the typically flat and horizontal lobes on the tails of cetaceans, made up of a cartilaginous core

Gill net: Nets consisting of single or, less commonly double (known as 'gillnets') or triple netting (known as 'trammel net') mounted together on the same frame ropes. These nets can be used either alone or usually in large numbers placed in line, anchored to the bottom or left drifting.

Mandible: The lower jaw of the dolphin.

Myopathy: A neuromuscular disorder in which the primary symptom is muscle weakness due to dysfunction of muscle fibres usually associated with the stress of capture, restraint and transportation.

Necropsy: It is a conventional term for post-mortem examination of non-human species. The necropsy procedure includes not only the dissection of the dead animal and macroscopic examination of all organs but also collection of appropriate tissue samples and measurements of the carcass, internal organs, and body fluids.

Pectoral fins: Also referred to as flippers and often as fins. These are modified limbs used for stability and steering.

Permit: An authoritative or official certificate of permission, usually a written order granting special permission to do something under relevant sections of Indian Wildlife (Protection) Act 1972.

Reconnaissance: A preliminary research or a survey, in basic terms, an act of scouting or exploring in order to gain information. Colloquially also referred to as "recce".

Rostrum: The 'snout' or 'beak' of a dolphin, comprising the upper and lower mandible or jaw.

Stakeholder: Any individual, group, or organization that has an interest or is involved or impacted by any activity or the outcomes of any action.

Stranding: Here, refers to the case where dolphins stray into irrigation canals upon the opening of barrage gates and are unable to swim back up into the main river channel

1. Background and Context



Image1: Stranded Ganges river dolphin rescued from one of the irrigational canals in Uttar Pradesh

Only three species of freshwater dolphins are remaining on the Earth after the functional extinction of the Chinese river Dolphin (Baiji) in 2006. The Ganges River dolphin (*Platanista gangetica gangetica*) is the only freshwater cetacean endemic to the Indian subcontinent found in the Ganges–Brahmaputra–Meghna and Sangu–Karnaphuli River systems in **India, Nepal, and Bangladesh**. Commonly known as ‘soons’ or ‘susu’ this species is facing a major decline in their population across the entire range. Ganges river dolphin faces a number of threats in the Ganga Basin; dwindling populations can be attributed to wide-scale habitat degradation from pollution, hydroelectric and development projects and industrial run off, as well as accidental deaths via entanglement in fishing nets or by villagers from curiosity, opportunistic poaching for meat and oil in certain pockets of the country. Among all the threats the primary threat arises from hydro- development projects that comprises a vast network of irrigation canals which draws water from various dams and barrages. (Reeves *et al.*, 2000, Sinha *et al.*, 2014). At least 50 water development projects within the range have affected rivers that historically or currently support dolphins (Smith. *et al.* 2000). Not only do they prevent migration, they also lead to the segregation of the population and alter the ecological conditions that make river channels suitable for sustaining dolphins. When the barrage gates are opened to release water into irrigation canals, the dolphins get flushed

and stray into these irrigation canals and end up stranded into it as the structure of the openings do not allow the animal to swim back up into the main river channel. The fate of all stranded animals eventually results in death if not rescued in time due to threats such as rapidly receding waters, heat stroke, chances of accidental drowning in siphons and intentional and unintentional harm by villagers (primarily fishermen), which warrants immediate rescue of strayed individuals. In an effort to mitigate canal stranding, a GRD rescue program has been jointly run by the Turtle Survival Alliance-India (TSA India) and the Environment, Forest and Climate Change Department, Government of Uttar Pradesh (previously known as the Uttar Pradesh Forest and Wildlife Department) since 2013, in response to increasing reports of Ganges River dolphins becoming stranded and dying in the irrigational canal network in Uttar Pradesh. Between October 2013-October 2020, 24 animals (Males=10; Females=14) has been rescued on 15 separate occasions, where 19 dolphins were rescued successfully and released back into the Ghaghara River (n=16), Ganga river (n=2) and Rapti river (n=1) while 5 animals unfortunately succumbed during the rescue process, possibly due to stress.

Ganges River Dolphin (GRD)

Scientific Name

Platanista gangetica gangetica
(Roxburgh/Lebeck, 1801)

Local Name-

Bengali- shushuk, susu, sishu, foo, or hungmaach; Hindi- soonse, mayabati, sunsar; Assamese- hiho, shihu; Nepali- swongsu, sus matsya

Legal Protection

WLPA (1972) – Schedule I

CITES- Appendix I

IUCN- Endangered

Size

Neonate: 70-90 cm, 4-7.5kg

Adult Male: 200-250cm, 70-100kg

Adult Female: 240-260 cm, 80-100kg (non-gravid), 100-130kg (gravid)

Colour

Gray or light brown. Calves have a pinkish hue (Smith and Braulik, 2018)

Morphology

A streamlined and fusiform body that is thickset in the middle and attenuating towards the tail. A prominently bulbous head that tapers downwards into a deep concave depression at the base of a rostrum (snout) that can reach upto 40cm in length. Snout contains 100-140 homodont teeth. Dorsal fin is almost negligible.

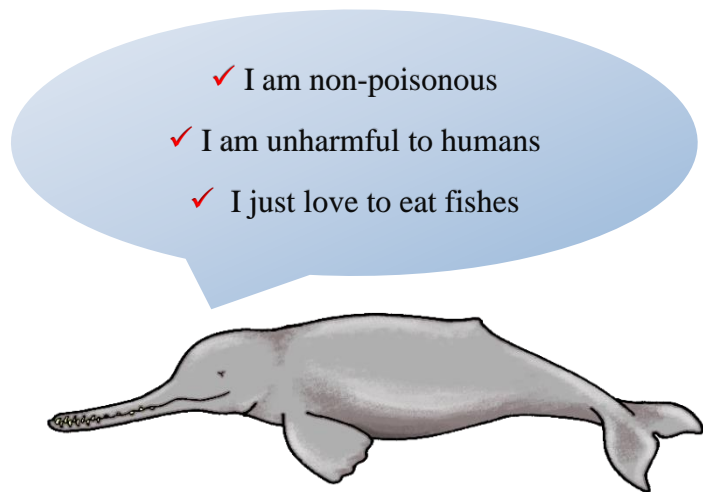


Figure1 : Ganges river dolphin (*Platanista gangetica gangetica*)

Dimorphism

Mature females and males differ in size, snout shape and teeth structure. Females are usually larger with uniform upturned snouts and smaller non-protruding teeth while males are smaller in size, with a shorter, tear drop shaped snout and longer interlocking and protruding teeth (Smith & Braulik, 2018)

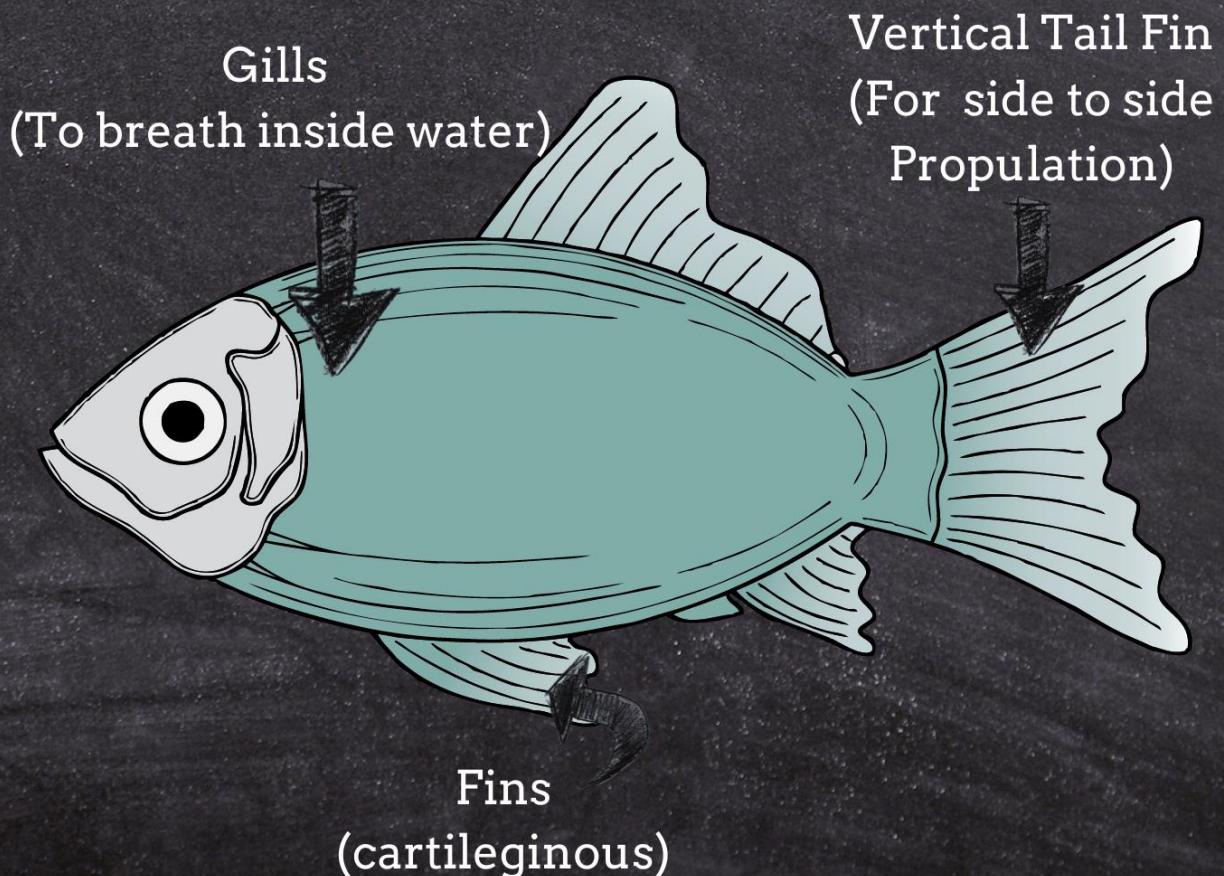
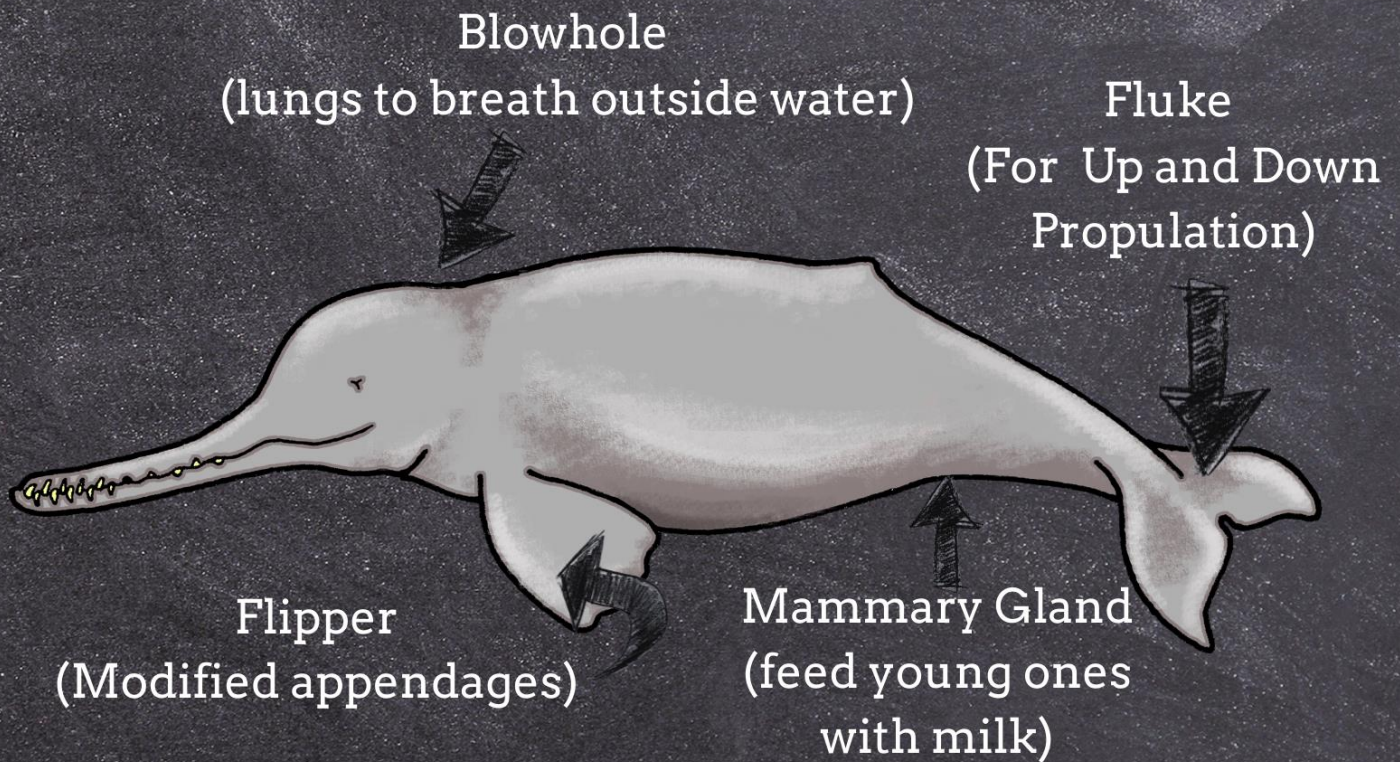
Diet-  Fishes and shrimps

Habitat- Primary preferred habitat is an eddy counter current system, though also known to frequently occur in deep pool habitats, also prefers counter currents pools, sharp meanders along with bridge pilings and other engineering structures that cause scouring.

Reproduction- Males attain sexual maturity at a body length of about 170cm and physical maturity at 200–210cm. Females attain sexual maturity at similar or slightly larger body lengths but physical maturity at about 250cm. Breeding season extends from January to June. Only a single calf is born after a nine-month gestation period with possible peak birthing seasons in early winter and/or early summer. (Kasuya, 1972, Brownell, 1984). Length at birth is estimated to be about 70cm.

Threats- Water developmental projects; industrial, domestic and agrarian pollution, opportunistic poaching for meat consumption, zootherapy and animal by-products, net entanglement mortality, depletion of prey base.

DOLPHIN IS MAMMAL NOT FISH



2. Anatomy of Ganges River Dolphin

2.1. External features

The body is overall smooth and rubbery, with no protruding body parts like ear lobes, body hair, external genitals or mammary glands to improve hydrodynamic efficiency. The bulbous head has a wedge-shaped portion at the front referred to as a 'melon', which is used in echolocation.

Having evolved to live in turbid waters, the Ganges River Dolphin is functionally blind, with the physical eye structure resembling 'pin-pricks' on either side of the head.



Image 2- Eyepin

The snout is an elongated and laterally flattened structure that is sexually dimorphic; males have short and straight snouts with a narrow base and bulbous end while female snouts are longer with uniform width from base to end, but slightly upturned towards the end (Smith and Braulik, 2018). Snouts have pairs of single file homodont teeth on either side of both jaws that are narrow, conical and interlocking. They are smaller and more widely spaced near the oral cavity, becoming more closely spaced and longer towards the end of the snout. Males have longer teeth that prominently interlock while females have smaller teeth that do not protrude (Smith and Braulik, 2018).



Image 3- Snout/Rostrum

A blowhole is a longitudinal nostril protected by a strong muscle and located above the head that helps the animal to breathe as it breaks the water surface.



Image 4- Blowhole

Dorsal fin is a small triangular hump along the top of the animal and usually helps to maintain balance, though it is smaller compared to other dolphin species, making it comparatively negligible. Forelimbs are modified into pectoral fins or flippers with a crenelated margin for aquatic propulsion and navigation, while hind limbs are externally non-existent (though are present internally as vestigial organs). Tails are horizontal and contain two 'lobes' called 'flukes' that help in swimming.

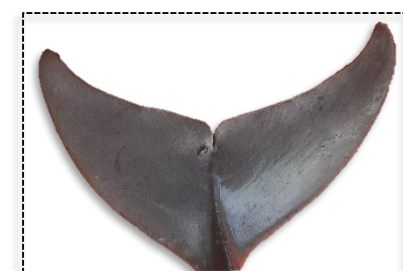


Image 5- Fluke

Females have a single genital slit on the ventral side, right above the pelvis, flanked by well-developed mammary slits on either side. Males, on the other hand, have two separate slits, one for the penis and another further behind for the anus.



Image 6- Genital Slit

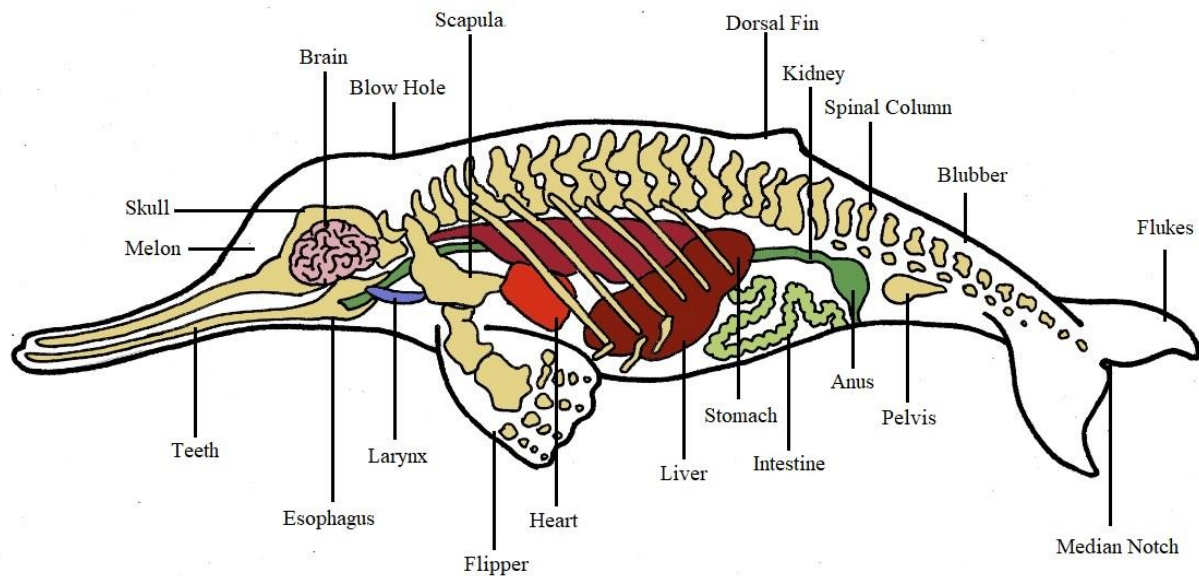


Figure 2: Internal anatomy of a Ganges river dolphin

2.2. Internal features

Respiratory system

GRDs have a pair of lungs similar to other mammals. Their breathing, unlike terrestrial mammals, occurs not from an oro-nasal region, but from a single naris (nostril) called a blowhole located on top of their head. Dolphins are conscious breathers, i.e., have a voluntary control over their respiration, where they can hold their breath for up to fifteen minutes under water and exhale it at 100 km/hr. This control over their breath can also be maintained during sleep, which involves intermittent surfacing for breathing. The rest of the respiratory mechanism is similar to the mammalian system, where the lungs are located in the thoracic region, guarded by the rib cage and separated from the abdominal region by a muscular diaphragm.

Digestive system

GRDs are obligate piscivorous carnivores i.e., rely mostly on fishes and shrimps as the sole dietary components. With a set of 100-140 homodont teeth that help to catch and hold onto prey, they have no mechanism to masticate and rely on the tongue to push food down the buccal cavity. Their stomach comprises of three compartments, the oesophageal, fundus and pylorus. Digestion occurs in the second and third compartments which are glandular. Digestion is aided by the liver which is connected to the duodenum via a sub-mucosal duodenal pouch which also serves to store bile as there is no gallbladder. Small intestine comprises of duodenum jejunum and ileum while large intestine comprises of caecum, colon and rectum that ends with the anus which opens to the outside of the body via the anal slit.

Circulatory system

GRDs have a four chambered heart similar to mammals and a well-developed circulatory system that supplies blood through a network of arteries and veins.

Nervous system

A well-developed mammalian brain and nervous system is found in the cranial cavity of a Ganges river dolphin. Eyes are poorly developed and not used for vision as they lack a crystalline lens, though do possess a flat and thick cornea and some remnants of a retina is present. Instead, GRDs use echolocation to navigate in turbid waters using an organ called the ‘melon’, situated dorsal to brain in the cranial cavity, which serves as a navigation system using high frequency clicks emitted from larynx and amplified through the melon or the fat in the dolphin’s cranium. Maxillary crests in the cranium help localize the acoustic beam of river dolphins.

Urinary system

GRDs have well developed multi-lobed mammalian kidneys that are highly developed for osmoregulation. Adrenal glands are placed above the kidneys.

Reproductive system

Males have a pair of testicles adjacent to the kidneys and a fibro-elastic penis which remains within the body and protrudes only during mating through a separate slit above the anal slit. Females have a well-developed reproductive system with a pair of ovaries, uterine horns, a uterus and vagina that opens to the outside via the genital slit. Mammary slits serve as milk ducts for nursing calves.

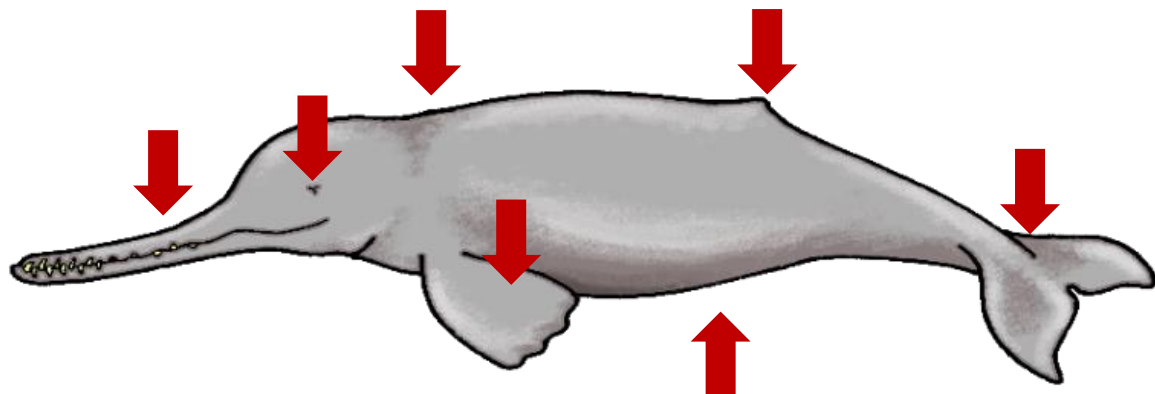


Figure 3: Arrows showing the delicate areas of Ganges river dolphin where a minor mishandling can cause serious injury to the animal.

Key Points

- ✓ Under no circumstances should the snout be used to move or hold onto the animal, despite its robust appearance
- ✓ Avoid pushing, pulling or twisting the appendages, as it may lead to internal injuries and decrease the animal(s)'s chances of survival
- ✓ Avoid rough touch or placing of sharp or abrasive objects as dolphin skin is highly sensitive to touch and pain and may increase the stress levels
- ✓ Never cover or block the blowhole, or spray water in or near it, as this may interrupt breathing or result in drowning
- ✓ Avoid placing hands inside the mouth, as dolphin may get severely injured
- ✓ Avoid covering the BLOWHOLE and place a wet towel carefully over the animal to ensure the animal is hydrated
- ✓ All team members should stay clear of tail fluke and snout to avoid getting injured

3. Offsite Operational Practices

3.1. Permit and Coordination:

The Ganges River dolphin is listed as a Schedule I species under the Wildlife (Protection) Act, 1972. Thus, it requires a special permit (template given as Annexure V) from a competent authority to be handled and rescued. Once a stranded animal has been sighted, the concerned Divisional Forest Officer (DFO) must inform the nearest established Dolphin Rescue Unit. A team of two to three experienced rescuers and biologists must then conduct a pilot visit to the site to ascertain the number and movement of the strayed animals, and make a detailed plan with the local forest and wildlife officials. A permit application must then be immediately submitted by the DFO, with inputs from the Dolphin Rescue Unit, to the Principal Chief Conservator of Forests (Chief Wildlife Warden) of the State, making sure it is copied to all concerned officers, detailing the specific capture and translocation plans. In the event that the selected release site is located in a different range, the DFO(s) under whose jurisdiction the release site falls must also be informed about the rescue operation, along with being involved in facilitating the release and post-release monitoring. In case of mortality, a necropsy must be performed by a panel of veterinarians formed by a competent authority with written evidence. It is advisable to strictly follow government procedures and submit a report of the rescue operation to the office of the PCCF (CWLW) within a week's time.

1. Receive and record information of stranding via dedicated helpline, and ideally, mobilize a pilot team for reconnaissance within six hours of obtaining information
2. Provide urgent inputs regarding detailed rescue planning to local head of Forest and Wildlife (not below the rank of Assistant Conservator of Forests) and request to submit an urgent permit request letter to the Principal Chief Conservator of Forests (Wildlife)/ Chief Wildlife Warden (CWLW). The obtaining permit might take 1-2 days depending upon the availability of the officer
3. Mobilize Quick Response Team (QRT) within 3 hours of receiving the permit and inform the Forest, Animal Husbandry, Police and Irrigation Departments as needed. Please note that operations can attract huge crowds and the involvement of the police might prove crucial in executing a smooth operation and evacuation. Request at least one government veterinarian to be present during the operation and two during the necropsy
4. Keep key contacts handy, such as the operator and execute engineer from the Irrigation Department, in case canal waters need to be diverted to minimize the flow during casting of nets
5. Use prescribed format to perform necropsies and report the death only after it has been approved and signed off by a panel of veterinarians
6. Request the presence of an officer (ranking no lower than the ACF (Range Officer)) during the operation and release and/or necropsy (ies) in case FD is not directly supervising an operation,
7. Release a clearly written statement for the press so that awareness about the species can be increased and locals may be updated about the progress of the operation
8. Document the operation using photos and videos and submit a detailed report to the PCCF (Wildlife) and other concerned officers such as the Chief Conservator of Forests (CCF). Make sure to also catalogue key information from the operation into a central data base for future reference (refer part 4.8)

Key Points

- ✓ Perform the rescue operation **ONLY AFTER** a **WRITTEN** permit has been procured from the competent authorities
- ✓ Use various modes of communications among stakeholders and continuously maintain communication about the progress of the operation throughout



Every range state may set up a Rescue Helpline Number like one in Uttar Pradesh (**888-188-0388**) to receive, and maintain the data log

3.2. Team Planning and Preparation:

Being prepared and competent for the whole rescue process is critical to ensure a successful operation. Rescue and release of GRDs involves swift decision making by the Lead Rescuer in continuous consultation with government officials and team members. Prior to every operation, the QRT is provided a refresher by the Lead Rescuer about individual roles and responsibilities to avoid any confusion, simultaneously also ensuring their safety. Essential elements before conducting a rescue include a QRT with veterinary back up support, equipment for moving animal/s and a designated researcher to collect data. To function as a unit, the team requires a training program involving regular practice drills, following uniform protocols and strong communication. The size of the team is determined by the number of the stranded individuals, their location and the profile of the canal/area where they are stranded.

1. The QRT is split into two sub-units. The first must develop a checklist of the equipment and documents required as soon as a stranding report is received
2. A second sub-unit of the QRT, simultaneously with Step 1 above, must travel and conduct an immediate reconnaissance of the area to understand the movement of the individual/s, canal profile (including depth and flow of the water) and identify the shortest and smoothest route between capture and release sites. Temporary signs and notices must then be put up along the canal with appeals to locals to not harm the animal/s, while forest patrol units are stationed to monitor the animal/s and surrounding area until the rescue operation begins
3. A public address system may be used to raise awareness among the local community about the dolphin by moving along the stranding location while the QRT or pamphlets informing about dolphin stranding can be put along the location.
4. Lead rescuer must organise the core members, trained fishermen, veterinarian/s and support team/s
5. Lead rescuer must brief the team about their specific roles, expectations and responsibilities (net deployment, crowd control, capture, transport, release, data collection and documentation)
6. Lead rescuer next outlines capture, handling and release procedures and necessary health and safety measures to be followed by the entire team
7. QRT team should tests all equipment (rescue, first aid equipment, diagnostic equipment) and keep complete kits ready in the rescue vehicle. In the event of a multiple stranding's, where multiple rescue vehicles are being used simultaneously, each vehicle must be fitted with its own complete equipment kit
8. Lead rescuer must conduct practice drills, reviewing each stage of response, condition of equipment, and identifying errors to avoid any minor mistake that may jeopardize the animal's survival



Image 7: Proper team planning and preparation is key to any rescue operation. Prior to every operation the QRT is provided a refresher by Lead Rescuer about individual roles and responsibilities. Officials from police and forest department staffs are also involved in the plan for a swift rescue operation.

Key Points

- ✓ Rescue team must be aware of their individual roles and responsibilities.
- ✓ Rescue vehicle and equipment must be thoroughly checked prior to rescue operation

3.3. Equipments:

For a successful rescue operation, it is imperative to prepare a list of equipments and conduct regular maintenance so that they are all clean and functional in the event of a rescue call. Most equipment used during GRD rescues can be easily procured from the local market, but there are a few items that require design and modification as needed. It is also advisable to keep two sets of minor but necessary equipments, in case of damage or loss. This also comes in handy in the event of multiple animal rescues.



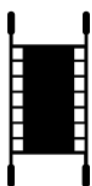
Nets: Dolphin rescue operations require large size nets to barricade the stream or canal from each side of the targeted animal. Silk drags nets and mosquito nets have been recorded to be quite harmless during rescue operations, compared to nets with larger gaps where delicate parts such as the snout or flippers may become entangled. These nets can be prepared on the basis of requirement from identified fish net shops.



Knives and scissors: Knives and scissors are helpful to cut nets in case of entanglement, especially in the final stages of capture and restraint.



Water storage tank, bucket and sprinkler: During translocation, it is necessary to keep the animal/s constantly hydrated. To this effect, it is important to equip rescue vehicle/s with a large water tank that can hold up to 100 litres. A bucket and mug, sprinkler or hand shower is also used to constantly sprinkle water over the animal.



Flexible Stretcher: A stretcher (Figure 8) is one of the equipments that would have to be designed as per needs. It is generally made of stretchable canvas or any other flexible material with two metal slats sewn into pockets and bars fitted with handles. Strong canvas is recommended, with reinforcing (double layered) along all edges. Poles made of thick-walled stainless-steel are used to provide structure to the stretcher. Stretchers are crucial in lifting and carrying animal/s over uneven and steep terrains without the risk of the animal slipping from hands whilst also minimizing direct contact with the animal.



Cot: A cot is a modified stretcher made from a sturdy metal bed frame fitted with a soft and flexible mesh using jute rope (or any other similar material) that slightly bends to take the shape of the weight on it. Legs may be fixed with sturdy shock absorbers and reinforcement framework to withstand jerks on rough roads during translocation. Under no circumstances must there be any metal framework running across the area where the dolphin will be placed. Before any operation, the cot must be tested to withstand weights of up to 500-700kg.



Fleece, foam mattress, and pillows: To keep the animal hydrated, it is placed upon a soaked foam mattress arranged on the cot and covered with a soft and wet blanket, avoiding the blowhole. Pillows and rolled up towels are used to avoid rolling and abrasions from the cot frame where the animal/s's extremities extend out.



Walkie-talkie: Waterproof walkie talkies are useful in planning and communication during an operation. Care must be taken to fully charge/replace low batteries of handsets, sync channels and test out walkies before starting the operation.



First Aid Kit: For the safety of the rescue team, a first aid kit must always be fully stocked and kept close at hand. Common injuries during rescue operation include, but are not limited to, sprains, cuts, bruises, abrasions, headaches, muscle spasms, fatigue and possible hypothermia. The first aid kit must be accordingly equipped, though can be amended as per individual needs.



Animal treatment kit: This should include the medical equipment and medicines necessary for any common injuries encountered during the entire rescue process. The animal treatment kit must be equipped upon consultation with recognized veterinarians.



Measuring equipment: To record basic morphometric measurements of rescued animal/s. It is advisable to use soft plastic tapes rather than metallic tape to reduce risk of injury, with a minimum length of 200cm.



GPS: To record GPS locations of stranding sites, capture sites and release site.



Canoe Boat: One or two canoe boat can be helpful to locate the animal as well as in deploying nets into the deep canal channels



Image 8: A suggested stretcher design for carrying a small to medium cetacean. It should be purpose built for use based on the average size of animal likely to be encounter, the number of crewmembers available to lift and handle the animal. Double hand holds can allow four to six people (based on design) to lift. Above picture showing a dolphin been carried in a stretcher on to a steep bank of canal.

4. Onsite Operational Practices

Once all off-site preparations are in place, there are just as many if not more on-site factors that must first be addressed before an operation is started. Time is of the essence, with most successful operations including capture, and transfer of a stranded dolphin ready for transport taking 15-30mins, which means that there is no time to discuss roles and procedures of the operation after it has begun.

Instructions are relayed by the Lead Rescuer, which are then passed on and enforced by Core Rescue Team members. Any changes in procedure are only sanctioned by the Lead Rescuer, and in his/her absence, by the second in command from the Core Rescue Team.

After he/she has delegated roles for all individuals that are part of the rescue, the Lead Rescuer must make sure to run through every stage of the rescue in minute detail, explaining positions and actions of each person to dispel any ambiguity. This is crucial to avoid critical mistakes that may jeopardize the animal's survival or injure another member.

Rescue Site Selection:

Firstly, based on previous surveys of the area, a section in which the rescue operation will be carried out is identified. This area should have an accessible edge on the inside, low incline banks with little to no vegetation to make access to and from the site easier. In case the banks are steep, a path or steps must be dug out so that it is easier to transfer the animal out. The rescue area and the exit point must be adjacent to a road that is accessible by the rescue vehicle, to reduce the distance and time in securing the animal onto the transport vehicle.

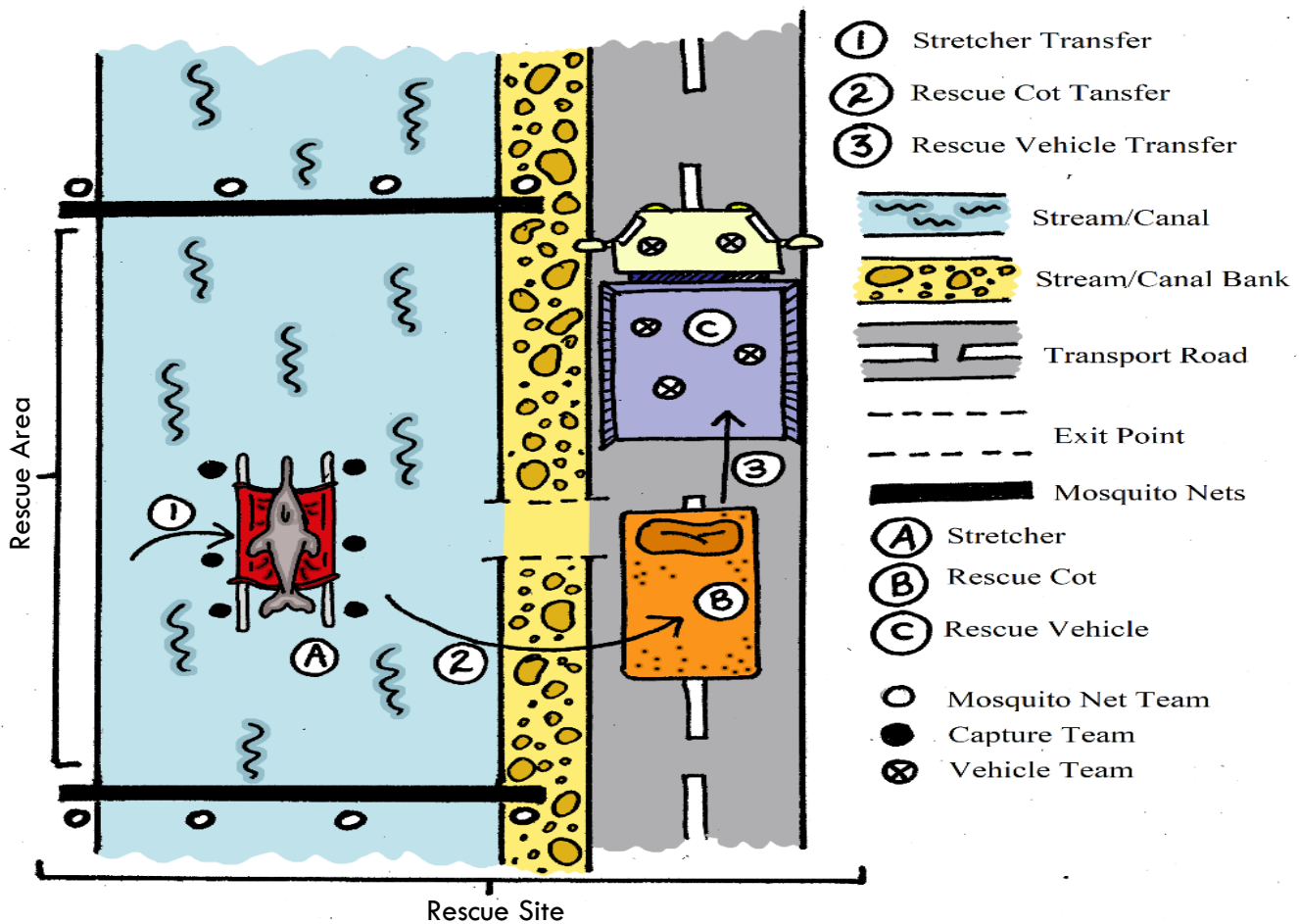


Figure 4: Stranded animal is first transferred onto the stretcher (A) in the water by the rescue team in Transfer 1. Next, animal is carried out of water and placed onto rescue cot (B) positioned directly in front of the rescue vehicle during Transfer 2. Finally, the entire cot is lifted with the stretcher and animal onto the rescue vehicle ready to be received by the vehicle team already on-board during Transfer 3. At no point during transfer procedure must net teams abandon their positions.

Team	Sub-team/key members	Position before operation	Role
Core Rescue Team: Lead Rescuer + 2 to 4 experienced team members	Lead Rescuer	On bank of stream/canal adjacent to exit point as part of Capture Team	Lead in off-site and on-site operation prep, briefing all teams prior to operation, lead rescuer as part of capture team, possible member of translocation team
	Core team member	On transport vehicle as part of Vehicle Team	Ensure med-kit and other necessary equipment are on the truck, confirm transport route with driver, monitor health of dolphin during transport
	Veterinarian	On transport vehicle as part of Vehicle Team	Monitor health of animal during transport and prior to release, collect morphometric data, administer treatment for any injuries, resuscitate animal in the case of collapse
	Remaining Core team members	On bank/next to exit point, transport vehicle	supervising equipment distribution, stretcher sub-team, crowd management, clearing of transport path and exit point
Net team: 12-15 trained team members split into three sub-teams	Sub-team A: 4-5 net handlers with at least one individual who has prior rescue operation experience	Half-way upstream or downstream from exit-point	Sealing off the upstream or downstream end of the stream/canal with silk drag net
	Sub-team B: 4-5 net handlers with at least one individual who has prior rescue operation experience	Half-way from exit point on opposite side of sub-team A	Sealing off the opposite end of the stream/canal from Sub-team A with mosquito net
	Sub-team C: 4-5 net handlers with at least one individual who has prior rescue operation experience	Between Sub-Team A and Sub-team B	Corralling dolphin towards Capture Team and exit point using mosquito net.
Capture team: 4 to 6 individuals, with at least three individuals with prior experience	Lead Rescuer	On bank at high vantage point before operation, in the rescue area after nets have been deployed	Direct net deployment teams until nets have been deployed, afterwards as part of main capture team that will capture animal
	Capture team: 2-3 members; min. one person with prior experience	On the bank before operation, in the rescue area after nets have been deployed	Capturing dolphin, untangling nets from animal, transfer to stretcher, transferring stretcher to cot and lifting cot onto rescue vehicle
	Stretcher Team Two members responsible for stretcher	On the bank; adjacent to exit point as close to the water's edge as possible without entering the water	Bringing stretcher into the water once animal has been captured and assisting Capture team in carrying animal to rescue vehicle
Vehicle Team	Core Team member	In Rescue vehicle	Secure dolphin snout whilst rescue cot is being loaded onto vehicle, supervise transfer and transport of animal, monitor health, ensure regular hydration, collect morphometric data
	Veterinarian	In Rescue Vehicle	Monitor health of animal during transport and release, collect morphometric data, administer treatment for any injuries, resuscitate animal in the case of collapse
	Back-end team 4-5 team members in addition to Core team member	In rescue vehicle	Assist in transfer of rescue cot from ground onto rescue vehicle, secure animal and ensure regular hydration
	Front-end team Driver and navigator	In rescue vehicle	Navigate pre-determined transport route and safely transport animal to release site
Support Team	Forest Officers	As required	Crowd management, transfer of animal, transport escort, navigation
	Police officers	Dispersed around entire rescue site	Crowd management
	Village Council Members/local contacts	As required	Crowd management, transfer of animal, navigation
	Press	On bank away from main rescue site	Reporting of rescue operation

Key points

Before starting any rescue operations, make sure....

- ✓ Rescue area and exit point have been identified by Lead Rescuer
- ✓ Exit point has been cleared of any debris or obstacles
- ✓ All members of the rescue operation have been thoroughly briefed by the Lead Rescuer
- ✓ Capture team member is equipped with knives and scissors prior to entering the water
- ✓ Stretcher team has positioned itself along the bank before the capture team enters the water
- ✓ Rescue vehicle/s have been equipped with medical kit, a filled water drum and water sprinkler, with the driver stationed within the vehicle
- ✓ Rescue cot/s have been equipped with foam blanket/s and support pillow/s and positioned behind the rescue vehicle/s such that once the animal is placed on it, it can immediately be lifted onto the vehicle
- ✓ Vehicle team is positioned on board the rescue vehicle/s
- ✓ Transport route has been cleared of all additional vehicles, with the escort vehicle/s ready and on stand-by to move with the rescue vehicle
- ✓ Crowds have been completely removed from transport route



Image 9: Positioning of the capture and stretcher teams is crucial for a smooth rescue operation. Lead rescuer explains positions, roles and responsibilities to each person with their proper positioning. As net team deploys net in each side the stretcher team gets ready with stretcher alongside the capture team for swift sifting of the animal. The vehicle team keeps the cot ready by the vehicle and makes sure water drums, sprinkler is in place. The back-end team makes sure the way towards the vehicle is cleared off from crowd.

4.1. Net Deployment:

Proper deployment of nets in the correct order and orientation is imperative for a successful rescue operation. This can be fundamentally broken down into two parts: the first using silk drag nets to 'seal off' the upstream and downstream ends of the canal to limit animal movement within a defined area and the second using mosquito nets to either secure the animal or corral it towards the capture team.

Out of the three net teams, two handle the upstream and downstream silk drag nets while the third team handles the mosquito net. It is important to clearly distinguish which individual is part of which team and to ensure they understand that during no part of the rescue operation must they abandon their designated teams or net. If the animal happens to become entangled within the mosquito net and needs to be freed, keeping the silk drag seals intact ensures that the animal is still within the rescue area, saving precious time for a second rescue attempt.

Teams must move as quickly as possible and ensure nets reach down to the canal floor, but make as little noise, movement or splashing during deployment to reduce stress to animal/s. Care must also be taken to always deploy a net, especially the mosquito nets, when an animal is moving in the opposite direction of the net position.

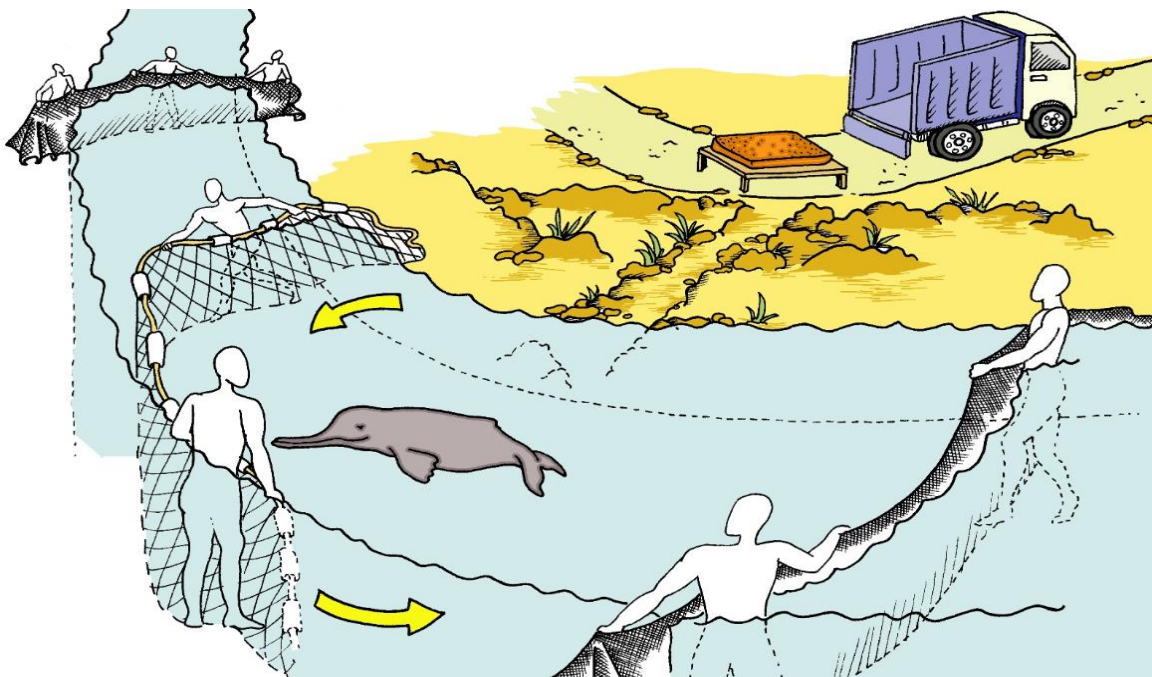


Figure 5: Silk drag nets are used to 'seal off' the rescue site while a mosquito net is rotated around the stranded animal to cordon near the exit point. Before the mosquito net is in place, the rescue cot and vehicle must be in position for easy transfer and quick departure



Image 10: Pictorial representation of the above illustrated figure showing how the animal is cordoned using nets from both the sides.

Step 1A: Sub team A slowly extends the silk drag net to seal off one end of the stream/canal, ensuring the net overlaps the banks at both ends.

Step 1B: Sub team B slowly extends the second silk drag net across the stream/canal to fully seal off the rescue area and the animal within it.

Step 1C: Sub team C slowly extends the mosquito net across the stream/canal, positioned roughly halfway between the upstream and downstream of the drag nets position.

Step 2A: Mosquito nets fully extended across the stream/canal, with ends overlapping onto the bank, sealing dolphin into smaller area adjacent to exit point.

Step 2B: Third net team moves entire mosquito net towards dolphin enclosed within until just short of exit point.

Step 2C: Third net team moves the net in a semi-circular motion towards the exit point, slowly reducing the enclosed area and directing the animal towards the capture team members.

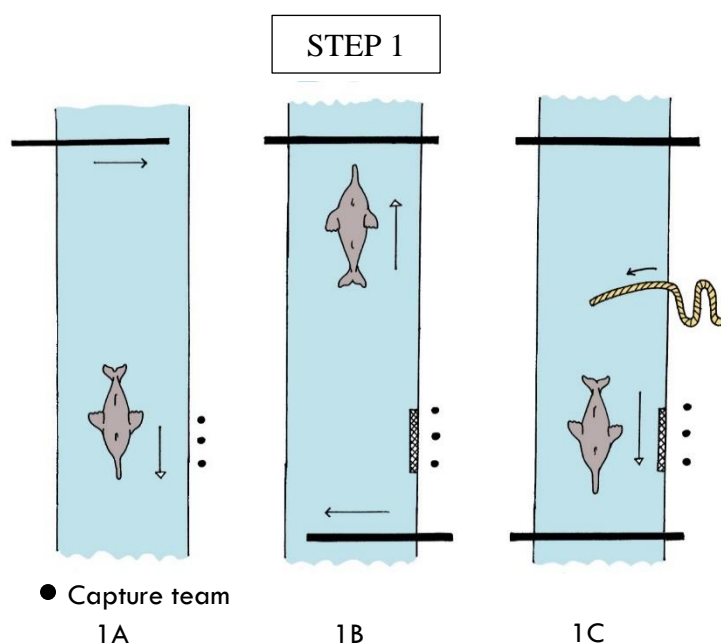


Figure 6: Step 1 of net deployment involves extending silk drag nets one at a time across the water channel width whilst the stranded animal is moving away in the opposite direction. After the first net is in place, the second drag net is extended and placed in position. The mosquito mesh net is only extended after Step 1 is complete.

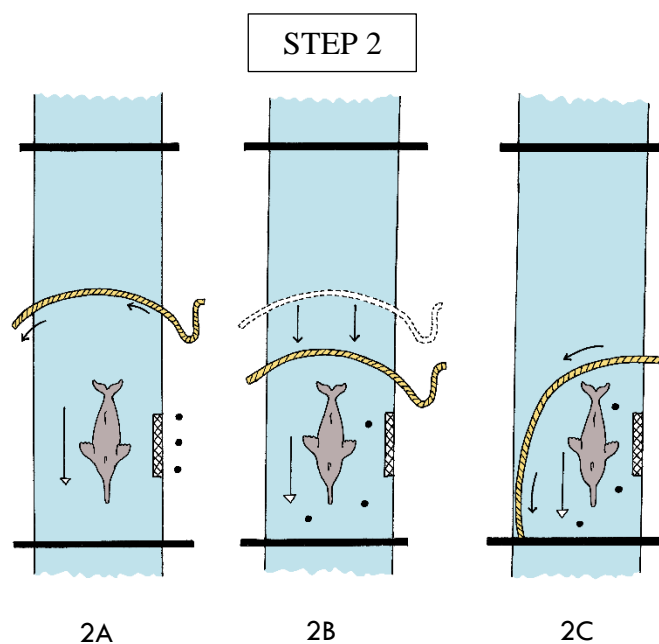


Figure 7: In Step 2, extend the mosquito mesh net at a safe distance from the stranded animal while it is moving away from the net position until across the channel. Once it has crossed the opposite bank, the team slowly moves the net towards the animal in an arcing motion, enclosing it in a smaller area, preferably adjacent to the exit point

Key Points

- ✓ Nets must always be deployed whilst the animal is swimming away from the net deployment site
- ✓ Rescue team must not enter the water until Step 2B from Figure 7 is completed
- ✓ Nets must be deployed only focusing on a single animal at a time until the entire operation is complete in the event of multiple stranding
- ✓ Avoid starting rescue operation after noon
- ✓ Avoid conducting any rescue operation in dark
- ✓ Suspend rescue operation until the next day to after a maximum of three failed attempts to deploy nets successfully to prevent death via fatigue and over-stress
- ✓ Underwater explosive must not be used by fishermen to drive dolphins to a particular area for ease of rescue. Such activity should be strictly banned as it stresses the dolphin

4.2. Crowd Control:

Often in the case of GRD rescue operations in rural areas, crowds numbering in the hundreds can gather to see an animal removed from the canal, even so far as driving down from neighbouring villages and towns, and inadvertently end up hindering the operation. However, large crowds not only increase stress and discomfort for the animal, but can also seriously jeopardise an operation.

Due to local myths and legends associated with GRDs, stemming from a general lack of education on the basic biology of the species, locals often believe that dolphins harm goats and small children. This sometimes results in gathered crowds throwing stones and other projectiles during the operation, threatening both the stranded animal and the rescue team with serious injury. Most often, crowds simply gather around the entire rescue site for a better view of the team in action and block key areas such as access to the rescue vehicle or pushes the team whilst they are carrying the animal in the stretcher. If the animal is left unattended in shallow waters, crowds may harm the animal.

Therefore, local law enforcement such as the police and forest officers must be deployed to manage crowds. Crowd management involves dealing with two core issues: crowds and obstructive vehicles.

Crowd Control

1. Use human corralling, physical dividers or strategically arranged police vehicles to clear entire rescue area
2. Maintain a clear path from the rescue site to the main highway at all times for the rescue vehicle
3. Create sub-teams of police officers to manage crowds and educate the public about safe practices during the operation
4. Designate a 'viewing area' for crowds; preferably on the opposite bank of the canal from where the animal is supposed to be evacuated, with the boundary heavily cordoned by police officers and vehicles

Vehicle Control

1. Clear out all private vehicles (four wheelers, two wheelers, bicycles) of the entire rescue site as well as the transport route
2. Police and forest department vehicles may be used to strategic positions to bar any private vehicles from blocking key exit routes



Image 11: A crowd gathers to witness a rescue operation of a Ganges river dolphin in Barabanki.

Community Awareness towards Stranded Dolphin

- Expansive education and outreach programmes for villages and communities residing near canals may reduce conflict
- Popular media, including video, posters, banners, pamphlets, comic books, can be used to publicize the conservation needs and value of river cetaceans
- The use of local radio stations for reporting stranding events and educating the public about their conservation is another tool in shaping positive public attitudes, particularly targeting the local inhabitants
- Youth from local community can be trained as 'Dolphin Mitra' (Dolphin friend), a local task force for quick reporting and local assistance to QRT during rescues
- Frontline forest staff and local police personnel in stranding sensitive areas can be trained in efficient patrolling, logistics and assisting QRT during GRD rescue
- Signages about dolphin stranding in local language can be put along the stranding locations
- Assess fishing related mortalities versus intentional captures, develop sustainable fishery management plan and reduce fishing interference in critical habitats of GRDs

4.3. Capture/Handling:

Capturing and transferring an animal onto the rescue vehicle is one of the most dangerous parts of a rescue operation, with the highest risk of injury or mishandling leading to stress, which may ultimately even cause death. Therefore, it is crucial to be fully prepared for this part and ensure that each team member is well versed and well trained with their respective roles. GRDs are large aquatic animals, weighing between approximately 70-100kg. This weight is deceptive while the animal is in water due to its buoyant state and it is important to always ensure that enough team members are stationed around the rescue area. Communication is also key between all members, and especially towards instructions relayed by the lead Rescuer, as he/she will constantly be monitoring all aspects of the operation as well as the condition of the animal, even deciding to postpone the entire effort mid-way if need be.

Once nets have been deployed appropriately, in most operations, a stranded animal may be captured via one of two ways: either by hand or via mosquito mesh net. While the former is safer as there is no risk of excessive injury from entanglement, both are fairly stressful to a wild animal and therefore, speed is most imperative in this portion of the rescue operation.

If smoothly executed, it should take no more than 15 minutes to capture an animal, transfer it onto a stretcher then a rescue cot and onto the rescue vehicle, ready to head off to the release site.

Capture/Handling by hand

1. Firmly secure the snout by hand (preferably the dominant hand), but do not press too hard, whilst wrapping the other hand over the dorsal side and around mid-section, keeping blow hole clear and facing upwards in a straight position
2. If the animal bucks or lurches, move slightly with the animal but maintain secure grip on the snout
3. A second team member secures the lower half of the body, firmly wrapping an arm slightly above the joint between the body and the fluke
4. A third and fourth-member brace against both flanks of the animal, using their bodies as a support to keep the body and blowhole upright
5. Only once all team members have a firm grip on the animal and it has reduced its struggling, the stretcher team summoned



Image 12: Capturing of animal by hand

Capture/Handling via net entanglement

1. Firmly secure the snout by hand (preferably dominant hand) and wrap other hand over the dorsal side around the mid-section, keep blow hole clear and facing upwards in straight position
2. A second team member immediately assists in loosening the net around the snout and blowhole to prevent damage or drowning, whilst also assisting in securing the animal
3. A third and fourth team member brace against both flanks of the animal, using their bodies as a support to keep the blowhole upright, using one or both hands underneath the body to ensure the blow hole remains above water
4. If the animal bucks or lurches, move slightly with the animal but maintain a secure grip on the snout
5. Use scissors or knife to immediately cut away entire entangled net around animal
6. Only once all team members have a firm grip on animal and entire net has been removed is when the stretcher team is summoned



Image 13: Capturing of animal via net entanglement

Key Points

- ✓ The animal should be immediately freed from the nets and straightened to clear blow-hole
- ✓ Avoid holding the snout/rostrum tightly, but hold gently with a firm grip

4.4. Transfer:

A GRD once captured goes through three ‘transfers’ before it is safely positioned on the rescue vehicle ready to be transported to the release site:

- **Stretcher transfer:** once captured in the water, the animal is positioned onto the stretcher in the water, and carried out towards the rescue cot
- **Rescue cot transfer:** the stretcher with the animal is directly deposited onto the rescue cot positioned for easy transfer onto the vehicle
- **Rescue vehicle transfer:** rescue cot with stretcher and animal lifted onto rescue vehicle

STEP-1



STEP-2



STEP-3

Stretcher transfer

Rescue Cot Transfer

Rescue Vehicle Transfer

- | | | |
|--|--|---|
| <ul style="list-style-type: none"> • Stretcher team slips stretcher underwater and underneath the animal whilst it is being held by capture team • Animal is positioned upright along centre of stretcher, parallel and equidistant from frame poles in the water • Head and up to first 4 inches of snout secured on stretcher, with rest protruding out • Flippers are in relaxed position on either side, not stretched out or folded underneath • Tail extended out of back of stretcher but supported by a team member | <ul style="list-style-type: none"> • Stretcher with animal shifted onto rescue cot equipped with foam mattress, blanket and support pillow, with snout facing the vehicle • Snout outstretched outside cot with support pillow underneath lower mandible protecting against the frame of the cot • Flippers adjusted over frame poles into natural position • Animal immediately covered with blanket and soaked with water until blanket is drenched, avoiding blowhole | <ul style="list-style-type: none"> • Once secured onto rescue cot, entire structure is lifted to vehicle height, ensuring cot remains parallel to the ground • Core team member on the vehicle immediately secures snout grip from Lead Rescuer once cot is at vehicle height • Cot shifted into vehicle snout first • Once front two legs are placed onto vehicle, cot is then pushed inside by capture team and pulled in by vehicle team • Cot pulled into vehicle until completely inside and snout is 3-5 inches away from vehicle wall • Once in place, back door securely fastened, cot from is securely tied with rope to back door and animal immediately sprayed with water until foam mattress is soaked |
|--|--|---|

Key Points

- ✓ Gentle but firm grip over the snout of the animal must always be maintained from the moment of capture until the final release,
- ✓ Blowhole must be maintained upright for the entire rescue operation after capture until release
- ✓ Time between all three transfer stages is crucial and must be done most efficiently to reduce stress
- ✓ Make sure to tie the tail end of the cot frame to a secure point in the back of the truck with rope to avoid cot slipping ahead in the event of a hard break and seriously injuring the snout



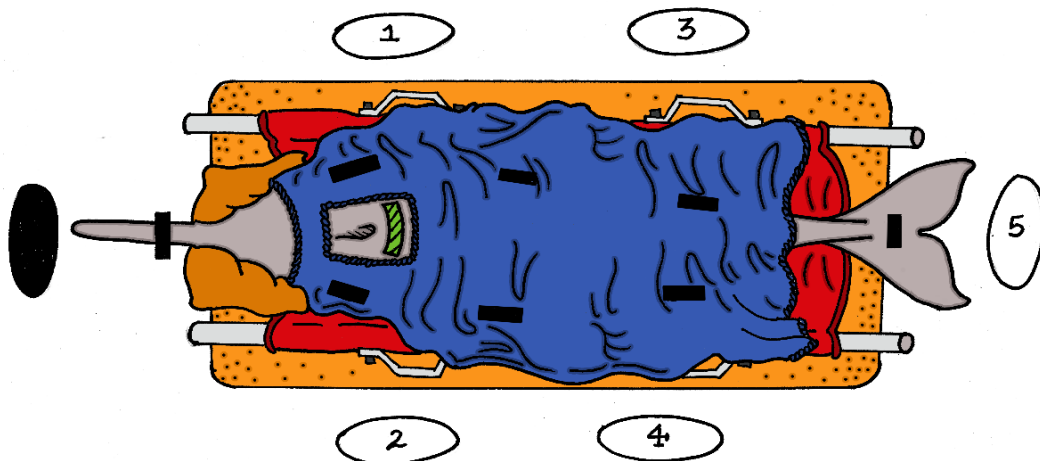
Image 14: Animal transfer to stretcher



Image 15: Animal transfer to rescue cot



Image 16: Animal transfer to rescue vehicle



- Core Team Member
- ① Vetererinarian
- ② Vehicle Team Member
- ③ Vehicle Team Member
- ④ Vehicle Team Member
- ⑤ Vehicle Team Member
- Body Support Points
- Hand placement point to protect blowhole against water spray

Figure 8: At any point during handling of a stranded dolphin, core areas such as the rostrum, flanks and tail joint must always be supported by a team of 4-5 persons. The core team member must always maintain their position at the front of the animal, maintaining a firm grip on the rostrum with one hand and using the other to 'cup' the blowhole (green striped area) to prevent water from entering.

4.5. Transport:

Prior diligent planning of the transport of a rescued animal can prove to be the difference between a successful and failed operation. One of the longest periods recorded for a GRD to be outside an aquatic environment has been nearly four hours, though this was only possible through meticulously planning of the transport route, ensuring careful monitoring of the animal and regular communication between the vehicle team, Lead Rescuer and Forest Department officials.

The first 15 minutes of a transport effort are the most crucial, during which all measures must be taken to settle the animal. More often than not, it is the constant jostling on uneven roads that increases stress in animals and often coincides with erratic breathing and even collapse. Therefore, it is prudent to select a route that has the least number of unpaved roads or dirt tracks, even if it means taking a slightly longer route.

1. A modified mechanised goods carrier can be used, which can sufficiently accommodate the cot, animal, vehicle team and a large water tank
2. Core team member must maintain a supportive grip on the snout throughout the transport
3. Remaining team members arrange themselves as shown in Figure 8 to restrain and monitor the health of the dolphin
4. Maintain the speed of the rescue vehicle at an average of about 60km per hour and much slower while passing villages and non-paved roads to avoid jerks
5. Hydrate the animal regularly for the entire duration of the transport, by covering the entire body with a wet fleece or woollen blanket making sure that the blow hole remains completely uncovered and continuously sprinkling with water. Vehicle team must communicate with navigator if water tank/drum requires refilling before reaching release site
6. Secure the back legs of the cot to the back of the vehicle with rope to ensure the rostrum does not hit the wall of the carrier in the event of a hard break and the cot shifts ahead.
7. In bumpy sections of transport route, vehicle team must brace themselves against the animal to ensure it remains upright, with no obstruction to the blow hole
8. Veterinarian must carefully monitor the respiration rate by tracking the time between each breath expelled through the blow hole until it regularizes to an average of 40-50s between each breath
9. After the animal has stabilized, at regular intervals of roughly 10-15 minutes, Core Team member holding the snout must allow air through throat passageway to help in oxygenation by carefully holding the top mandible with one hand and bottom mandible with the other, avoiding the teeth, and opening the mouth for 1-2mins
10. CPR can be administered immediately by the veterinarian using the AMBU bag, or steroids can be injected if the animal is collapsing (observed breathing time is more than 1 minute between breaths),

Key Points

- ✓ Rubbing the flanks of a GRD underneath the flipper with a flat open palm is assumed to help calm down an agitated animal
- ✓ Take care to not insert fingers into snout gaps as the closing snap is extremely powerful and may cause serious injury
- ✓ Avoid sitting on the rescue cot to reduce weight stress on the structure, however continue to hold the animal/s and keep adjusting holding position to ensure blood circulation
- ✓ Avoid shouting or talking loudly in the carrier
- ✓ Avoid tilting the rostrum whilst placing support cushions
- ✓ Photographs of the entire snout, TTL, injuries, abnormal colouration or markings can help to sex animals and document individuals

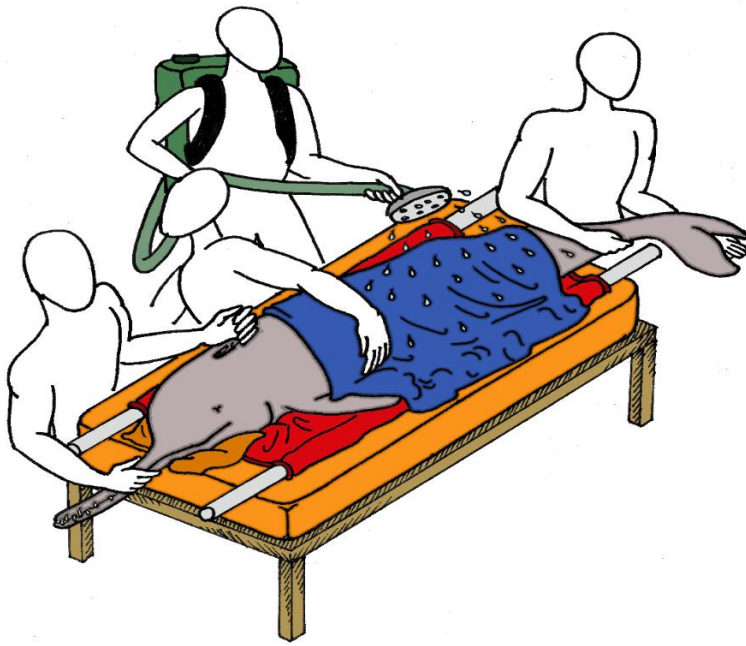


Figure 9: Immediately upon transferring animal onto the rescue cot, the body must be supported on either flank to be maintained in an upright position and support provided to the tail. Animal is immediately covered with blanket and heavily sprinkled with water over entire body, taking care to not pour over the head when blowhole is open. Team member holding the rostrum must continue maintaining a firm hold with one hand and using the other to 'cup' the blowhole, protecting against water streaming into it.



Image 17: QRT team hydrating the animal during transportation while lead rescuer is maintaining a gentle hold on the rostrum of a dolphin rescued from irrigational canal in UP.

Instances where an operation should be postponed completely:

- × Permits have not been granted
- × If the rescue vehicle or complete teams have not been arranged or organized
- × Transport route has not been arranged
- × During peak sunlight hours; generally categorized between 11am and 5pm
- × If animal is observed to be slow and lethargic on the first day of rescue operation
- × If an animal is over stressed or fatigued from being chased by crowd prior to rescue team arriving at rescue site
- × If water level is above hip height and current too strong
- × If it's too hot or cold and there is a large difference between water and ambient temperature.
- × If animal has avoided three attempts at successful net deployment
- × If two animals become entangled in the net instead of one

4.6. Release:

Returning a GRD back to the water is a critical part of the process. Coordination amongst the team is crucial in deciding when the animal will be lifted and the pace at which it will be moved from the rescue vehicle to the release spot. Rolling should be avoided and at no point during the process should the animal be held by the flippers or tail fluke, as this will not only stress the animal, but may also lead to injury. All handlers should make sure to keep the dolphin spine aligned along the midline of the stretcher. The Lead Rescuer must make sure that all team members are in place and informed about the direction the cot must be taken once it has been lifted off of the rescue vehicle. As the animal is moved, the team should maintain synchrony whilst moving towards the release site, following the directions of only the Lead Rescuer. Other team members, along with help from the Forest and Police personnel, must mark and ensure a clear way through to the identified release site (previously determined by the pilot team before the rescue operation was conducted and prepared accordingly with help from the presiding Forest Department officer). A spot with depth greater than 1.45m and having counter current pools, in a river known to have a population of dolphins, qualifies as a good release site. It is also important to watch and monitor the animal for several minutes as it becomes acclimated post release.

1. All team members should strictly follow the instructions of the Lead Rescuer, who should in turn keep the team well informed throughout the release
2. Ensure that the way to the release site is cleared of any debris or lingering crowds upon reaching the release site but before transferring the animal off the rescue vehicle
3. Three to four members of the core team must position themselves on the ground near the tail of the animal while another three to four members arrange themselves around the stretcher on top of the vehicle. The Lead Rescuer or Core Team member holding the snout must maintain their grip throughout
4. Ground crew members lift the back section of the stretcher at the same time as the other members on the vehicle, ensuring that the animal remains parallel to the ground and does not roll
5. The animal on the stretcher is slowly unloaded from the vehicle, where each member on the vehicle disembarks from the vehicle and re-secures their grip again ONE AT A TIME, and the Lead Rescuer/Core Team member continues to maintain their grip on the snout until they themselves can disembark last, or hand over to another Core member on the ground
6. Once the team is close to the bank, it is important for the team to have direct access to a point in the water that is high enough to submerge the entire stretcher so that the animal can easily swim through from the stretcher
7. Once the stretcher is submerged in water, the grip on the snout is partially released but still supported while the tail end is tipped upwards to orient the animal towards the water. The stretcher and animal are both lowered and tipped further with the snout completely let go to allow the animal to slide off into the water

Key Points

- ✓ Reconnaissance of the release site is important to ascertain an ideal spot
- ✓ Avoid twisting or pulling any of the appendages at any point, as it not only stresses the animal but may also lead to severe internal injuries
- ✓ Avoid rolling the animal in order to prevent damage to the tissues at the base of flippers
- ✓ Orient the animal in the water so that it can gently slide into the water rather than splash into it from a height
- ✓ Monitor the animal immediately after release, for at least a few minutes, as it resumes normal swimming and surfacing behaviour

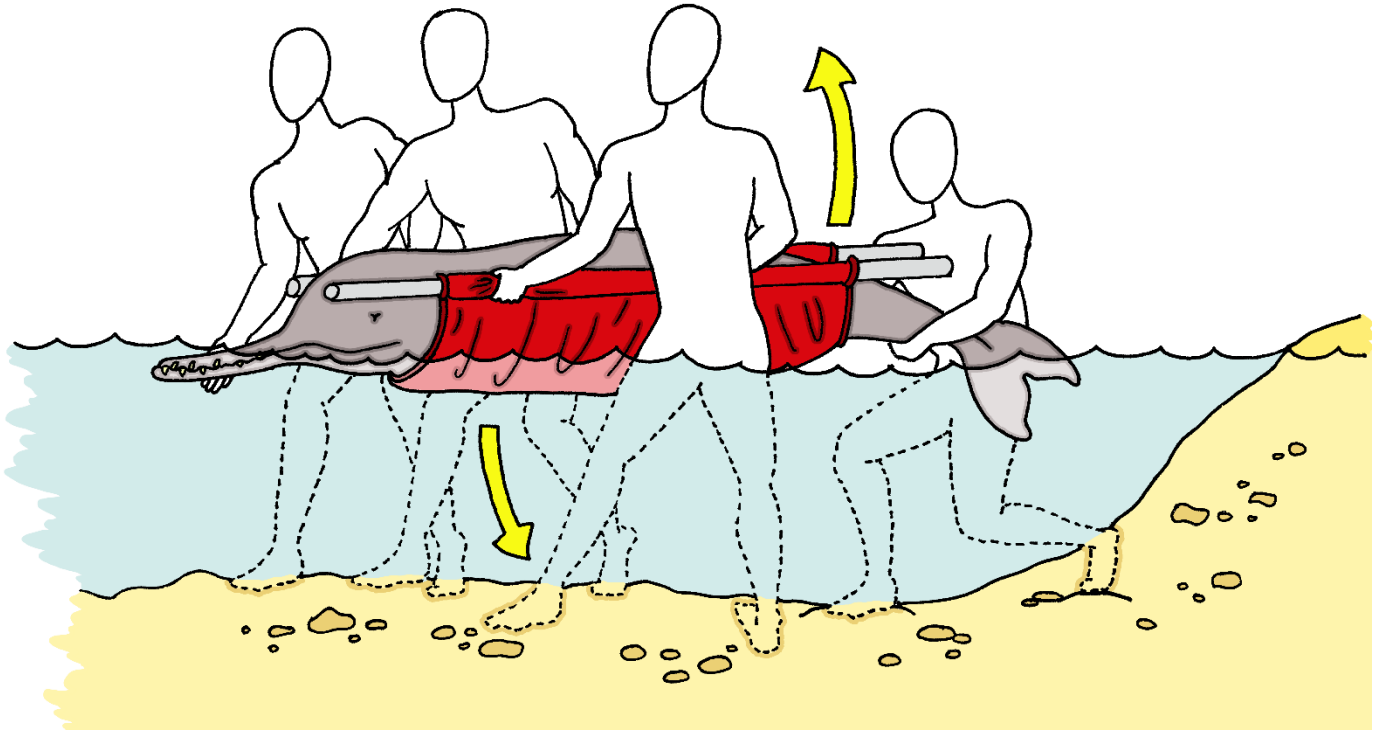


Figure 10: Upon unloading the stretcher from the rescue vehicle, the stretcher should be directly carried towards the river whilst maintaining the position of the animal with secured grip. It is important to release the animal at a depth where the stretcher can be submerged and animal easily swims out into the water. Lead Rescuer maintains grip on.



Image 18: A successful release of Ganges river dolphin in Ghaghara River

4.7. Stress Management during Rescue Operation (Capture, Translocation and Release) of Ganges river dolphin:

The process of manual handling may not physically disturb an animal, but excessive and prolonged stress may profoundly affect the animal/s in the long term. The effects of capture and transport induced stress have been reported in many mammals, including some marine dolphins, that have been shown to exhibit a typical mammalian response to acute stress of capture and restraint (Fair *et al*, 2014). GRDs are quite a sensitive and elusive freshwater species, where a few incidences have been recorded where myopathies and trauma caused by capture stress have led to heart failure in individuals from the Brahmaputra (Pilleri, 1972). A rise in stress level hormones during a rescue operation may be caused by a number of events: improper handling, chasing dolphins for capture, extreme weather conditions, and physical injury etc, which is why it is important to consider and appropriately plan a rescue and translocation operation in order to minimize the stress induced.

1. The rescue operation should be time bound and if it goes over the time limit then it should be restarted after a break of at least 24 hrs. This break will allow the dolphin to recover, and avoid any stress/capture myopathy or cardiomyopathy induced death
2. It is important to avoid conducting rescues in extreme weather conditions; this may not only increase stress levels in animals but may also adversely affect the rescue team. The most favourable time for handling and rescues has been observed at times of low light (i.e., early pre-dawn morning)
3. Keep in mind the sensitive parts of a dolphin and avoid rough or improper handling
4. At the first sign of abnormal behaviour (excessive bucking or squirming; no movement and limp body) during capture, the attempt must be abandoned. Upon discovering an injury, triage must be administered by the veterinarian as soon as possible once animal has been stabilized.
5. During translocation, breathing and heart rate must be monitored continuously by trained personnel
6. Small pillows used as supports on either side of the dolphin during translocation can stabilize the animal against jerks, thus reducing stress
7. Keep blowhole upright and without any coverings or obstructions
8. Use a stretcher to minimize direct handling and skin to skin contact between rescue team and the GRD
9. Continuously hydrate the animal by covering with a wet blanket and regularly sprinkling water to prevent the blanket or animal from drying out. Take care to not obstruct the blowhole or pour water down it
10. The temperature of the animal and the water used for hydration should be almost the same to avoid temperature shock

Key Points

- ✓ Rescue operation should be time bound
- ✓ Animal should be continuously monitored by experienced/trained personnel
- ✓ Avoid overcrowding around the animal during capture and translocation
- ✓ Keep the animal upright at all times
- ✓ Translocate one animal at a time
- ✓ Keep animal hydrated during the translocation by sprinkling water onto a blanket.
- ✓ Keep checking the respiration rate of the GRD
- ✓ Make sure that the Dolphin emergency treatment kit is readily available at all times during the rescue
- ✓ Avoid covering the blowhole and avoid water from entering it
- ✓ Avoid shouting and minimize conversations as oscillating noise is likely to further stress the animal

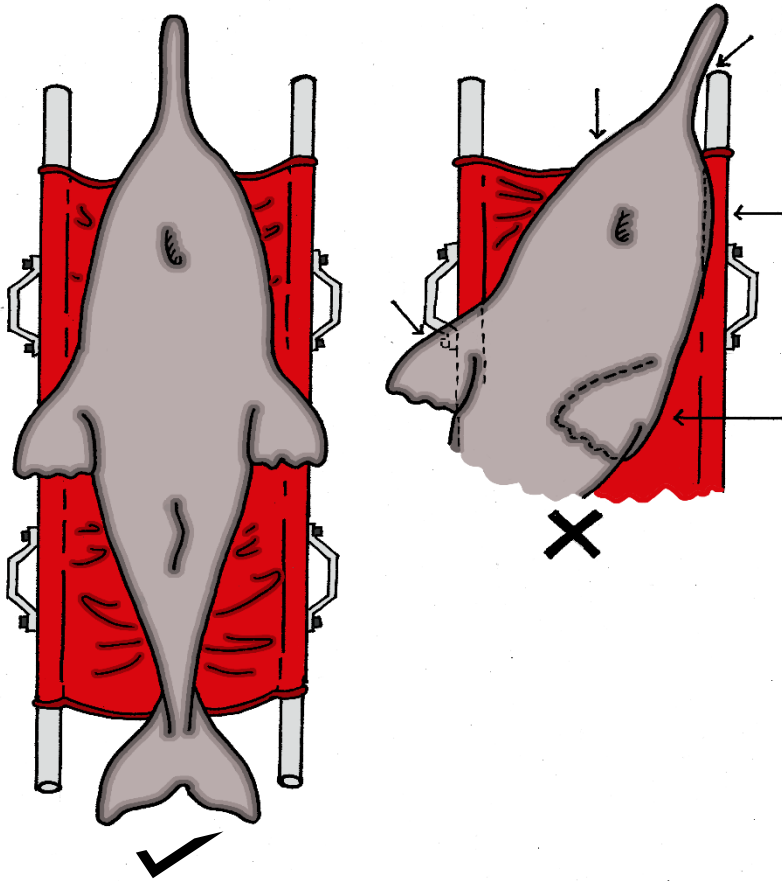


Figure 11: Left: animal is placed centrally and parallel to poles on the stretcher and positioned upright, such that the stretcher material supports up to the first four inches of the mandible in the anterior and 12 inches past the dorsal fin in the posterior. Animal is positioned upright such that the blowhole faces upwards and the flippers are placed flat and in a natural position.

Right: Animal must not be placed diagonally, avoiding body weight on the poles, any body parts obstructing handles or sensitive areas such as the rostrum coming into abrasive contact with sharp edges that may cause damage whilst being carried. Flippers must not be placed in any unnatural positions such as being stretched out or folded underneath the body.

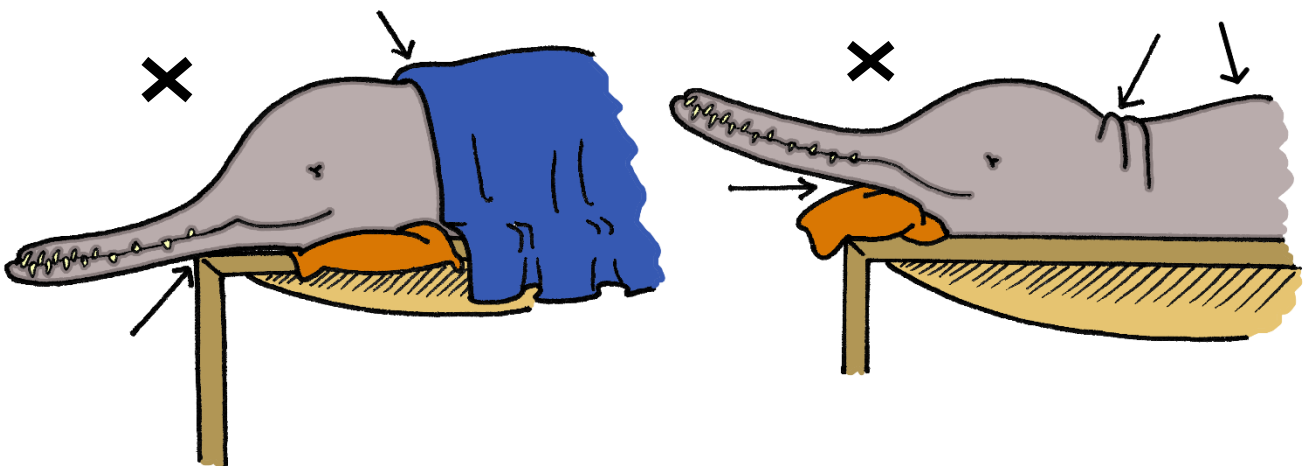


Figure 12: Left: An example of improper placement of an animal on the rescue cot, where it has been placed too far ahead on the cot, with the support pillow not adjusted properly such that the lower mandible is in contact with rescue cot frame. Blanket is also covering the blowhole which can be fatal.

Right: Another example of improper placement of an animal on the rescue cot, where the support pillow is too far ahead, causing an unnatural raised position of the head and stress to the neck, which may cause excessive distress. A blanket has also not been placed on the animal, risking extreme dehydration.

"A World Record in Ganges River Dolphin Rescue: A Case Study"

In late May of 2020, the TSA India Program's QRT implemented the protocols detailed in this document to successfully rescue four Ganges river dolphins (*Platanista gangetica gangetica*), marking a world record for the largest successful rescue of its kind.

Initial Reporting: The animals were first sighted in the Indira Canal, which comes within the Dewa Range, Barabanki District, and were immediately reported to the Forest Department. Following this, the team from TSA India Program were notified, where the Lead Rescuer connected with the Divisional Forest Officer (DFO) to learn more details, keeping the PCCF (Wildlife) in the loop at all times, while the rest of the QRT checked and accordingly readied the equipments, fisherman teams and rescue vehicles.



Image 19: One of the four dolphin rescued and successfully released in May 2020

Reconnaissance, pre planning and permit: The Lead Rescuer conducted a reconnaissance of the area to gauge the number of animals, assess the best exit point and map out the translocation route. Three dolphins were confirmed to have been stranded in the area. A formal request was made to the PCCF (Wildlife) via the DFO, and necessary authorisations were procured to begin the operation. Simultaneously, the Lead Rescuer was also in constant contact with the irrigation and police departments for necessary logistical and operational support, as well as the QRT so that they may be better prepared for a multi-animal rescue operation.

Arrival of Rescue Team and Decision making- The first half of the rescue team reached the site in the evening before the planned rescue, camping overnight so that there would be enough time to instruct the team of experienced divers from the fishing community; make arrangements such as transport vehicles, stretchers, mattresses and water drums etc, and most importantly, to monitor the animals through the night. The second half of the team, who had remained behind in case of any last-minute additional equipment requirements, departed from Lucknow at 4 am on the morning on 22 May, and reached the site within the hour. Taking advantage of the early morning low temperatures to improve success, the operation was started around 5 am.

Rescue, Translocation and Release Operation: Prior to starting the operation, the QRT was split into three 'vehicle teams', who were ready and waiting on each of the vehicles to escort the animals to the release site, even before the fishermen had entered the water. Using mosquito nets and large silk drag nets, the fishermen quickly sequestered the first animal and transported it onto the cot. Since there were more animals, the stretcher was carefully removed from underneath the first dolphin to be used again. As soon as the cot was loaded, the rescue vehicle was on its way, by which time the capture team was already in the water securing the next animal. Within 15 minutes, this second dolphin too had been captured, loaded onto the truck, which was already speeding away. Within another half hour, the third dolphin had also been successfully captured and a convoy of all three vehicles were making their way towards the release site 65km away. The Lead Rescuer had stayed back to ensure all three captures followed strict protocols before joining the third vehicle team during translocation. Throughout the 45 min journey, all three teams were regularly hydrating their animals, carefully monitoring breathing and looking out for any signs of distress or collapse, all the time maintaining contact with each other and providing updates on the status of the animals as well as the water levels in the drums. Thankfully, all three animals were relatively stable and were successfully released into the Ghaghara River, Bahraich District, which has a healthy population of Ganges river dolphins.

Surprising Developments: Despite all efforts to be as prepared as possible, there is always a chance of new situations arising during an operation which involves quick thinking and affirmative action. Whilst halfway towards the release site, the Lead Rescuer received news from officers that a fourth animal had been confirmed back at the canal. Giving strict instructions to not make any attempts to capture or sequester the animal, the Lead Rescuer first ensured that all three of the captured dolphins had been safely released into the river, before redirecting rescue vehicles back to the rescue site to resume the operation for the fourth animal. Though the capture and transfer of the fourth animal was smoothly done, it was observed to be slightly stressed during transportation due to increased temperatures of the day, travelling at around 11am. However, this animal too was safely transported and released at the same site as the previous three, marking an end to a 23-hour operation, not counting two additional days of prior planning. All four animals were identified as newly matured individuals (two males and two females).

4.8. Record Keeping:

Record keeping is an important exercise in all scientific endeavours and dolphin rescue operations are no less. Every stranded cetacean, whether dead or alive, provides a rare opportunity to learn about dolphin biology, illness, and life history characteristics. Records can not only help to develop a database of key information that can inform future management decisions and planning of future operations, but also serve as a repository of important natural history and ecological data that can be used in local education and awareness, conservation action plans, government policy and research methodology. Furthermore, if records are published, they can help fishermen, local communities, researchers and organizations in mitigating ill practices and developing a scientific impetus towards the welfare of these animals. To produce data that is reliable and useful, it must be collected in a standardized and systematic way, include as many specimens as possible, and extend over time. While it is important to develop a data-sheet and have a designated team member for the data collection, it is always helpful if all team members keep a record of any minute event or observations that they deem significant or noteworthy. Additionally, a dedicated photographer and videographer is always an added advantage.

1. Date, time, duration of stranding, translocation and release
2. Locations for the stranding and rescue site (with nearest coordinates)
3. Reason of stranding (nets, canals, receding water areas etc)
4. Injuries sustained by the animal (any external observations as scars, signs of blood around rostrum, blowhole or anal opening), basic health status (to ascertain pregnant females or any internal injury using stethoscope or hand-held ultrasound), pulse rate, morphometric measurements
5. An animal recording data sheet should be made where HR (heart rate) behaviour can be noted.
6. A list of all the actions undertaken during the operation, from rescuing to release of the animal, handling while translocation (any successful and unsuccessful intervention done)
7. Photo and videography (with fine name/number) is strongly encouraged, in order to generate information that may aid in future learning and designing operations. If not with a dedicated photographer, the lead person should encourage some team members to use mobile camera. Pictures should always be taken, including: Whole body (dorsally and ventrally), head, jaws, dorsal fin, tail, and any new injuries

Information recording formats has been attached as Annexures I, II, III, IV

- ✓ Ganges River Dolphin Stranding Report form template
- ✓ Sample Necropsy Report Form template
- ✓ Tissue Sample Checklist template
- ✓ Template of final report to be submitted for disposal of dolphin carcass/body parts

Creation of GRD stranding National Database

In line with the Marine Megafauna Stranding Management Guidelines, 2021 stranding database should also be created for Ganges river dolphins. Each range state should maintain a database of all local GRD stranding including information on location, time, date, photos, measurements and information following Annexures I and II. All these information should be collected to form a National Database which may be published every year as an annual report to make the information public as an effort to increase awareness.

4.9. Recommendation:

While this manual focuses on presenting a set of protocols to safely and successfully rescue stranded Ganges river dolphins, it is also critical to identify and address the various issues that cause strandings in the first place, aiming to completely eradicate this phenomenon. Canal mapping could shed light on stranding patterns and canal ecology, helping identify high-risk sites. Capacity building could not only raise awareness of the issue, but help recruit a vast on-ground network to obtain timely information and improve response times. A system of communication between the irrigation department and other environment departments would be ideal to coordinate schedules of canal water release, gate movement and discharge through primary and branching canals to reduce the risk of strandings. In the long term, range states may be approached to incorporate long term infrastructural and policy changes to make canals more dolphin-friendly, whilst also supporting key research that can help scientists to better understand this elusive species.

1- Canal mapping and patrolling covering a stretch of roughly 100km downstream of barrages and gates

2- Conduct long term monitoring of a stranded sub-populations, such as the one identified in the Ghaghara Sarju Canal system, to understand turn-over

3- Improve/ develop dedicated Quick Response Team in each state with sound proof ambulance and state-of-the-art rescue equipment

4- Test acoustic deterrents i.e., "pingers" or bubble curtains along sensitive points of exits in association with Irrigation Department

5- Collect biological samples to understand the stress level, body condition, reproduction, effects of contaminants as well as genetics and preserve the entire specimen in case of mortality

6- Prepare a cadre of village volunteers, forest staff and veterinarians to support timely rescue and release of such animals

7- Tag few rescued animals (representing both sexes and all life stages) with transmitters to understand species survival and dispersal

8- Develop/design hydro-projects that incorporate "dolphin excluder devices" that can be tested prior to installation or incorporate new designs that are dolphin friendly

9- Involve IUCN Cetacean Specialist Group and their veterinarian unit for further guidance

10- Sanction more state supported research programmes on dolphin biology, as well as community level education and awareness drives

11- Incorporate more veterinarian training sessions on dolphin ecology and anatomy, possibly utilizing recently deceased animals

12- Work with police officials to improve efficacy of prosecution for crimes of injury or murder against dolphins

Key Points

Avoid releasing any animals that have been rescued exhibiting minor injuries into any captive rehabilitation centre.

Recommendation for transitional staging facility

In rare cases, a dolphin may be grievously injured that it would be irresponsible to release it immediately after capture without medical intervention. In exceptional circumstances, keeping a dolphin in a semi-captive facility for a period of assessment and treatment may prove beneficial. Though it is strongly advised to do so only after an extra secondary permit has procured from the necessary authorities. As no such facility currently exists in India, temporary arrangements such as a shallow portable pool may prove ideal, allowing easy access for veterinarians. Care must be taken that the pool is large and deep enough for the animal to move around. Once the animal is deemed healthy enough to survive by itself, it may be then transported and released as planned.



Transitional is an option when:

- Through examination of the animal indicates that there is reasonable chance of recovery and a subjective decision made by a qualified veterinarian to determine the likelihood of survival
- Appropriate transitional care facilities are available and properly equipped
- Safe and short transport is possible
- Animal is of manageable size
- Staff resources are available to provide care for a sustained period of time

5. Necropsy

Necropsy is the examination of a dead animal's body to get further insight into the cause of death and is performed by a trained veterinarian. For the necropsy of a deceased GRD, a team of veterinarians (minimum of three with at least one appointed by the state) must be present. It is also advisable to have a representative of the competent authority (holding a rank no lower than Range Officer) to be present at the necropsy. Along with inspecting the body, organ and tissue samples must be collected for research and diagnostic purposes. These can provide more information on cause of death, parasitic load and life history. All examinations and interpretations must be carried out by qualified professionals, and results published from recognized laboratories.

5.1. Safety:

Personal and public safety precautions should be maintained when handling the animal and samples, to avoid transmission of any harmful zoonotic diseases. Protective gears such as disposable gloves, goggles/shields, face masks and protective body gear should be worn to reduce risk of contamination or transmission. Any open cuts or wounds should be appropriately sealed.

5.2. External examination:

- Before beginning a necropsy, an external examination should be performed to better understand:
- Nutritional condition- An emaciated animal will have a greater loss of epaxial muscle girth and will concave down the dorsal lateral side of the body
- Sex determination- A single short mammary slit can be seen on either side of the genital slit in most females. A more definitive method is to blunt probe the genital slit. If the probe angles forward it has entered the vagina and thus a female, if the probe angles backward it has entered the penile opening of a male
- Age estimation- Body size, size and number of teeth and the extent of their decay can all help to age an animal superficially. However, age is primarily estimated from bones; specifically, by counting growth layer deposited and the extent of fusion of epiphyses. Some teeth could be extracted from the animal, for exact age estimation at a later stage. The teeth, apart from exact age, can also be used for stable isotope studies, which can yield important information on the animal's growth history, prey intake, etc

5.3. Post-mortem instruments:

The Instruments most commonly required are:

- | | |
|---------------------------|---|
| 1. Large knives | 13. Ropes |
| 2. Axe (small and big) | 14. Magnifying glass |
| 3. Handsaws | 15. Torches (Flash light) |
| 4. Chain saw and hack-saw | 16. Emergency lamps/Generator |
| 5. Bone cutter | 17. Camera |
| 6. Crow-bar | 18. Vehicle fitted with light focusing facilities |
| 7. Hammer and chisels | 19. Metal detector |
| 8. Scalpel handles | 20. Ropes |
| 9. Scalpel blades | 21. Magnifying glass |
| 10. Surgical scissors | 22. Torches (Flash light) |
| 11. Forceps | 23. Emergency lamps/Generator |
| 12. Iron spatula | |
| 13. Large knives | |

Other accessories required-

1. 10% neutral buffered formalin.
2. Sterile instruments for culture collection
3. Culture swabs
4. Glass slides
5. Containers for sample collection
6. Labels and waterproof marking pens
7. Tape measure
8. Gloves

5.4. Necropsy procedure:

1. Place the animal in dorsal recumbency
2. Examine the carcass externally for signs of injury beginning from snout till the anal opening
3. Examine the orifices for exudates, parasites like lung flukes and nematodes which are often seen coming out of the oral cavity upon death
4. Approach the viscera via linea alba. With a surgical blade, reflect the skin to reveal underlying blubber which is a thick layer of creamy white fat just above the abdominal muscles
5. Incise through the muscles into the abdominal cavity caudo-cranially keeping view of the underlying viscera; avoid perforations
6. Extract the abdominal viscera starting with the gastro-intestinal tract, followed by liver, kidneys and rest of the organs
7. Incise the gastric cavity for ingesta, parasite; fluid. Collect the contents in a sterile vial for pathological examination. Stomach contents (fish and shrimps) should be collected and maintained systematically in records to understand starvation due to canal stranding
8. Incise the intestines (small & large) and examine for partially digested ingesta, faecal matter, parasites and fluid content (if any). Collect the contents in a sterile vial, using multiple vials for different samples
9. Examine the liver for discoloration/enlargement. Dissect and examine the triad and hepatocytes and keep the contents for histo-pathological examination
10. Kidneys are multi-lobed structure, dissect and examine the sagittal and keep the tissues for evaluation
11. Approach the thoracic cavity, cutting through the sternum with a bone saw
12. Whilst examining the heart, check the pericardium for fluid. Dissect and examine the myocardium, aorta, vena cava, aortic valves, auricles and ventricles for blood clots or parasites
13. Examine the lungs for patency, whether there are any liquid contents within the alveoli/lobes, parasites, discoloration etc. Normal lungs on perforation will deflate
14. For gross sign of capture myopathy look for signs of pale muscle under musculoskeletal and under cardiac
15. Open the cranial cavity carefully with a bone-saw and examine the contents
16. If an adult female, ovarian / uterine tissue can be histologically examined for scars of implantation, which can give an idea of the number of pregnancies the dolphin may have had

5.5. Samples and data collection:

- Obtaining samples requires a permit from a competent authority. No samples may be collected or stored without the procurement of the appropriate permit
- Samples collected for histopathological examination must be kept in sterile vials in 10% Formalin and normal saline for microbiological evaluations
- Skin samples / swabs / other samples should also be collected for DNA whenever possible and without hurting the animal to create a DNA repository for future genetic analysis
- All samples must be sent to the appropriate laboratories at the earliest. If not possible, samples must be stored appropriately following strict storage guidelines

- Document all stages of the necropsy using both photography and videography. It is advisable to either place identifying markers during the process or to catalogue photographs within the first 24 hours of the necropsy, so that organs and samples may be correctly identified in the future

5.6. Disposal:

In the event that a special permit has not been granted to preserve the animal, GRD carcasses must be burnt under the supervision of a forest officer not below the rank of Divisional Forest Officer. Care must be taken to make sure the entire carcass, including bones, has been fully burnt. The entire incineration sequence must be photographed and video recorded for future evidence and record. After complete incineration, a report must be prepared on the disposal proceedings, duly signed by the officer in charge and post-mortem team present, and be sent along with a final report (Annexure IV) to the PCCF (CWLW), with supporting photographs/video/documents. However, burial can be a better option as skeletons can be preserved for future zoological and genetic investigations, pending appropriate permit procurement.



Image 20: Necropsy procedure being conducted on Ganges river dolphin.

Section of WPA 1972 under relevant clauses

11. Hunting of wild animals to be permitted in certain cases.- (1) Notwithstanding anything contained in any other law for the time being in force and subject to the provisions of Chapter IV, _

[a] the Chief Wild Life Warden may, if he is satisfied that any wild animal specified in Schedule I has become dangerous to human life or is so disabled or diseased as to be beyond recovery, by order in writing and stating the reasons therefore, permit any person to hunt such animal or cause such animal to be hunted; ³[Provided that no wild animal shall be ordered to be killed unless the chief wild life warden is satisfied that such animal cannot be captured, tranquilised or translated:

Provided further that no such captured animal shall be kept in captivity unless the Chief Wild Life Warden is satisfied that such animal cannot be rehabilitated in the wild and the reasons for the same are recorded in writing.

[48A. Restriction on transportation of wild life - No person shall accept any wild animal (other than vermin), or any animal article, or any specified plant or part or derivative thereof, for transportation except after exercising due care to ascertain that permission from the Chief Wild Life Warden or any other officer authorised by the State Government in this behalf has been obtained for such transportation.]

Essential Contacts:

Country	National authorities	Other Organisations/Individuals		
		Organisations	Expert/s	Contact
India	Ministry of Environment Forest and Climate Change, Government of India	Barkatullah University-Bhopal, Madhya Pradesh	Prof. R. J. Rao	rjrao09@gmail.com
	Ministry of Jal Shakti (Department of Water Resources, River Development & Ganga Rejuvenation)	Human Environment Alliance League (HEAL)- Kolkata, West Bengal		Healearth2010@gmail.com
		National Mission for Clean Ganga (NMCG)- New Delhi and State Capitals of Ganga States	Dr. Sandeep Bahera Dr. Syed Ainul Hussain	sandeepbehera@nmcg.nic.in ainul.hussain@gmail.com
	CWLW of range states Uttar Pradesh: cwlwup@gmail.com Madhya Pradesh: pccfwl@mp.gov.in Rajasthan: cwlw.raj@gmail.com Bihar: cwlwbihar@rediffmail.com West Bengal: wbwildlife@gmail.com Assam: ccf.wl.assam@gmail.com	NA (Gwalior, Madhya Pradesh)	Dr. R.K. Sharma	rksharma_ncs@yahoo.com
		Assam University- Silchar, Assam	Dr. M. Khairujjaman Mazumder	khairujjaman1987@gmail.com
		Shri Mata Vaishnodevi University- Katra, Jammu and Kashmir	Dr. Ravindra Kumar Sinha	rksinha.pu@gmail.com
		Tilka Manjhi Bhagalpur University -Bhagalpur, Bihar	Dr. Sunil Choudhary	Sunil_vikramshila@yahoo.co.in
			Mr. Subhasis Dey	
		Turtle Survival Alliance (TSA) India-Lucknow, Uttar Pradesh	Dr. Shailendra Singh	shai@turtlesurvival.org
		Wildlife Conservation Trust (WCT)- Mumbai, Maharashtra	Dr. Nachiket Kelkar	rainmaker.nsk@gmail.com
		Wildlife Trust of India (WTI)- Noida, New Delhi	Prof. B.C. Choudhury	bcchoudhury77@gmail.com
			Dr. Samir Sinha	Samir@wti.org.in
		Wildlife Institute of India (WII)- Dehradun, Uttarakhand	Prof Qamar Qureshi	qnq@wii.gov.in
	Dr. Abdul Wakid		wakid@rediffmail.com	
World Wide Fund for Nature (WWF) India- New Delhi	Mr. Suresh Babu	sbabau@wwfindia.net		
Zoological Survey of India (ZSI)- Patna, Bihar	Dr. Gopal Sharma	gopal_dolphinboy@rediffmail.com		
Nepal	Department of National Parks and Wildlife Conservation (DNPWC)	National Trust for Nature Conservation-Nepal	Dr. Naresh Subedi	nareshsubedi@gmail.com
		World Wide Fund for Nature (WWF) Nepal	Director	info@wwfnepal.org
Bangladesh	Ministry of Environment Forest and Climate Change, Bangladesh Forest Department	Wildlife Conservation Society (WCS) Bangladesh	Dr. Brian D Smith	bsmith@wcs.org

Suggested Readings:

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- National Guidance on the Management of Whale and Dolphin Incidents in Australian Waters (2013) Department of Sustainability, Environment, Water, Population and Communities.
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Annexure I

Ganges River Dolphin Stranding Report Form Template:

Initial Observation

Stranding Number _____ Name of Observer _____

Common Name: _____ Scientific Name _____

Local Name: _____ Number of individuals _____

Date: Year _____ Month _____ Day _____ Temperature _____ °C/F

Location: State: _____ City: _____ District: _____ Village: _____ Canal: _____

Latitude: _____ N Longitude: _____ E

Condition at initial observation: (Check ONE)

- | | |
|---|---|
| <input type="checkbox"/> Alive | <input type="checkbox"/> Advanced Decomposition |
| <input type="checkbox"/> Fresh Dead | <input type="checkbox"/> Mummified/Skeletal |
| <input type="checkbox"/> Moderate Decomposition | <input type="checkbox"/> Condition Unknown |

Morphological Information

Sex

- Male
- Female
- Unknown

Estimated Age Class

- Adult
- Subadult
- Yearling
- Calf
- Unknown

If Female, Pregnant (gravid)

- Yes
- No

Measurements

Total body length (TBL) _____ cm

Width _____ cm

Length of rostrum _____ cm

Length of blow hole _____ cm

Length of genital slit _____ cm

Annexure II

Sample Necropsy Report Form Template:

Field Number: _____ Accession Number: _____ Date: _____ Examiner Name (s) _____

Species: _____ Sex: _____ Length: _____ Weight: _____ Age: _____

Brief History: _____

(Date of Death: _____)

Tentative Diagnosis

Final Diagnosis

MEASUREMENTS (cm unless indicated) *

Snout to melon: _____ Snout to angle of mouth _____

Snout to blowhole _____ Snout to center of eye _____

Snout to fin tip: _____ Snout to fluke notch: _____

Snout to caudal end of ventral grooves: _____ Snout to center of anus: _____

Snout to center of genital aperture: _____ Snout to ant. insertion of flipper: _____

Snout to ant. insertion of fin: _____

Flipper length: _____ Flipper width: _____ Fin Height: _____

EXTERNAL EXAMINATION

General condition: (lesions, deformities, appearance)

Parasites:

Mouth / Teeth: (teeth condition)

PRIMARY INCISION

Blubber:

Thorax:

Abdomen:

MUSCULOSKELETAL

Muscle:

Skeletal:

Vertebral epiphyses:

open _____ mm /closed, visible _____ /closed, invisible _____

RESPIRATORY

Upper:

Lower:

Cranial Sinuses:

CIRCULATORY

Heart:

Great Vessels:

Blood:

LYMPHATIC

Spleen:
 Lymph Node (LN):
 Thymus:

URINARY

Kidneys (reniculi differentiation, colour, condition):
 (R):
 (L):
 Bladder: (empty / full / urine saved)

ENDOCRINE

R. Adrenal:
 L. Adrenal:
 Thyroid:
 Pituitary:
 Other:

PULMONARY SYSTEM

Trachea:
 Bronchi:
 Lungs (colour, condition, edema, congestion, consolidation, granulomas, emphysema, lesions)
 (R) :
 (L) :

GASTROINTESTINAL SYSTEM

Stomach:
 Stomach contents: (contents, ulcers, mucosa, parasites)
 Small Intestine: (Length m)
 Large Intestine: (Length m)
 Faecal exam:
 Liver (colour, congestion, lesions, size):
 Pancreas:
 Gall bladder / Hepatopancreatic duct /Bile Duct / Pancreaticoduodenal Duct (color, amount):

REPRODUCTIVE

Testes / Ovaries: Immature / Mature
 (R):
 (L):
 Sperm / Corpora:
 Penis:
 Uterus: (vaginal mucus: Y/ N)
 R. Mammary:
 L. Mammary:
 Reproductive Condition: Pregnant / Fetus: (Sex = Weight = Length =)
 Lactating:

NERVOUS / SENSORY

Spinal cord:
 Peripheral: Brain:
 Ear sinuses: (parasites)
 INTERNAL PARASITES (location, type, number):

Annexure III

Tissue Sample Checklist Template:

Samples	Life History	Genetics	Chemical toxicology	Biological Toxicology	Photos	Measurements
Tissue						
Skin						
Teeth						
Oral Mucosa						
Blubber						
Muscle						
Liver						
Kidney (R)						
Kidney (L)						
Stomach						
Lung (R)						
Lung (L)						
Tracheobronchial Lymph						
Spleen						
Blood/Serum						
Esophagus						
Trachea						
Prescapular Lymph						
Heart						
Diaphragm						
Pancreas						
Mesentric Lymph						
Intestine						
Adrenal (L)						
Adrenal (R)						
Colon						
Bladder						
Testis						
Uterus						
Ovary						
Longissimus Dorsi						
Rectus Abdominus						
Faeces						
Stomach Contents						
Urine						
Aqueous humor						
Milk/Mammary Discharge						
Brain						
Other:						
Lesions (list)						
Fungal growths						
Parasites						
Culture (swab)						

Annexure IV

Template of final report to be submitted for disposal of dolphin carcass/body parts:

1	Name of the Officer	
2	Locational details of mortality: GPS coordinates, Compartment /Block/Range /Sub-Division/ Forest Division/ Tiger Reserve or place/ time	
3	Date of mortality/ carcass report	
4	In case of seizure of body parts, details indicating the status of carcass or seized material	
5	Details of the person (staff/ others) who reported the incident first: name (s)/address (es)/telephone numbers/e-mail(s)	
6	For carcass: Date, time and place of Post Mortem (PM)	
7	Details of PM Team (names/designations/ addresses/ contacts)	
8	Details of missing body parts, if any	
9	Cause of death as ascertained after the PM	
10	Colour photographs of the carcass/ body part (s)- (close ups, indicating injury, if any); details of comparison with camera trap photo data base	
11	Cause of death:	
12	<i>Panchnama</i> (memo of disposal of carcass/ body part (s))	
13	Additional remarks if any	
14	Signature of the Officer In-charge with name, designation, date and stamp	

Annexure V

Template for Rescue Permit:

कार्यालय प्रधान मुख्य वन संरक्षक, वन्यजीव, उत्तर प्रदेश, लखनऊ।
 पत्र संख्या- 123-2 (न्यु न्यू) लखनऊ, दिनांक, सितम्बर, 25/10 2020
 सेवा में,
 वन संरक्षक,
 देवीपाटन वृत्त,
 उत्तर प्रदेश, गोण्डा।
 विषय- श्रावस्ती रेंज के अन्तर्गत सरयू नहर में (गेट नं०-26200 इकौना पयागपुर संपर्क मार्ग पर ग्राम सभा पयागपुर) डाल्फिन पकड़ने हेतु अनुमति प्रदान करने के सम्बन्ध में।
 संदर्भ:- आप का पत्रांक-674/23-1 दिनांक 18.09.2020
 महोदय,

उपरोक्त संदर्भित पत्र से आप द्वारा अवगत कराया गया है कि श्रावस्ती रेंज के अन्तर्गत सरयू नहर में (गेट नं०-26200 इकौना पयागपुर संपर्क मार्ग पर ग्राम सभा पयागपुर) डाल्फिन देखी गयी है। आप द्वारा यह भी अवगत कराया गया है कि डाल्फिन की सुरक्षा हेतु मौके पर कर्मचारी की ड्यूटी लगा दी गयी है। उक्त डाल्फिन को रेस्क्यू कर घाघरा नदी (प्राकृतवास) में छोड़े जाने की आवश्यकता के दृष्टिगत सुरक्षा की दृष्टिगत से राप्ती या घाघरा नदी में उसके प्राकृतवास में छोड़ने हेतु अनुमति चाही गयी है।

अतः वन्य जीव (संरक्षण) अधिनियम-1972 की धारा-11 (1) (ए) एवं धारा-48क में निहित प्राविधानों के अन्तर्गत स्वयं अपनी देख-रेख में सरयू नहर में (गेट नं०-26200 इकौना पयागपुर संपर्क मार्ग पर ग्राम सभा पयागपुर) के अन्तर्गत डाल्फिन को उसके प्राकृतवास (घाघरा/राप्ती नदी) में छोड़े जाने की अनुमति आपको प्रदान की जाती है।

डाल्फिन को रेस्क्यू करने के कार्य में सहयोग करने हेतु श्री शैलेन्द्र सिंह, निदेशक, टी0एस0ए0, डण्डिया-लखनऊ को भी नामित किया जाता है। उक्त डाल्फिन को घाघरा नदी में अवमुक्त करते समय उसकी वीडियोग्राफी कर इस कार्यालय को अवगत करायें। इस सम्बन्ध में वन्य जीव (संरक्षण) अधिनियम-1972 में निहित प्राविधानों का कड़ाई से अनुपालन सुनिश्चित किया जायें।

भवदीय,

(सुनील पाण्डेय)

प्रधान मुख्य वन संरक्षक, वन्य जीव,
 उत्तर प्रदेश, लखनऊ।

पत्र संख्या-753, / उक्त दिनांकित।

प्रतिलिपि-निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित:-

1. मुख्य वन संरक्षक, मध्य क्षेत्र, उत्तर प्रदेश, लखनऊ।
2. प्रभागीय वनाधिकारी, श्रावस्ती वन प्रभाग, श्रावस्ती।
3. डॉ० शैलेन्द्र सिंह, निदेशक, टी0एस0ए0 को इस आशय से प्रेषित कि उक्त डाल्फिन को रेस्क्यू करने में आवश्यक सहयोग देने का कष्ट करें।

(सुनील पाण्डेय)

प्रधान मुख्य वन संरक्षक, वन्य जीव,
 उत्तर प्रदेश लखनऊ



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