BEST PRACTICES FOR THE DISENTANGLEMENT OF FREE-SWIMMING SMALL CETACEANS

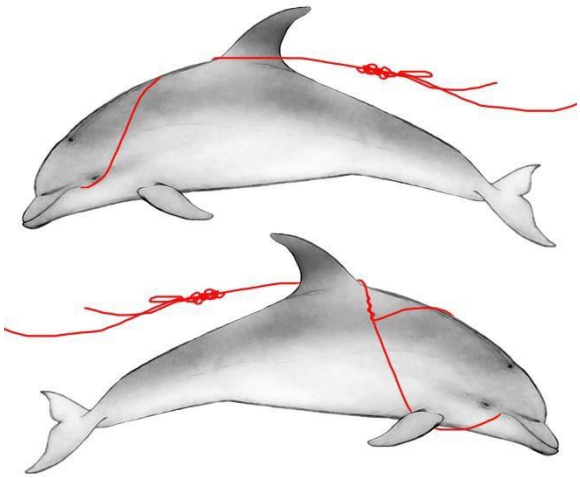

Illustration courtesy of S. Landry

Draft: 07 May 2024 (version 5 Endorsed by the Scientific Committee of the International Whaling Commission)

Adapted from the NOAA document available here: https://repository.library.noaa.gov/view/noaa/48557

EXECUTIVE SUMMARY

Entanglement in, hooking by, and ingestion of, fishing gear and marine debris are global problems affecting hundreds of marine species. Small cetaceans (*i.e.*, porpoises, dolphins, and toothed whales, including freshwater dolphins and porpoises, but excluding sperm whales) can become entangled in active and derelict fishing gear and marine or riverine debris (*e.g.*, plastic packing bands, large rubber bands, garbage, etc.), as well as ingest fishing gear and marine or riverine debris, causing injury and death. Responding to entangled animals is often difficult or impossible due to the inaccessibility of the animal, inability to relocate the animal, inclement weather, lack of experienced and trained personnel, human safety concerns, and more.

PREVENTION is key to reducing entanglements and should be the first consideration for all those involved in entanglement response. Until the influx of entangling materials and debris into the marine environment is reduced, responders must do their best, within the constraints of human and animal safety and welfare, and logistical concerns, to disentangle small cetaceans that are injured due to human activities.

Although guidelines are available for the safe and humane handling and release of small cetaceans that are immobilized and trapped in fishing gear (https://www.cms.int/en/publication/guidelines-safe-and-humane-handling-and-release-bycaught-small-cetaceans-fishing-gear), disentanglement of free-swimming cetaceans that are constricted by and/or trailing gear poses a different set of challenges. This document provides entanglement response Best Practices for free-swimming cetaceans based on currently used methods. The document has been adapted from guidelines produced by the United States National Oceanographic and Atmospheric Administration (NOAA), available here: https://repository.library.noaa.gov/view/noaa/48557 Readers/potential responders based in the United States or United States overseas Territories should refer to the original NOAA document, which contains information specific to entanglement response in the US.

This adaptation is intended to provide practitioners in any setting around the world with basic guidelines that can be followed and adapted for the small cetacean species, environment, capacity, tools and facilities that are available in that setting, with the knowledge that these vary greatly from one area to another. Best Practices are indicated for remote disentanglement to be performed by boat-based crews using specially adapted long-handled cutting tools with protective guards or 'hoods' to minimize the risk of causing additional injury to the dolphins. The original NOAA guidelines include more complex operations that involve temporary capture and immobilization of entangled free-swimming cetaceans. These operations can create additional risks for the humans and cetaceans involved and should only be undertaken by experienced teams that are accompanied by veterinarians with experience with marine mammals. To request guidance in these more complex temporary capture and restraint operations, please contact the Sarasota Dolphin Research Program (sarasotadolphin.org).

PLANNING is the key to a successful intervention. Section 2 of these guidelines places a great deal of emphasis on ensuring that a team planning an intervention/remote disentanglement is has the correct experience and qualifications to undertake the operation, that they have the necessary equipment, and have thoroughly assessed all of the risks involved to avoid further

injury to the animals being disentangled, and to prevent accident or injury to the disentanglement team. The document includes a risk assessment matrix (Table 2-4) and a decision tree (Figure 7) to assist (potential) responders evaluating whether or not an intervention should be undertaken.

The guidance for vessel-based remote disentanglement (detailed in Section 3) is based on years of accumulated experience in the United States with inputs and adaptations from experienced responders in Europe and South America. The document includes photographs of specially designed or adapted disentanglement tools and suggestions for how they can be assembled and used during an intervention. Appendices A and B include examples of data forms that can be used to accurately document the intervention, and Appendix C contains illustrated case studies of disentanglements undertaken by the Sarasota Dolphin Research Program in Florida. Readers are reminded that every intervention will need to adapt to the particular circumstances at hand, including the species in question, the age/sex/condition of the animal, the environmental conditions, the available teams and equipment, etc. Although this document includes current Best Practices, responders should never stop striving for innovative and new methods and training to increase the safety and likelihood of success of an entanglement response. These protocols are meant as overall Best Practices and should not limit advances in techniques or animal welfare during responses.

Figure 1. Photographs of free-swimming small cetaceans entangled in fishing gear. Top Left: An Amazon river dolphin entangled in an artisanal gillnet ©Miriam Marmontel. Top right: a Lahille's bottlenose dolphin carrying a monofilament gillnet in in Laguna/ Santa Catarina -Brazil. ©Ana Cremer Dotto. Bottom: Common bottlenose dolphin entangled in fishing line in the Adriatic Sea. © Tilen Genov.

CONTENTS

1. INTRODUCTION

1.1 BACKGROUND

Marine entanglement is defined as an interaction between marine species and human-made material in which the loops and openings of various types of fishing gear and debris entangle animal appendages or entrap animals (Laist 1997). Entanglement and hooking of non-targeted species in fishing gear such as traps, rope, and nets is of growing concern for wildlife worldwide and can result in serious injury and mortality (Reeves *et al.* 2003, Dau *et al.* 2009, Anderson *et al.* 2011, Adimey *et al.* 2014, Brownell et al. 2019).

Fishery gear, most notably monofilament and micro-multifilament lines, trap pot lines, and nets, has been documented as a significant source of entanglements for aquatic animals including sea turtles, marine mammals, and coastal and marine birds (Laist 1997, Adimey *et al.* 2014). Additionally, marine debris, which is any persistent solid material that is manufactured or processed and directly or indirectly disposed of or abandoned into the marine environment, is a significant global stressor on the marine and coastal environment (Coe and Rodgers 1997, UNEP 2009). The majority of marine debris is composed of various forms of plastic that are highly persistent, and chemically harmful either because they are themselves potentially toxic (Lithner *et al.*2011) or because they absorb other pollutants from the surrounding seawater (Teuten *et al.* 2009, Rochman *et al.* 2013a). The impact of marine debris is of global concern, affecting at least 693 species (Gall and Thompson, 2015). More than half of reports reviewed in a study published in 2015 documented entanglement in and ingestion of marine debris (Gall and Thompson, 2015), representing more than a 100% increase in the number of species affected since an earlier review by Laist (1997), which reported 247 species impacted by marine debris. For more information about marine debris and cetaceans see Eisfeld-Pierantonio et al., 2022 and IWC, 2020.

Increasing concern over plastics in the ocean led to the introduction of Annex V of the International Convention for the Prevention of Pollution from Ships (MARPOL 73/78) which prohibits the at-sea disposal of plastic wastes. Annex V was signed in 1973, although a complete ban on the disposal of plastics at sea was not enacted until the end of 1988. Despite 134 nations agreeing to eliminate plastic disposal at sea, oceanic sampling indicates that the problem has worsened since MARPOL was signed (Rochman *et al.* 2013b) and formally adopted in 1988. Accidental loss of fishing gear is exempted from MARPOL Annex V. Illegal dumping of plastics, fishing gear, and garbage is difficult to enforce and continues to be a threat to marine life.

Entanglements and hooking have been identified as significant causes of injury or mortality to small cetaceans (*i.e.*, porpoises, dolphins, and toothed whales, excluding sperm whales) throughout the world (Wells & Fahlman 2024). Entangling materials may cause drowning, lacerations, amputation of appendages, infection, strangulation, increased energy expenditure (especially while dragging large fragments of net or biofouled line), may impact behavior and foraging, and may result in starvation, premature death and/or dependent offspring mortality. Common examples of entangling gear that harm small cetaceans include active or derelict fishing gear, rope, and other debris (Wells *et al.* 2008, Barco *et al.* 2010, Stolen *et al.* 2013, Adimey *et al.* 2014). Small cetaceans can also ingest fishing line, hooks and lures leading to injury and death (Barros *et al.* 1990, Gorzelany 1998, Baulch and Perry 2014, McLellan *et al.* 2015).

To address the root of the entanglement problem - primarily plastic debris in the ocean or interactions with fisheries - stakeholders, industry, non-governmental organizations, local, state and federal governments, and Native organizations **must work together to solve the problem.** A number of agencies and organizations have developed methods to respond to entangled small cetaceans. It has been clearly demonstrated that rescues of individual animals can leverage population-level conservation benefits (McHugh *et al.* 2021).

However, entanglement response is limited for many reasons (*e.g.*, inaccessibility of the animal, inability to relocate the animal, inclement weather and other environmental conditions, lack of experienced and trained personnel, human safety concerns, logistical considerations, cost, etc.), with response reaching only a small fraction of entangled animals.

1.2 BEST PRACTICES PURPOSE AND INTENDED USES

These Best Practices have been developed and refined for responding to live small cetaceans in marine or freshwater environments observed with life-threatening entanglements (including hookings, from this point forward, to ensure the health, welfare, and safety of human responders and the impacted animals. These Best Practices balance the need for standardized procedures while allowing flexibility to address specific needs of different situations for diverse species and habitats, as well as unforeseen circumstances. For more information on general stranded marine mammal rescue and rehabilitation, see *Marine Mammals Ashore* (Geraci and Lounsbury 2005) and the *CRC Handbook of Marine Mammal Medicine* (Gulland *et al.* 2018). **Human and animal safety should be the top priority for all interventions**.

Those seeking protocols and procedures for use with large cetaceans should consult with the International Whaling Commission's Global Whale Entanglement Response Network (GWERN). A separate set of guidelines is available are available for the safe and humane handling and release of small cetaceans that are immobilized and trapped in fishing gear (https://www.cms.int/en/publication/guidelines-safe-and-humane-handling-and-release-bycaught-small-cetaceans-fishing-gear) (Hamer and Minton, 2020). Best practices are indicated for remote disentanglement to be performed by boat-based crews using specially adapted long handled cutting tools with protective 'hoods' to minimize the risk of causing additional injury to the animals. Another set of guidelines is available elsewhere for more complex operations that involve temporary capture and immobilization of free-swimming cetaceans that are entangled. These operations should only be undertaken by experienced teams that are accompanied by veterinarians with experience with marine mammals, as they can create additional risks for the humans and cetaceans involved. To request guidance in these operations, please contact the Sarasota Dolphin Research Program (sarasotadolphin.org).

This document is not intended for independent use as a training manual. Readers/users will need to ensure that prior to undertaking any intervention, they have obtained all of the necessary authorizations and/or are collaborating with the authorities responsible for wildlife management. These Best Practices balance the need for standardized procedures while allowing flexibility to address specific needs of different situations for diverse species and habitats, as well as unforeseen circumstances. These Best Practices are a "living document," and as such, we plan to periodically review and update them as new information becomes available.

2. PLANNING AND EXECUTING SMALL CETACEAN ENTANGLEMENT RESPONSE: REMOTE INTERVENTIONS FOR FREE-SWIMMING SMALL CETACEANS

2.1 AUTHORIZATION

Before any intervention is undertaken, responders should ensure that they have the necessary authorizations from the relevant authorities. Depending on the country and setting, this could include coast guard, wildlife management authorities, fisheries authorities, protected area management bodies, etc. As part of the readiness and planning phase, responders are encouraged to determine exactly which authorities have the mandate to either respond, or grant permissions for response, and to establish a good working relationship with these authorities and/or to share these guidelines with them so that they can also prepare for best practice response.

2.2 PREPARATION

PRIOR TO ANY OPERATION:

Entanglement response requires extensive logistical preparations, including training of personnel, developing strategies for successful intervention, and identification of appropriate supplies/equipment/vessel support, as well as a plan for managing and communicating with bystanders and the general public. Once approval has been received and prior to any operation, an experienced team should be selected and roles and boat crews assigned.

Points to consider:

- Take time to assess as much photo-, video, or direct observation of the entangled animal as possible. It is important to have as much information as possible about the species, age/sex/size, kind(s) of gear involved, overall condition of the animal, anatomical locations of entangling material, nature, and severity of the entanglements, exacerbating factors such as biofouling, existence of other imminent threats, and the animal's mobility. All of these factors will determine the best course of action.
- Whenever possible, consult with colleagues with experience with similar species, situations. Consult this online list) (NOTE – this link is temporary – and we will ask the IWC to create a 'live' document that can be edited and consulted over time) to find someone with the relevant experience and language skills for your situation.
- Choose experienced team members and assign roles.
- Consider appointing a communications lead, and craft key messages for the public to manage expectations and ensure that they don't interfere with operations.
- Ensure that any authorities or members of the public who may be exerting pressure for 'immediate action' understand that an intervention should only be initiated when the chances of success are optimized, with the appropriate team, equipment, and conditions. It would be better to take the time necessary to create this optimal situation than to rush into an intervention without appropriate preparations, to minimize safety risks for the animal and the rescue team.

24 – 72 HOURS PRIOR TO OPERATION:

- Check marine weather forecasts.
- Ensure that the animal has been sighted recently (i.e., within 5 days of scheduled disentanglement effort), to confirm that the entanglement is still active (e.g., gear has not moved, been removed by another party, or fallen off, etc.) and the animal is still alive/in the area.
- Assemble the appropriate tools and team (see details below) and run practice sessions on land. The more the team practices ahead of time, the better prepared they will be for the unexpected.
- When necessary, arrange for additional personnel, better visualization of the entangled animal and better control of onlookers in the area.
- Ensure all equipment is clean, organized, packed, and ready for operations.
- Confirm the operation of all vessels (fuel and maintenance, if needed).
- Notify appropriate entities (e.g., wildlife authorities, law enforcement, harbormaster, park personnel, lifeguards, etc.). Depending on circumstances (e.g. remote area operations) consider notifying local Emergency Services to expedite response and treatment in case of accidents.
- Develop rehabilitation contingency and necropsy contingency plans.

IMMEDIATELY PRIOR TO OPERATION:

- Conduct safety and operations briefing.
- Re-check marine weather forecasts.
- Consult decision matrix (see below) – prior to operations and during operations, determine if conditions allow for safe operations and make a final go/no go decision for response.

2.2 TRAINING

Responders must be trained by experienced personnel in safe use of small boats, familiar with the target species and its behaviour, have practiced using the remote disentanglement tools, and have experience working under pressure. Ideally, use of remote disentanglement tools requires hands-on experience under the direct supervision of experienced response staff. If possible, inexperienced personnel should watch the process and participate in secondary aspects of the response to gain more experience before they lead an intervention themselves. Personnel should document their training and skills so the response coordinator who is choosing the team has a current list of team abilities.

2.3 HUMAN AND ANIMAL SAFETY

Because of the inherent risks encountered during an entanglement response, methods used to remotely disentangle should minimize risk, stress, and pain to the animal while also ensuring the safety of both the animal and responders (Norman *et al*. 2004). A broad list of human and animal safety procedures can be found below.

I. HUMAN SAFETY

- First and foremost, responders should never enter the water with an entangled animal. This creates very real risk of injury, entanglement, drowning and death. All operations should be undertaken by responders who remain on a vessel and use long-handled tools or grapples to cut gear from the entangled animal or gently bring it alongside the vessel for manual cutting and removal of gear (more details in Section 3 below).
- Create a written safety protocol with emergency services response numbers to be kept with first aid kits.
- Responders should only conduct procedures for which they meet minimum qualifications and training. Appropriate response staff should be trained in basic first aid and CPR.
- Designated personnel (e.g., intervention boat teams) should carry a safety knife/cutter on their person for human and animal safety.
- Vessels should have appropriate human safety equipment (e.g., a throw bag, safety ring/flotation device, etc.) available in case a team member falls in the water.
- Use a hooked/curved/covered blade (see illustrations in section 2.7) for cutting (e.g., net, line, debris, etc.) to minimize accidental injury to handlers and the animal and cut away from yourself. Stow the cutting implement safely when finished.
- Do not wrap net or line around hands or fingers, and keep feet clear of lines and nets.

SAFETY EQUIPMENT AND PERSONAL PROTECTION

- Ensure that each response group/vessel has a well-supplied first aid kit.
- Have a written safety protocol with emergency numbers to be kept with first aid kits.
- Ensure that each vessel has a radio/other communication equipment.
- Personnel should wear appropriate personal protective equipment (PPE) such as strong, non- slip, closed-toed footwear without potentially entangling external features (e.g., hard-soled dive boots), Personal Flotation Devices/life jackets, wetsuits (when temperatures require them), and appropriate clothing as necessary for weather conditions. Make sure that team members remove any entanglement hazards (e.g., earrings, rings, watches). Other recommended protective gear includes eyewear (including sunglasses, preferably polarizing), helmets, and gloves if handling lines or remote cutting tools.
- Vessels should contain safety equipment that conforms to best standards and local vessel licensing regulations (e.g., personal flotation devices/life jackets for all crewmembers, fire extinguisher, flares, navigation lights if applicable, etc.) and be appropriate to the role each vessel plays in the response operation.
- Operational safety
- Journey/intervention plans should include an assigned point of contact on land who can alert emergency services if needed.
- Responses should not be conducted in poor weather, lighting, or sea conditions.

- Assess how to safely reach the animal and egress after the response. Consider tide, weather, time of day, other environmental factors, and other animals in the area.

Report injuries, incidents, or PPE failures to the Team Lead immediately.

- Any significant accident or injury requires that operations cease and the event, person, or injury be immediately addressed.
- Depending on the situation, the decision is made by the team lead whether to continue or discontinue operations for the day.
- Presence of public or bystanders
- If response is in a public area, ensure there is sufficient crowd control and outreach. If necessary and appropriate, request support from the relevant authorities to enforce a safe and clear area of operation.
- Ensure observing public are informed where possible/practical and ensure they stay a safe distance away from the rescue operation.

2.3.2 ANIMAL SAFETY

- Consider the potential effects of response efforts on non-entangled animals and/or species within the response areas and take precautions to minimize disturbance.
- Disentanglement/cutting tools should be sterilized before use.
- Responders should minimize close approaches and take breaks between disentanglement attempts if the animal shows signs of distress or tiring. The number of disentanglement attempts per day and number of consecutive days should be evaluated on a case-by-case basis, taking into account the severity of the animal's injury and the individual animal's response to disentanglement attempts.
- Fully assess the entanglement on the animal to determine how pressure on the entanglement(s) may exacerbate the situation or injury, for example, by pulling embedded lines deeper into tissues, pulling on line or hooks in the mouth, moving gear into contact with eyes or the blowhole, or applying inappropriate forces to flippers.
- If the entangling material is embedded in the animal's flesh, and if possible with the long-handled tool, peel it out of the wound rather than dragging it or pulling it out from one side if possible; this can minimize pain and prevent further injury.
- Once the entangling material has been removed, clean and sterilize any disentangling or sampling tools that were exposed to the animal.

ENVIRONMENTAL HAZARD ASSESSMENT

- Use a decision matrix (see section 2.11) prior to the response to ensure risks and mitigation are planned and accounted for by all responders and properly mitigated.
- Prior to the response, survey the surroundings to identify any environmental hazards that might pose a threat to responders or the animal.

DISTURBANCE (OTHER CETACEANS AND WILDLIFE)

- Reduce all forms of disturbance to the entangled animal and any nearby animals (e.g., if the animal is within a group) as much as possible (e.g. keeping noise to a minimum).
- Time limits
- If the animal shows strong avoidance or aggressive behaviors give the animal a cool-down period (e.g. 10-20 minutes, depending on the situation).
- Remote disentanglement tool deployments
- Ensure all equipment is in working order prior to deployment.
- Where possible, approach or maneuver the disentanglement vessel closest to the animal to allow for deployment of remote tools.
- If not possible prior to the response, assess where the entangling material is easiest to access and cut away. Also, identify the fewest cuts needed to release the animal to reduce handling time and stress to the animal.
- Sterilize any sampling or tagging tools that were exposed to the animal.
- Clean and dry all equipment after response and stow securely where it can be accessed for future use.

2.4 TEAM MEMBER ROLES

Responding to entangled small cetaceans has inherent risks for both responders and animals. Clarifying team member roles and responsibilities prior to any response, and ensuring that responders meet minimum qualifications for each role, is essential to a safe and successful response. Disentangling small cetaceans should always be conducted by trained personnel. When medications are used for treatment or sedation, extra training and licensing requirements are required, and safety protocols must be in place.

Suggested specific team member roles and qualifications for each role are listed below. In some circumstances, roles can be combined (*e.g.*, documentation and data collection).

- **Response Lead (RL)** – The RL is responsible for all on-water activities and resources needed to conduct and maintain safe and efficient operations. If more than one vessel is used, the RL coordinates the deployment of the other vessels while searching for the target cetacean(s). The RL makes the final call on when and where to approach the cetacean for remote disentanglement attempts. The RL ensures that the response is as safe as possible for responders, the target animal, other animals, and the public.
    - **Qualifications** – Experience conducting remote disentanglement activities. Experience working around small cetaceans including close approaches and general vessel operations. Experience monitoring and detecting stress reactions in small cetaceans. The ability to remain objective to ensure safe operations and willingness to stop operations if there is a safety concern. Communication skills are important to the role. Ability to brief the response team beforehand, communicate w/ the various vessels on the water, and the veterinary team as needed.

- **Small Boat Operator** – For remote entanglement responses, small boat operators are an essential component to a successful operation. Small boat operators are responsible for ensuring that vessels are safely maneuvered around animal(s), and that vessels are safely handled in various conditions, such as inclement weather, sea state, currents, tides, surrounding vessel traffic, etc. Small boat operators should be experienced with animal close approaches.
    - **Qualifications** – Internationally, nationally, or regionally recognized boat training and certification should be required. Because many of these duties are outside the scope of normal boat operations, skills should be practiced prior to working with small cetaceans around the boat. Experience maneuvering in tight spaces, ability to remain calm under pressure, and remain focused under potentially hectic circumstances. Experience driving vessels around cetaceans is preferred.
- **Disentanglement Tool Operator** – The disentanglement tool operator is responsible for using remote cutting tools from a vessel to disentangle the free-swimming small cetacean. Tools may include cutting poles, cutting grapples, or other types of remote cutting equipment. The disentanglement tool operator must know how to use the remote tools safely to minimize injury to the target cetacean, nearby animals, themselves and other response personnel.
    - **Qualifications** – Experience in using remote disentanglement tools and experience working around free-swimming small cetaceans. The ability to remain calm under pressure.
- **Data Collector** – The data collector is essential in recording all aspects of the disentanglement response. This person is responsible for ensuring all data are complete on the data sheets, the animal is given an identifying number, all marks, dorsal fin features, and all samples and gear are properly recorded and labeled.
    - **Qualifications** – Familiarity with data sheet and information to be recorded, attention to detail, and ability to accurately record data legibly.
- **Photographer or Videographer** – This person is responsible for operating still or video photography to document the response. This person may also serve as the data collector.
    - **Qualifications** – Experience using photographic equipment. Knowledge of how the equipment operates, how to change settings, troubleshoot, take clear and meaningful photos and video including dorsal fin pictures, and ability to post-process photos/video after the capture.
- **Veterinary Staff (Optional**) – The veterinary staff is responsible for the health and monitoring of the entangled animal during the response and until the animal is safely disentangled and on its own. Based upon the type of remote response, veterinary staff may not be needed for each response. Having veterinary staff available for consultation via cell phone or radio is encouraged.
    - **Qualifications** – A licensed Doctor of Veterinary Medicine (DVM) or equivalent, or veterinary technician experienced in small cetacean medicine.
- **Unmanned Aerial System Operator (UAS; Optional)** – If permitted to operate an UAS during the remote response, the UAS pilot must have no other duties. The pilot must be in communication with the RL and immediately cease operation if the UAS is in any way negatively impacting the success of the disentanglement or causing any disturbance to the target or other animals.

- **Qualifications** – A certified drone pilot's license that is valid in the country/ setting where the intervention will take place. The pilot in question should have experience launching and recovering drones from vessels and flying drones over water.

2.5 COMMUNICATION

Clear communication is essential before, during, and after an entanglement response. There must be clear communication when planning for the response, and among team members during the response (*e.g.*, among vessel operators, between vessel operators and shore personnel, between response team and emergency personnel, members of the public, law enforcement, harbor masters, etc.). Common forms of communication include very high frequency (VHF) handheld or mounted marine radios, satellite phones, cell phones, and two-way radios (*e.g.*, walkie-talkies). Some applications for phones (*e.g.*, Zello) allow a cell phone to be used as a walkie-talkie. Non-verbal communication may also be required while approaching an animal. Responders should ensure all non-verbal communication gestures are understood by the entire response team and practiced prior to each response.

The RL must coordinate with the relevant authorities, as necessary. Responses are generally not advertised and most media interviews or social meeting postings are conducted **after** the response has taken place. If responders are contacted by the media for an interview, they should notify the relevant government authority before responding. It is best to work with the relevant authorities' communications staff for news media, such as news releases, news conferences, media interviews *as well as social media posts*. All media interviews should be considered "on the record". Always remember that human safety comes first, followed by the entanglement response. **Responders are NOT required to speak to the news media.**

2.6 ENVIRONMENTAL CONDITIONS

Responders should consider weather, environmental conditions, and features of the response area prior to any entanglement response effort. These considerations should include wind, lightning, precipitation, fog, sea state, incoming storm systems or any other changes in weather, tides, currents including subsurface currents, submerged hazards (*e.g.*, crab pots, derelict gear, oyster beds, ship wrecks, etc.), and surf. The air and water temperatures should also be considered. If it is very hot or very cold, it could be a safety risk for responders and the animal.

Create a risk assessment tool (see Risk Factor Table below) or decision matrix (See Decision Matrix below) to determine whether an entanglement response is safe for responders and small cetaceans based on environmental conditions. Assess the following environmental conditions prior to small cetacean remote disentanglement response:

- Weather conditions (i.e., lightning, rain, snow, fog, wind, sea state, approaching storm systems, heat, cold).
- Submerged hazards (i.e., sand bars, rocks, coral reefs, ship wrecks, sunken debris, aquaculture infrastructure, oyster bars, etc.).
- Location of the animal in relation to the surf zone.
- Tide (i.e., incoming or outgoing tide, increased surf, currents).

- Time of day (e.g., response too close to sunset leading to activities occurring under conditions of poor lighting).

2.7 EQUIPMENT

Small boats generally fall within the range of 5-8 metres in length and operate in near-shore environments, although the size and type of vessels may vary depending upon the response needs and availability. It is essential that the proper equipment be clean, tested, packed, and immediately available before a response. Typical equipment required for all responses includes data sheets, camera, disentanglement tools, etc.

DATA AND DOCUMENTATION SUPPLIES

- Entanglement Response forms (see the 'Level A form', Human Interaction Data Sheet and Disentanglement form provided as examples in Appendix A, Photo-ID form, etc.)
- Pencils/clipboard
- Watch with timer
- Camera and/or video camera (e.g., GoPro), extra batteries
- Sampling supplies
- Sampling kit (e.g., forceps, sample vials filled with ethanol or DMSO for skin if present on retrieved gear)
- Protective clothing
- Footwear appropriate for vessel
- Protective clothing (e.g., PFD, raingear, helmet, etc.)
- Non-permeable work gloves (if handling cutting tools)
- Optional - eyewear, etc.

HUMAN MEDICAL EQUIPMENT

- First aid kit (optional AED)

CUTTING TOOLS (BELOW) CUTTING POLE

There are a variety of different cutting tools that can be used to cut entangling material. When using a "hooked fixed pole knife" to cut an entanglement without restraining the animal, a stainless-steel knife fabricated into a "V" shape with a threaded fitting that attaches to an aluminum or carbon fiber pole that can be extended by adding sections, works well. While it is best to know ahead of time what kinds of entanglements you are likely to encounter, and to construct appropriate disentanglement gear in advance, this is not always possible. The rescuer will need to be resourceful with the gear options available to them. Some basic considerations include:

Pole:

- A pole more than 3-4 m long becomes unwieldy, and difficult to position relative to a moving animal.

- Rigid poles generally work better than flexible poles, as they allow more accurate and quicker placement of the tool where it needs to be. Carbon fiber is good, but expensive and hard to find in many places. Aluminum, such as in a boat hook or pool-cleaning pole, works well (but not painter's poles). A strong telescoping pole can enhance maneuverability.
- The pole and attachments should be sufficiently strong and secure that they will not come apart or break during the disentanglement attempt, creating additional problems. The gear should be attached to the boat or a float with a tether.
- Consider the trade-off between strength and weight of the gear for being able to maneuver the pole quickly and accurately, while minimizing the possibility of breakage.
- The pole or cutting gear at the end of the pole should be tapered to facilitate getting under lines or through meshes, but the point should not be capable of impaling the animal.

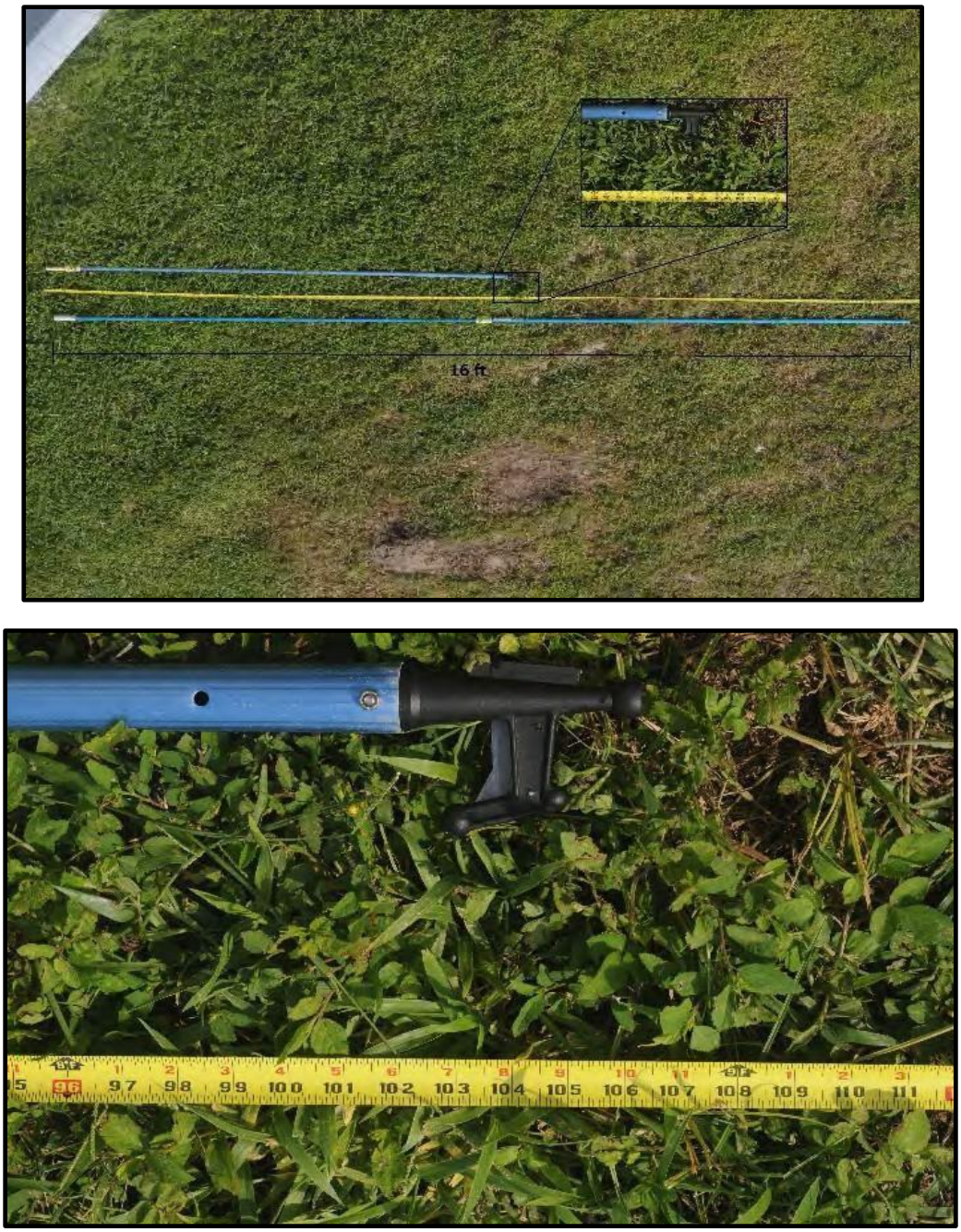

Figure 2. Specially designed cutting tools that can be fitted to the ends of long poles for use from the bow of a boat (photos courtesy of the Sarasota Dolphin Research Program).

Cutting Blades:

Cutting blades should be shielded from contact with the animal. They should only be on the inside of hooked cutting tools. As a simple example, the Sarasota Dolphin Research Program have secured box-cutter blades to the inside of a boat hook, as in the photo below. If blades become rusty, replace them, to make sure the tool is as sharp as possible.

Figure 3. Specially designed cutting tools that can be fitted to the ends of long poles for use from the bow of a boat (Top photo courtesy of the Sarasota Dolphin Research Program, bottom tool designed by the Center for Coastal Studies).

CUTTING GRAPPLES AND LONG-HANDLED GRAPPLES

Cutting grapples that can be attached to ropes or poles and extended from the deck of a boat to cut entangling gear can be designed so that they are curved and unlikely to injure the animal from the blunt side. When it seems unlikely that a long-handled cutting tool will be able to remove gear, a small, tethered grappling hook, with hook ends covered to eliminate dangerous points (see photos below), can be taped to the end of a long pole and used to grab an entanglement to provide access to an animal for hands-on gear removal at the side of a boat.

Figure 4. Cutting grapples that can be attached to ropes or poles and extended from the deck of a boat to cut entangling gear. Photo supplied by the Center for Coastal Studies (https://coastalstudies.org/).

Figure 5. Long-handled grapples with protected tips to avoid injury to the animal.

HAND-HELD CUTTING TOOLS

Have small cutting tools available should the animal be brought alongside the boat. Ideally these will be sharp knives without points, and with a blade on one side only (see photo below). Parachute knives are an option. Always cut away from the animal.

Figure 6. Hand-held cutting tools that can be used in case the animal is brought along side the boat, or lines need to be cut on the boat to prevent injury or accident.

CLEANING/DISINFECTING SUPPLIES

- Antibacterial soap/hand sanitizer
- Disinfectant solution (e.g., chlorhexidine, 70% ethanol, etc.)
- Spray bottle for disinfectant solution
- Garbage bag(s) or other container(s) to separate gear and clothing
- Miscellaneous supplies
- Cooler/waterproof case/Backpack/Bucket (to carry supplies)

TABLE 2-1. OVERVIEW OF GENERAL EQUIPMENT THAT MAY BE USED FOR REMOTE DISENTANGLEMENT.

General Equipment	**Remote techniques – free-swimming**
Communications (*e.g.*, marine radio, cell phone, satellite phone)	√
Data supplies (*e.g.,* clipboard, data sheets) and recording equipment [*e.g.,* camera (with backup), video, dorsal fin board]	√
Safety equipment/Protective clothing and shoes/PFDs	√
Medical equipment for humans and animals (*e.g.,* human first aid, dolphin 'crash' kit (if qualified veterinarians are involved), stingray kit)	√
Small boats/vessels	√
Disentangling equipment/tools (See section above for illustrations and examples)	√
Cleaning/disinfectant supplies	√

2.8 DATA COLLECTION

Response and sampling data needs must be well thought out prior to the start of any entanglement response effort. Instructions should be followed and data forms completed during a response. Capture and sampling equipment checklists should be developed and used. Important data forms for preparation prior to response may include:

- applicable permits,
- data forms (See Appendix A for examples of forms used in the USA)
- gear checklists
- disentanglement forms (See Appendix A for an example)
- respiration rate form (See Appendix B for an example)
- All of the fishing gear or other materials found on the animal should be photographed prior to removal and retained after removal (if possible), documented on the appropriate forms, and stored in a centralized location or sent to a gear repository.

2.9 RISKS AND MITIGATION

To minimize risks to human responders, animals, and, in some cases, the general public, a comprehensive entanglement response safety plan should be implemented. A safety briefing should occur prior to each entanglement response. In addition, a decision matrix or Go/No Go criteria should be established to guide responders in making safe decisions regarding the response to entangled small cetaceans. Responders should prepare, plan, and practice for possible risks and identify

mitigation measures (Table 2-3) for these risks prior to any response. After each response, the team should conduct a thorough de-brief and summarize lessons learned that can be applied to future responses. When responding to entangled small cetaceans, the list of risks and mitigations is never complete. ***There is always room for improvement and documents should be updated continually.***

TABLE 2-2. A GENERAL RISK AND MITIGATION CHECKLIST TO USE FOR AN ENTANGLEMENT RESPONSE.

General Risk and Mitigation Checklist	√
Approval for response from relevant authorities	
Assign Response Lead	
Alert law enforcement (and harbourmaster, land owners etc., if applicable)	
Depending upon response type, have Emergency Services contact information readily available	
File a journey/trip plan with a designated Point of Contact on land	
Check vessel, trailer, vehicle, and equipment operation	
Prepare for follow-up monitoring	
Assign and explain team member roles	
Review authorization/permit and decision matrix or Go/No Go	

Check marine weather forecasts and tides	
Review safety plans	

2.10 RISK MANAGEMENT ASSESSMENT

Assessment of risks and mitigation starts long before initiating a response. Risks to humans and animals should be identified, and mitigation measures established. Some examples of general risk and mitigation measures are listed below.

RISKS TO HUMANS

RISK:

- Injury or death as a result of drowning; slips, trips, or falls; human entanglement in entangling gear (such as hands, fingers, arms resulting in breaks, amputations or drowning); changeable environmental conditions; sun exposure; hypothermia; hyperthermia.

MITIGATION:

- Preparation, planning, practice, proper training, and use of decision matrices.
- RL to oversee operations.
- Wear appropriate PPE.

RISKS TO ANIMALS

RISKS:

- Injury or death to an entangled animal from remote disentanglement tools, net, drowning, capture myopathy, or other animals.
- Injury or disturbance to surrounding non-entangled animals from vessel operations during response.
- Possible separation of social unit (e.g., mother and calf).

MITIGATION:

- Preparation, planning, practice, and use of decision matrices.

2.11 INTERVENTION CRITERIA/DECISION MATRIX

The first and most important question that will be asked by all responders before initiating an entanglement response is: Is the entanglement life threatening?

For entangled small cetaceans, responders should consult with marine mammal experts and veterinarians, to determine if an entanglement is considered life threatening. This is achieved through field observations by biologists, researchers, and veterinarians, analysis of photos and/or videos, the animal's behavior and appearance, and the experts' prior experience with

similar entanglements (*e.g.,* Wells *et al.* 2013). Table 2-3 outlines some of the evidence, levels of severity, and response methods that may be considered when assessing interventions.

If the entanglement is determined to be life-threatening, there is increased urgency, and the next step is to determine the most appropriate method of intervention, remote or catch-and-release. If intervention is not an option or the entanglement is not considered life threatening, the animal may be monitored, usually by local researchers, stranding network partners, or trained biologists, to determine whether an intervention may be possible at a later date (*e.g.*, the animal moves to a more suitable area for rescue, the animal live strands, the animal becomes lethargic and more approachable, weather improves, the animal's condition deteriorates (if the entanglement was not originally considered life threatening). In contrast, monitoring may reveal that the animal sheds the gear without intervention.

TABLE 2-3 SMALL CETACEAN ENTANGLEMENT INTERVENTION (EVIDENCE, LEVELS OF SEVERITY, AND METHODS)

Evidence	Visible entangling material present; encircling lesions with likelihood of embedded gear around/through mouth, body, dorsal fin, flippers, flukes; animal anchored by gear. May also include lesions and abrasions from contact with trailing gear. Entangling material may include fishing gear (*e.g.*, monofilament, net, rope) and marine debris.
Level of Severity	**Conditions**
Serious Outcome (Life threatening)	Entanglement gear interfering with breathing and/or feeding; circumferential wraps around or gear embedded in head, mouth, flippers, peduncle, body; gear severely limiting mobility or animal is anchored; hooks in eyes or head; ingested fishing gear protruding from the mouth (https://www.fisheries.noaa.gov/national/marine-mammal-protection/marine- mammal-protection-act-policies-guidance-and-regulations#distinguishing-serious-from-non-serious-injury-of-marine-mammals)
Unlikely Serious Outcome	No restrictions of breathing and/or eating; fishing gear not embedded; gear only impacting the dorsal fin; minor superficial lesions; strength of animal exceeds that of the gear (Moore *et al.* 2013); hooks externally except for eyes or head; line only affecting distal portions of dorsal fin or flukes (Wells *et al.* 2008)
Intervention Method	Remote disentanglement; in-water capture for free swimming animals
Disposition Options	Released at site; translocated and released; rehabilitation; euthanasia

Additionally, if the decision to intervene is made, then there are two main tools to aid in determining if a response should occur: **The Risk Factor or GAR (Green-Amber-Red) Model** (Table 2-4). The GAR model allows for time critical risk assessment and generates communication concerning the response risks. This communication then helps identify the risk and leads to

the appropriate mitigation. This model is not a strict Go/No Go because it is focused on identifying risks and mitigations. If the cumulative risk levels across multiple areas (*e.g.*, team composition, mission complexity, etc.) are above a certain threshold, teams must work with the RL, and/or appropriate authorities prior to conducting activities to discuss mitigation measures or the team must stand down.

TABLE 2-4. THE GAR (GREEN-AMBER-RED) GENERAL MODEL TABLE BASED ON A TABLE PROVIDED BY THE HAWAIIAN MONK SEAL RESEARCH PROGRAM, NMFS.

Risk Factor	Risk Factor Category						Risk Level
	Very Low - 1	**Low - 2**	**Medium - 3**	**Medium High - 4**	**High - 5**	**Very High - 6**	
Environment	Very Acceptable	Acceptable	Moderately Acceptable	Moderately Dangerous	Dangerous	Very Dangerous	
Team Composition and Fitness	Excellent Team	Good Team	Appropriate Team	Marginal Team	Poor Team	Very Poor Team	
Animal Condition	Healthy (besides entanglement)		Mildly Compromised Health	Moderately Compromised Health	Highly Compromised Health		
Permits & Authorization	Excellent		Good		Poor		
Resources: Equipment, PPE, Communication, etc.	Excellent		Good		Not Prepared		
Mission Complexity: New or Experimental, Time Sensitive, etc.	Simple	Standard	Moderately Complex		Very Complex	Extremely Complex	
If any risk level equals:	Medium-High	Discuss with RL or immediate supervisor before proceeding.					
	High – Very High	Contact appropriate wildlife management authorities					

Key considerations or questions to be asked in the risk factor analyses:

1) ***Health and behavior assessment:*** Ideally, previous direct visual observations and via photos or video will have allowed for an initial assessment of health prior to the response, including evidence of malnutrition/emaciation, active infection

or abscesses, etc. During the response, observe current body condition, responsiveness (responds normally to natural stimuli), or if there are any external or behavioral abnormalities including abnormal breathing patterns.

2) ***Weather and tide concerns:*** Does weather pose a threat to the animal or responders (*i.e.*, heat stress, hypothermia, large waves, or threatening storms)? If so, is there a way to mitigate it? Consider the animal's body temperature before, during, and after intervention. Is the tide coming in or going out, how high/low is it and how can it impact the event?
3) ***Habitat concerns:*** Habitat (i.e., geographic location, substrate type, navigational hazards, water depth, currents) should be assessed for hazards to animals and responders.
4) ***Equipment:*** Is all necessary gear functional, available, and ready? This includes, but is not limited to: vessels, sampling, disentanglement tools, emergency equipment.
5) ***Presence of other animals of concern:*** Are there other small cetaceans, or other wildlife in the area that may be disturbed by the response (e.g., manatees or sea turtles inhabiting the same area in which an entangled dolphin is located)? Is there a potential for other small cetaceans to approach and disrupt the target animal or responders during capture?
6) ***Team composition:*** Are there adequate responders with the appropriate level of expertise and experience to safely complete the mission and address unforeseen situations?
7) ***Public presence***: Is the response going to be in a public area? Ensure adequate crowd control and outreach. Consider a public briefing after (and if needed prior to) the event. Expect to be recorded or live streamed and ensure that all involved behave professionally. Where teams represent a particular authority or institution with relevant expertise, clothing/logos that will be seen by the public may help the public to recognize the professionalism of the team.

INTERVENTION/RESPONSE DECISION TREE.

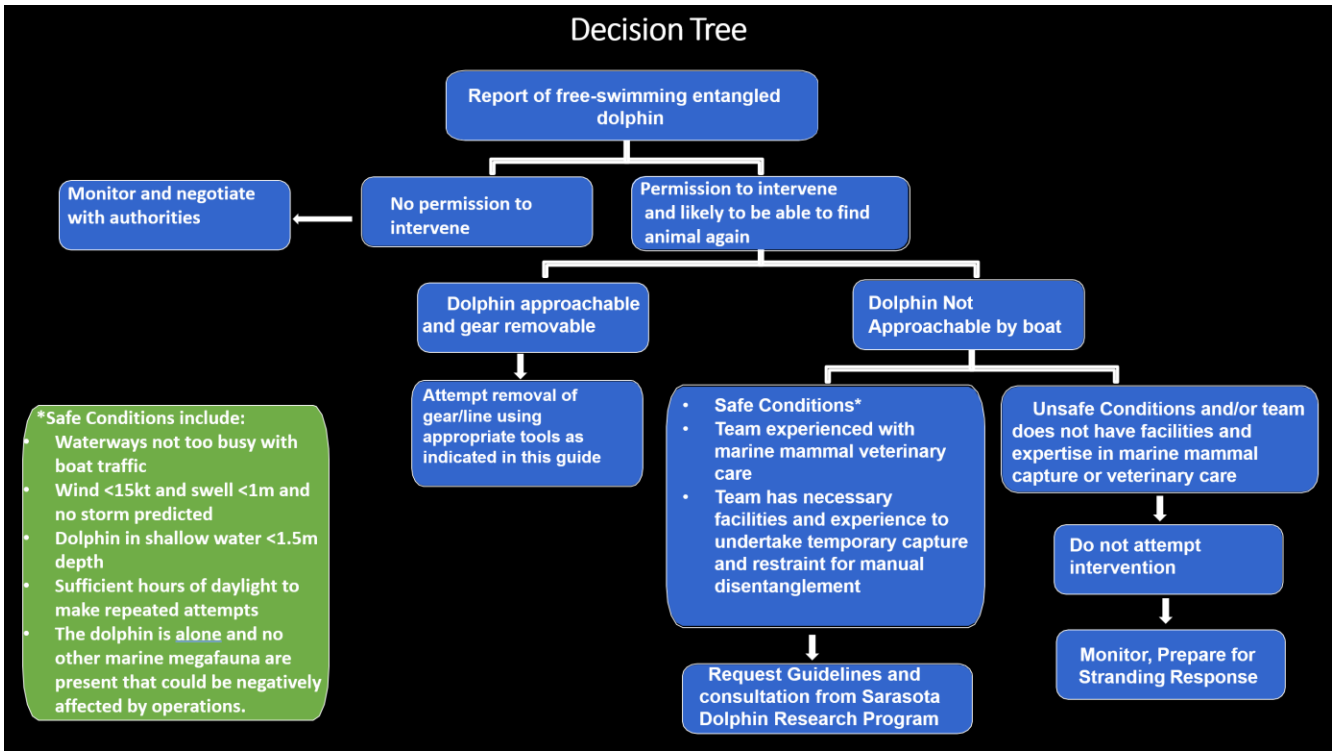

Figure 1. General example of a decision tree to assess whether to intervene, and if so, what type of intervention may be considered if a free-swimming entangled dolphin is reported. Adapted from procedures used by the Sarasota Dolphin Project. Note that the steps of the decision tree may be iterative as circumstances change – for example weather conditions may change, the dolphin may move into a new area, authorizations may be obtained or revoked, etc. Teams should be prepared to continually re-assess and re-evaluate.

3. INTERVENTION PROCEDURE: STEP-BY-STEP SUMMARY

Consolidating the information above, the following steps are listed here to guide responders through the usual timeline and specific actions of an intervention. Please note that procedures will vary depending on the setting. However, the general sequence of events includes:

1. **Final team meeting**: Hold a team briefing before the response occurs so team members know their duties.
    - Double-check all the equipment and supplies.
    - Confirm all team roles and review roles and responsibilities of each team member (and backups) for every part of the response, and confirm the team members fully understand, are capable, and are mentally prepared.
    - Review the response scenario and all procedures, any emergency response, and the sequence of the activities.
    - Discuss when a response should be aborted and who makes the decision.
    - Review animal warning signs to monitor and the appropriate emergency response actions.
    - Review agreed communications and signals/commands to be used between team members – including verbal or other signals to ensure quick responses in pressure situations.

- Discuss ideal cuts to be attempted to remove entangling gear/debris.
- Final check by the RL will ensure all personnel and equipment are ready and perform the final Go/No Go determination.

2. **Final Go/No-Go determination:** The RL will ensure all personnel and equipment are ready and perform the final Go/No Go determination (if there is ANY question of increased risk, abort).
3. **Camera and video check:** All camera and video monitoring equipment is operational and ready to record.
4. **Secure the area:** Ensure there is adequate security and crowd control in place, if necessary.
5. **Modify protective clothing and personal effects to minimize injury during the response event:** Remove rings from fingers or wear gloves, remove jewelry, tie hair back, check clothing for buttons or entangling points and modify as appropriate to reduce entanglement/tripping risks.
6. **Documentation:** The documentation person will ensure all photo and video equipment is on and recording.
7. **Timing of activities/events:** Record the time of day, time of each close approach and remote attempt, and beginning and ending of cutting time (from when the remote tool actually first cuts the line and when it finishes). Record number of remote attempts per hour and per response day.
8. **Location of animal and re-assessment:** The team (re-)locates the animal and approaches – initially maintaining some distance to observe. remotely assesses any changes in condition or entanglement. If the animal still needs intervention, RL will assess the environment, animal condition/entanglement, etc. and issue the Go/No Go order for operations.
9. **Drone deployment (optional):** A drone can be very helpful for visualizing the extent of the entanglement and planning the approach.

Figure 2. Vessel demonstrating the approach an animal for a remote disentanglement using a cutting tool mounted on a long handle. Note that the team members in this photo are not wearing life jackets/personal flotation devices, which is NOT recommended practice for actual interventions. ALL team members, especially those who will handle the tools and risk being pulled overboard if a took is caught on the dolphin, should wear personal flotation devices and other protective equipment. Photo courtesy of the Sarasota Dolphin Research Program.

SAFETY REMINDERS:

- Take the necessary time to fully evaluate the situation for the safest possible approach for personnel and the animal. If you or your team members are injured or worse, you will not be able to help the dolphins.
- Even seemingly immobilized small cetaceans can be very strong and unpredictable in their movements. Contact with a thrashing dolphin can cause serious injuries.
- At **no time** should any team member intentionally enter the water with the entangled animal.
- Be careful about lines wrapped around hands or fingers. All personnel should wear protective gloves. A quick, powerful movement by the animal that pulls on lines can cause serious injuries, or pull the rescuer into the water.
- All personnel operating the cutting gear or potentially tending lines on the animal should be wearing personal flotation devices (PFDs) and other appropriate protective gear (see section 2.7).

10. **Close approach and disentanglement:**
    - Observe the animal from a distance to get a sense of its movement patterns, and how you can approach it most appropriately to access the entanglement.
    - Fully assess the entanglement on the animal to determine how pressure on the entanglement(s) may exacerbate the situation or injury, for example, by pulling embedded lines deeper into tissues, pulling on line or hooks in the mouth, moving gear into contact with eyes or the blowhole, or applying inappropriate forces to flippers.
    - The remote disentanglement response vessel will approach quietly and calmly and position itself in the best position for the remote cutting tools to be deployed (cutting pool, cutting grapple, etc. – see tool section above).
    - Approach the animal slowly, from behind and to the side.
    - Clear communications between the cutter and boat driver are essential.
    - Do not extend the pole until you are approaching cutting range.
    - If possible, the cutter should be wearing a head-mounted Go-Pro or equivalent to document the entanglement and disentanglement.
    - Be aware of the possible dangers of the long-handled gear getting caught in the entanglement on the animal.
    - If possible, have at least 2 people other than the boat driver, one to use the cutting gear, and another to assist and tend lines.
    - Take photos and/or video of the entanglement, when possible.
    - Determine in advance of your approach which cut(s) will be most effective.
    - The first cut should be designed to make the greatest difference, as the team may not get more than one chance to approach.

- For wraps around the body, plan the cut for where there is sufficient space between the line/mesh and the body, such that you will not have to touch the body. You will probably not be able to get the tool under a wrap that is tight against the body, and the animal will respond vigorously and quickly to the touch.
- For entanglements that are trailing behind an animal, try to cut as close to the animal as possible, or at least try to cut off as much of the trailing biofouled gear as possible, to provide some measure of temporary relief to buy time for further planning.
- In some cases where multiple non-embedded strands are around an animal, cutting one strand may relieve pressure and allow the others to come off on their own.
- Avoid using the tool near the dolphin's face, eyes, or blowhole.
- In some cases, the tool may not cut completely through the gear, but remains attached to the gear on the animal. Be prepared to pull the animal to the boat and carefully complete the work with hand knives.
- If possible, place cushioning (e.g., boat cushions or PFDs) between the animal and the boat hull to reduce the possibility of injury from thrashing.
- If an approach is unsuccessful, back off and discuss with the team how best to approach again, if the animal is likely to allow another approach. If available, review the video.

11. **Monitoring and assessment:** Throughout the effort the behaviour and condition of the animal should be assessed for any signs of avoidance or abnormal behavior. Monitor the breathing (see Appendix B for a data form that can be used for this), swimming speed, and diving behavior of the animal during the deployment of the remote cutting tools. If the animal shows strong avoidance or aggressive behaviors give the animal a cool-down period of (e.g., 10-20 minutes).
12. **Data collection:** Record appropriate response data using appropriate forms (see Appendix A for examples from the USA that can be adapted).
13. **Monitoring post-disentanglement:** After the entanglement is removed, continue to monitor the animal from a safe distance for ~15 minutes to assess respiration rate, swimming, diving and general behavior prior to leaving the animal. Ideally, additional post-entanglement monitoring and photo/video-documentation of the animal will be conducted over the following days to weeks.
14. **Post-response debrief:** The entire team discusses the response, gives constructive feedback, and brainstorms on areas that need improvement. It is important to discuss as a team within 24 hours of the capture while memories of the event are fresh. Debrief notes should be added to the final report.
15. **Assessment and archiving of entangling materials:** Any materials that were removed from the animal should be carefully examined, photographed, and, if relevant, stored in the appropriate repository held by the authorities (see appendix C for examples).
16. **Disinfecting/disposal:** If protective reusable clothing (e.g., coveralls, footwear, PFDs) are soiled, they must be cleaned and disinfected before reuse. All contaminated reusable equipment and gear must be treated including cutting tools, specimen supplies, and other miscellaneous items (e.g., buckets, clipboards, writing implements, etc.).

17. **Submit reports:** Ensure all datasheets and reports are complete, appropriately reviewed by team members, and submitted where appropriate.
18. **Prepare again:** The gear is cleaned, packed, and organized for the next response.

4. ACKNOWLEDGEMENTS

Many people contributed information, protocols, photos, and expertise to the original NOAA Best Practices document. NOAA would like to especially like to thank the Sarasota Dolphin Research Program, Harbor Branch Oceanographic Institution, Florida Fish and Wildlife Conservation Commission, National Ocean Service, National Marine Mammal Foundation, SeaWorld Orlando, Erin Fougeres, Mandy Keogh, Blair Mase-Guthrie, Kim Raum-Suryan, Kristin Wilkinson, Jason Allen, Brian Balmer, Andrew Garrett, Randall Wells, and Eric Zolman.

This Adaptation was carried out by the original NOAA team, in collaboration with a volunteer intersessional working group formed by International Whaling Commission's Scientific Committee. The group was convened by Gianna Minton. Members included: L. Aranha, K. Baird, T. Genov, C. Kolesnikovas, M. Marmontel, D. Mattila, L. Porter, J. Renell, L. Rojas-Bracho, M. Simmonds, F. Trujillo, and R. Wells.

5. REFERENCES

Adimey, N.A., C.A. Hudak, J.R. Powell, K. Bassos-Hull, A. Foley, N. A. Farmer, L. White, K. Minch. (2014). Fishery gear interactions from stranded bottlenose dolphins, Florida manatees and sea turtles in Florida, U.S.A. Marine Pollution Bulletin 81:103-115.

Anderson, O.R., C.J. Small, J.P. Croxall, E.K. Dunn, B.J. Sullivan, O. Yates, A Black. (2011). Global seabird bycatch in longline fisheries. Endangered Species Res. 14:91–106.

Barco, S.G., L.R. D'Eri, B.L. Woodward, J.P. Winn and D.S. Rotstein. (2010). Spectra fishing twine entanglement of a bottlenose dolphin: A case study and experimental modeling. Marine Pollution Bulletin 60:1477–1481.

Barros, N.B., D.K. Odell, G.W. Patton, G.W. (1990). Ingestion of plastic debris by stranded marine mammals from Florida, Abstract. In: Shomura, R.S., Godfrey, M.L. (Eds.), Proceedings of the Second International Conference on Marine Debris, Honolulu, Hawaii, 2–7 April 1989, NOAA-TM-NMFS-SWFSC-154, pp. 531–539.

Baulch, S., and C. Perry. 2014. Evaluating the impacts of marine debris on cetaceans. Marine Pollution Bulletin 80:210-221.

Brownell RLJ, Reeves RR, Read AJ, Smith BD, Thomas PO, Ralls K, Amano M, Berggren P, Chit AM, Collins T, Currey R, Dolar MLL, Genov T, Hobbs RC, Kreb D, Marsh H, Zhigang M, Perrin WF, Phay S, Rojas-Bracho L, Ryan GE, Shelden KEW, Slooten E, Taylor BL, Vidal O, Ding W, Whitty TS, Wang JY (2019) Bycatch in gillnet fisheries threatens Critically Endangered small cetaceans and other aquatic megafauna. Endangered Species Research 40:285-296.

Coe, J.M. and Rodgers, D.B. (1997) Marine Debris: Sources, Impacts and Solutions. Springer-Verlag, New York, 432 p. http://dx.doi.org/10.1007/978-1-4613-8486-1Dau, B.K., K.V.K. Gilardi, F.M. Gulland, A. Higgins, J.B. Holcomb, J. St. Leger, M.H. Ziccardi. 2009. Fishing gear-related injury in California wildlife. J. Wildl Dis. 45, 355–362.

Eisfeld-Pierantonio SM, Pierantonio N, Simmonds MP. (2022) The impact of marine debris on cetaceans with consideration of plastics generated by the COVID-19 pandemic. Environ Pollut. May 1;300:118967. doi: 10.1016/j.envpol.2022.118967. Epub 2022 Feb 5. PMID: 35134431.

Gall, S. C., and R. C. Thompson. (2015). The impact of debris on marine life. Marine Pollution Bulletin 92:170-179.

Geraci, J.R., Lounsbury, V.J., & Yates, N. (2005). Marine Mammals Ashore: A Field Guide for Strandings. Second Edition. Baltimore Aquarium. 371pp.

Gorzelany, J. F. (1998). Unusual deaths of two free-ranging Atlantic bottlenose dolphins (*Tursiops truncatus*) related to ingestion of recreational fishing gear. Marine Mammal Science 14:614– 617.

Hamer, D.J., Minton, G., 2020. Guidelines for the safe and humane handling and release of bycaught small cetaceans from fishing gear, In: Secretariat, U.C. (Ed.), CMS Technical series, Bonn, Germany, 50pp. Available from: https://www.cms.int/en/publication/guidelines-safe-and-humane-handling-and-release-bycaught-small-cetaceans-fishing-gear

IWC. 2020 Report of IWC Workshop on Marine Debris: The Way Forward IWC/SC/68B/REP 3. 38pp. Available here: https://iwc.int/management-and-conservation/environment/marine-debris#:~:text=Training%20workshops%20also%20teach%20consistent,debris%20is%20another%20potential%20threat.

Gulland, F.M.D., Dierauf, L.A., Whitman, K.L. (Eds). (2018). CRC Handbook of Marine Mammal Medicine. 3rd Edition. CRC Press (Taylor & Francis), Boca Raton, Florida, USA. 1,124 pp.

Laist, D.W. (1997). Impacts of Marine Debris: Entanglement of Marine Life in Marine Debris Including a Comprehensive List of Species with Entanglement and Ingestion Records. In: Coe, J.M., Rogers, D.B. (eds) Marine Debris. Springer Series on Environmental Management. Springer, New York, NY. https://doi.org/10.1007/978-1-4613-8486-1_10

Lithner, D., Å. Larsson, and G. Dave. (2011. Environmental and health hazard ranking and assessment of plastic polymers based on chemical composition. Science of the Total Environment 409:3309-3324.

McHugh, K. A., Barleycorn, A.A., Allen, J. B., Bassos-Hull, K., Lovewell, G., Boyd, D., Panike, A., Cush, C., Fauquier, D., Mase, B., Lacy, R. C., Greenfield, M. R., Rubenstein, D. I., Weaver, A., Stone, A., Oliver, L., Morse, K., & Wells, R. S. 2021. Staying Alive: Long-term success of small cetacean interventions in southwest Florida. Frontiers in Marine Science, Section Marine Megafauna, Small Cetacean Conservation: Current Challenges and Opportunities, 7:624729. https://doi.org/10.3389/fmars.2020.624729

McLellan, W. A., Arthur, L. H., Mallette, S. D., Thornton, S. W., McAlarney, R. J., Read, A. J., & Pabst, D. A. 2015. Longline hook testing in the mouths of pelagic odontocetes. ICES Journal of Marine Science, 72(5), 1706-1713.

Norman, S.A., R.C. Hobbs, J. Foster, J.P. Schroeder, and F.I. Townsend. 2004. A review of animal and human health concerns during capture-release, handling and tagging of odontocetes. J Cetacean Res Manage 6(1):53-62.

Reeves, R.R., B.D. Smith, E.A. Crespo, G. Notarbartolo di Sciara. 2003. Dolphins, whales and porpoises: 2002–2010 conservation action plan for the world's cetaceans. Gland, Switzerland; Cambridge, UK:IUCN/SSC Cetacean Specialist, Group, 147p.

Rochman, C. M., E. Hoh, B. T. Hentschel, and S. Kaye. 2013a. Long-Term Field Measurement of Sorption of Organic Contaminants to Five Types of Plastic Pellets: Implications for Plastic Marine Debris. Environmental Science & Technology 47:1646-1654.

Stolen, M., W. Noke-Durden, T. Mazza, N. Barros, J. St. Leger. 2013. Effects of fishing gear on bottlenose dolphins (*Tursiops truncatus*) in the Indian River Lagoon system, Florida. Mar. Mamm. Sci. 29:356–364.

Teuten, E. L., J. M. Saquing, D. R. Knappe, M. A. Barlaz, S. Jonsson, A. Björn, S. J. Rowland, R. C. Thompson, T. S. Galloway, and R. Yamashita. 2009. Transport and release of chemicals from plastics to the environment and to wildlife. Philosophical Transactions of the Royal Society B: Biological Sciences 364:2027-2045. UNEP, 2009. Marine Litter: A Global Challenge. UNEP, Nairobi.

Wells, R.S., J.B. Allen, S. Hofmann, K. Bassos-Hull, D.A. Fauquier, N.B. Barros, R.E. DeLynn, G. Sutton, V. Socha, M.D. Scott. 2008. Consequences of injuries on survival and reproduction of common bottlenose dolphins (*Tursiops truncatus*) along the west coast of Florida. Mar. Mamm. Sci. 24: 774–794.

Wells, R.S., Fauquier, D.A., Gulland, F.M.D., Townsend, F.I., DiGiovanni, Jr., R.A. 2013. Evaluating postintervention survival of free-ranging odontocete cetaceans. *Marine Mammal Science*. 29(4): E463-E483.

Wells, R.S. 2018. Identification methods. Pp. 503-509 In: B. Würsig, J.G.M. Thewissen, and K. Kovacs, eds., Encyclopedia of Marine Mammals. 3rd Ed. Academic Press/Elsevier, San Diego, CA.

Wells, R. S., & Fahlman, A. 2024. Human impacts on dolphins: Physiological effects and Conservation. Pages 267-284 *in:* The Physiology of Dolphins. A. Fahlman and S. Hooker, eds. Elsevier. ISBN 978032390516

APPENDIX A – EXAMPLE OF DATA FORMS: USA 'LEVEL A' AND HUMAN INTERACTION FORMS

Level A forms, Human Interaction forms, and a complete and detailed examiners guide can be found online at: https://www.fisheries.noaa.gov/national/marine-mammal-protection/level-data-collection-marine- mammal-stranding-events.

MARINE MAMMAL STRANDING REPORT - LEVEL A DATA

FIELD #:_____ NMFS REGIONAL #:_____ (NMFS USE) NATIONAL DATABASE#: _____ (NMFS USE)

COMMON NAME:_____ GENUS:_____ SPECIES: _____

EXAMINER Name:_____ Affiliation: _____

Address:_____ Phone: _____

Stranding Agreement or Authority: _____

Report Type: ☐ Stranded ☐ Live entangled, in-water **CONFIDENCE CODE** (Check ONE): ☐ Unconfirmed Public Report ☐ Confirmed Public Report ☐ Confirmed by Network

INITIAL OBSERVATION ☐ Same Information for Level A Examination

DATE: Year:_____Month:_____Day: _____

First Observed: ☐ OnBeach/Land/Ice ☐ Floating ☐ Swimming ☐ Anchored

LOCATION: State:_____ County:_____City:_____
Body of Water:_____
Locality Details:_____
Lat (DD):_____._____N
Long (DD):_____._____W
☐ Actual ☐ Estimated

How Determined: (check ONE)
☐ GPS ☐ Map ☐ Internet/Software ☐Other_____

CONDITION AT INITIAL OBSERVATION (Check ONE)
☐ 1. Alive ☐ 4. Advanced Decomposition
☐ 2. Fresh Dead ☐ 5. Mummified/Skeletal
☐ 3. Moderate Decomposition ☐ 6. Condition Unknown

LEVEL A EXAMINATION ☐ Restrand Examined? ☐ YES ☐ NO

DATE: Year:_____Month:_____Day: _____

First Examined: ☐ OnBeach/Land/Ice ☐ Floating ☐ Swimming ☐ Anchored

LOCATION: State:_____ County:_____City:_____
Body of Water:_____
Locality Details:_____
Lat (DD):_____._____N
Long (DD):_____._____W
☐ Actual ☐ Estimated

How Determined: (check ONE)
☐ GPS ☐ Map ☐ Internet/Software ☐Other_____

CONDITION AT EXAMINATION (Check ONE)
☐ 1. Alive ☐ 4. Advanced Decomposition
☐ 2. Fresh Dead ☐ 5. Mummified/Skeletal
☐ 3. Moderate Decomposition

LIVE ANIMAL INFORMATION

INITIAL LIVE ANIMAL DISPOSITION (Check one or more)
☐ 1. Left at Site ☐ 5. Died at Site
☐ 2. Immediate Release at Site ☐ 6. Died during Transport
☐ 3. Relocated and Released ☐ 7. Euthanized
4. Disentangled ☐ 8. Transferred to Rehabilitation:
☐ a. Partially
☐ b. Completely
Date: Year: _____Month: _____Day:_____
Facility:_____
☐ 9. Other:_____

CONDITION/DETERMINATION (Check one or more)
☐ 1. Sick 7. Location Hazardous
☐ 2. Injured ☐ a. To animal
☐ 3. Out of Habitat ☐ b. To public
☐ 4. Deemed Releasable ☐ 8. Unknown/CBD
☐ 5. Abandoned/Orphaned ☐ 9. No Rehabilitation Options
☐ 6. Inaccessible ☐ 10. Other: _____

DEAD ANIMAL INFORMATION

CARCASS STATUS (Check one or more)
☐ 1. Frozen for Later Examination/Necropsy Pending
☐ 2. Left at Site ☐ 5. Landfill ☐ 8. Towed:
Lat_____Long_____
☐ 3. Buried ☐ 6. Incinerated ☐ 9. Sunk: Lat_____Long_____
☐ 4. Rendered ☐ 7. Composted ☐ 10. Unknown/Other_____

DEAD ANIMAL EXAM ☐ YES ☐ NO
☐ Photos Only ☐ External Exam ☐ Partial Internal Exam ☐ Complete Internal Exam
☐ Carcass Fresh ☐ Carcass Frozen/Thawed

CARCASS CODE AT EXAM ☐ Code 2 ☐ Code 3 ☐ Code 4

EXAMINED BY: _____
Date: Year:_____**Month:**_____**Day:**_____

PHOTOS/VIDEOS TAKEN: ☐ YES ☐ NO
Photo/Video Disposition:_____

MORPHOLOGICAL INFORMATION

SEX (Check ONE)
☐ 1. Male
☐ 2. Female
☐ 3. Unknown

ESTIMATED AGE CLASS (Check ONE)
☐ 1. Adult ☐ 4. Pup/Calf
☐ 2. Subadult ☐ 5. Unknown
☐ 3. Yearling

☐ Whole Animal ☐ Partial Animal

Straight Length:_____ ☐ cm ☐ in
☐ Actual ☐ Estimated ☐ Not Measured

Weight:_____ ☐ kg ☐ lb
☐ Actual ☐ Estimated ☐ Not Weighed

SAMPLES COLLECTED (Check one or more)
☐ 1. Histology ☐ 2. Other Diagnostics ☐ 3. Life History
☐ 4. Skeletal ☐ 5. Other _____

PARTS TRACKING (Check one or more)
☐ 1. Scientific Collection ☐ 2. Educational Collection
☐ 3. Other:_____

OCCURRENCE DETAILS

Was the Marine Mammal Human Interaction Report completed? ☐ YES ☐ NO

Findings of Human Interaction: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)
Evidence of:
1. Vessel Interaction ☐ YES ☐ NO ☐ CBD
2. Shot ☐ YES ☐ NO ☐ CBD
3. Fishery Interaction ☐ YES ☐ NO ☐ CBD
4. Entangled ☐ YES ☐ NO ☐ CBD
5. Ingestion ☐ GEAR ☐ DEBRIS ☐ NO ☐ CBD
6. Other Human Interaction: _____

If YES, what was the likelihood that the human interaction contributed to the stranding event?
☐ Uncertain (CBD) ☐ Improbable ☐ Suspect ☐ Probable

Gear/HI Items Collected? ☐ YES ☐ NO Gear Disposition: _____
Other Findings Upon Level A: ☐ YES ☐ NO ☐ Could Not Be Determined (CBD)
If Yes, Choose one or more: ☐ 1. Illness ☐ 2. Injury ☐ 3. Pregnant ☐ 4.Other: _____
How Determined (Check one or more): ☐ Photos Only ☐ External Exam ☐ Partial Internal Exam
☐ Complete Internal Exam (Necropsy) ☐ Other: _____

NOAA Form 89-864; OMB Control No 0648-0178; Expiration Date 06/30/2024

GE# _____

(NMFS Use)

Group Event: ☐ YES ☐ NO

If Yes, Type: ☐ Cow/Calf Pair ☐ Mass Stranding ☐ UME # Animals:_____☐ Actual ☐ Estimated

TAG DATA		ID#	Color	Type	Placement* (Circle ONE)	Applied	Present	Removed
Tags Were:								
Present at Time of Stranding (Pre-existing):	☐ YES ☐ NO				D DF L R LF LR RF RR V	☐	☐	☐
Applied during Stranding Response/Release:	☐ YES ☐ NO							
Applied during Rehabilitation/Release:	☐ YES ☐ NO				D DF L R LF LR RF RR V	☐	☐	☐
Absent but Suspect Prior Tag:	☐ YES ☐ NO							
					D DF L R LF LR RF RR V	☐	☐	☐
					D DF L R LF LR RF RR V	☐	☐	☐

* D= Dorsal; DF= Dorsal Fin; L= Left Lateral Body R= Right Lateral Body LF= Left Front; LR= Left Rear; RF= Right Front; RR= Right Rear; V= Ventrum

ADDITIONAL IDENTIFIER: _____ (If animal is restranded, please indicate any previous field numbers here)

ADDITIONAL REMARKS:

DISCLAIMER

THESE DATA SHOULD NOT BE USED OUT OF CONTEXT OR WITHOUT VERIFICATION. THIS SHOULD BE STRICTLY ENFORCED WHEN REPORTING SIGNS OF HUMAN INTERACTION DATA.

DATA ACCESS FOR LEVEL A DATA

UPON WRITTEN REQUEST, CERTAIN FIELDS OF THE LEVEL A DATA SHEET WILL BE RELEASED TO THE REQUESTOR PROVIDED THAT THE REQUESTOR CREDIT THE STRANDING NETWORK AND THE NATIONAL MARINE FISHERIES SERVICE. THE NATIONAL MARINE FISHERIES SERVICE WILL NOTIFY THE CONTRIBUTING STRANDING NETWORK MEMBERS THAT THESE DATA HAVE BEEN REQUESTED AND THE INTENT OF USE. ALL OTHER DATA WILL BE RELEASED TO THE REQUESTOR PROVIDED THAT THE REQUESTOR OBTAIN PERMISSION FROM THE CONTRIBUTING STRANDING NETWORK AND THE NATIONAL MARINE FISHERIES SERVICE.

PAPERWORK REDUCTION ACT INFORMATION

PUBLIC REPORTING BURDEN FOR THE COLLECTION OF INFORMATION IS ESTIMATED TO AVERAGE 30 MINUTES PER RESPONSE, INCLUDING THE TIME FOR REVIEWING INSTRUCTIONS, SEARCHING EXISTING DATA SOURCES, GATHERING AND MAINTAINING THE DATA NEEDED, AND COMPLETING AND REVIEWING THE COLLECTION OF INFORMATION. SEND COMMENTS REGARDING THIS BURDEN ESTIMATE OR ANY OTHER ASPECT OF THE COLLECTION INFORMATION, INCLUDING SUGGESTIONS FOR REDUCING THE BURDEN TO: CHIEF, MARINE MAMMAL AND SEA TURTLE CONSERVATION DIVISION, OFFICE OF PROTECTED RESOURCES, NOAA FISHERIES, 1315 EAST-WEST HIGHWAY, SILVER SPRING, MARYLAND 20910. NOT WITHSTANDING ANY OTHER PROVISION OF THE LAW, NO PERSON IS REQUIRED TO RESPOND, NOR SHALL ANY PERSON BE SUBJECTED TO A PENALTY FOR FAILURE TO COMPLY WITH, A COLLECTION OF INFORMATION SUBJECT TO THE REQUIREMENTS OF THE PAPERWORK REDUCTION ACT, UNLESS THE COLLECTION OF INFORMATION DISPLAYS A CURRENTLY VALID OFFICE OF MANAGEMENT AND BUDGET (OMB) CONTROL NUMBER.

Marine Mammal Human Interaction Report

Exam Information *(fill in or circle most appropriate)*

1 Field #: _____ Species: _____

2 Examiner: _____ Recorder: _____

3 Date of exam: _____ Condition code (at exam): 1 2 3 CBD

4 Preservation: alive fresh frozen frozen/thawed Body condition: emaciated not emaciated CBD

5 Documentation: digital print slide video Image disposition: _____

6 Integument : normal abnormal decomposed % Skin missing: <10% 10-25% 25-50% >50%

7

Explanation of terms:
YES = I have examined the area and/or found signs of this pathology, natural marking, or human interaction
NO = I have examined the area and/or did not find signs of this pathology, natural marking, or human interaction
CBD = I have examined the area and could not determine whether there were signs of human interaction (*i.e.* the part was missing, degraded, or signs were ambiguous)
NE = I did not examine the area
NA = this animal doesn't normally have that part (*i.e.* seals have no peduncle, dolphins have no rear flippers)

	WHOLE BODY EXAM	YES	NO	CBD	NE	NA	Image taken
8	External pathology *(pox, tattoo lesion, abscess, fungal patches)*						
9	Natural markings *(scars, tooth rakes, unusual pigmentation)*						
10	Appendage(s) removed / Mutilation *(with instrument)*						
11	Pelt removed / Mutilation *(with instrument)*						
12	Body sliced / Mutilation *(with instrument)*						
13	Gear / Debris present on animal *(including tags)*						
14	Gear / Debris retained *(name & contact info in Comments)*						
15	HI lesions *(fishery, gunshot, propeller, healed HI scar, brand)*						

16 Predation / scavenger damage *(circle all anatomical areas where damage hinders evaluation; numbers coincide with anatomical areas below)*: 17 18 19 20 21 22 23 24 25 26 27 28 29 NONE

FILL IN TABLE FOR **ALL POSSIBLE FINDINGS OF HI**
Do not use for natural markings/pathology.

						Type of Lesion					Origin of Lesion									
											Gear- Line			Gear/Debris			Other			
	DETAILED EXAM OF ANATOMICAL AREAS	YES	NO	CBD	NE/NA	Impression/ Laceration	Penetrating wound	Healed HI scar	Abrasion	Other / CBD	Twine / line	Net	MO/MU/CBD*	Hook	Packing Band	Other / CBD	Propeller	Gunshot	Other / CBD	Image taken?
17	Rostrum/snout																			
18	Mandible																			
19	Head and/or neck																			
20	L Front appendage																			
21	R Front appendage																			
22	L Body																			
23	R Body																			
24	Dorsum/dorsal fin																			
25	Ventrum																			
26	Peduncle																			
27	L Rear appendage																			
28	R Rear appendage																			
29	Flukes/tail																			

* If Gear-Line is the lesion origin, mark the MO/MU/CBD column: "MO" for monofilament, "MU" for multifilament, and "CBD" if the type of line cannot be determined

NOAA Form 89-864; OMB Control Number 0648-0178; Expiration Date: 06/30/2024 IFAW & VAQS (2012)

Field #:_____

	INTERNAL EXAM Date _____	YES	NO	Partial	CBD	Image taken	Detailed Info *(circle all that apply)*
30	Internal exam conducted				■	■	*Details in Comments section -use line number*
31	Bruising/blunt trauma			■			*Details in Comments section -use line number*
32	Skeleton examined				■		*Details in Comments section -use line number*
33	Broken bones present			■			*Associated tissue reaction: YES NO CBD*
34	Mouth/GI tract examined *(circle contents)*				■		*intact prey partially digested hard parts only* ***debris/gear*** *empty other*
35	Lungs/bronchi examined				■		*Details in Comments section -use line number*
36	Lung/bronchi contents			■			*froth fluid air* (color:)
37	Bullet/projectile found			■			*found using: CT X-ray dissection (collected? Y N)*
38	Other lesions noted			■	■		*Details in Comments section -use line number*

39 **Comments** (*note line number from left margin before each comment*):

40 **Findings of Human Interaction:** ☐YES ☐NO ☐CBD

(Exam Type: ☐ Photos Only ☐ External Exam ☐ Partial Internal Exam ☐ Complete Internal Exam (necropsy))

41
☐ Entanglement (gear__ debris__ CBD__) ☐ Vessel trauma (sharp__ blunt__ both__)
☐ Hooking (recreational__ commercial__ CBD__) Gunshot ☐ Mutilation
☐ Ingestion (gear__ debris__ CBD__) ☐ Harassment ☐CBD/Other_____

42 **Stranding Event History/Circumstances:**

43 **INITIAL HUMAN INTERACTION EVALUATION:** If you marked YES above (line 40) evaluate the external exam, necropsy, carcass condition and circumstances surrounding the stranding event to answer the question below. *Remember to be conservative in your subjective evaluation.*
What is the likelihood that the finding of human interaction (line 40), contributed to the stranding event?

0: Uncertain (CBD) 1: Improbable 2: Suspect 3: Probable

44 **Justification:**

Final human interaction evaluation requires additional data from level B and C analyses as well as review by experts (e.g. a veterinary pathologist)

Example of a *Steller sea lion disentanglement form* that could be adapted for small cetaceans (provided by Protected Resources Division, NMFS Alaska Region and Alaska Department of Fish and Game Steller sea lion program).

STELLER SEA LION DISENTANGLEMENT FORM

Date: **ADF&G No:** **NMFS No:**

RESPONDERS:
1. Name of vessels and responders in each during darting:
2. Responders on shore:
3. Veterinarian:

CONDITIONS
1. Sea state: 2. Wind direction and speed: 3. Other:

ENTANGLEMENT
1. Location of haulout/rookery: 2. Location of animal: 3. Distance of animal to water: 4. Other:
5. Type of entanglement:
- Description of entanglement:
- Entangling material:

DARTING
1. Age and gender estimation:
2. Initial size estimate kg: lbs:

Drug	Dose range for size(mg)	mg given	ml given
Medetomidine			
Butorphanol			
Midazolam			
0.9 % NaCl			

3. Darter: Stalk time:
4. Time drugs mixed: Time drugs into dart:
5. Size of dart: Size of needle:
6. Time dart pressurized and loaded into gun: 7. Distance to animal: Pressure loaded:
8. Location of darter (underline): *on shore* *on water*
9. Orientation of darter's line of sight to animal:
10. Time of shot:
11. Dart placement (underline): *right side* *left side* *neck* *shoulder* *thorax* *abdomen* *flank* *hip*
12. Other:
13. Reaction to dart (underline): *startled* *looked* *moved* *none* *stayed on haulout* *went into water and tracked* *went into water and lost*
14. Additional behaviors:
15. Number animals in immediate vicinity: Number animals alerted: Number animals flushed into water:
17. Time of capture: Behavior:

DISENTANGLEMENT PROCEDURES
1. Entanglement (underline): *flasher removed* *neck entanglement removed*
2. Description of event:
3. Other: A. Morphometrics: B. flipper tags applied/location/number: C. hair dye applied/location:
D. sat tag applied/location: E. skin sample/location: F. hair sample/location:
G. whisker/location: H. antibiotic/location/volume: I. hot branding:

MONITORING
1. Start time: End time:
2. Beginning RR: Ending RR:
3. Beginning CRT: Ending CRT:
4. Beginning temp: Ending temp:
5. Other:

Time	BPM	CRT (sec)

REVERSAL AND RECOVERY
1. Time of reversal: 2. Location of injection:
3. Reversal drug dosage:
Atipamezole mg: ml:
Naltrexone mg: ml:
Flumazenil mg: ml:
4. Time to full recovery:
5. Behavior:
6. Dart (underline): *retrieved* *lost* Remaining volume of drugs in dart:
7. Other:

DOCUMENTATION:

FOLLOW UP:

APPENDIX B – RESPIRATION RATE FORM

DATE:	**OBSERVER NAME:**

NOTIFY VETERINARY STAFF IF:

- Animal holds breath one min or longer.
- Respiration rate is greater than 8 breaths/minute.
- Breathing sounds “unusual” (not full, deep, smooth) or if breathing is only “partial” (*i.e.* exhalation only)

HOUR	**MIN**	**SEC**	**START/END OF ALL PROCEDURES/COMMENTS**

APPENDIX C: EXAMPLES OF REMOTE DISENTANGLEMENTS OF BOTTLENOSE DOLPHINS BY THE SARASOTA DOLPHIN RESEARCH PROGRAM

Prepared by Randall Wells and Aaron Barleycorn
(all photos taken under NOAA/National Marine Fisheries Service MMPA Permits)

Dolphin: FB03
Date: June 4, 1996
Location: Sarasota Bay, Florida
Entanglement Description: 484 m of 80-pound-test floating core Dacron "squidding" recreational fishing line, trailing behind the flukes, with numerous balls of line acting as sea anchors. See photo below.
Disentanglement Gear Used: Boat hook and pocket knife. We were able to hook the line with the boat hook, pull the dolphin alongside the boat, and cut/remove all but a few strands on the fluke. The remaining strands came off soon on their own.
Fate of Dolphin: Successful disentanglement, with full recovery. Photos of the fluke one year later taken during a health assessment show complete healing of entanglement sites on the leading edge of the fluke. The dolphin was observed frequently over the next 7 years.

Dolphin: FB28
Date: June 22, 2007
Location: Sarasota Bay, Florida
Entanglement Description: Monofilament fishing line extending from dorsal fin to fluke, and trailing behind.
Disentanglement Gear Used: Long-handled cutting tool. A cut of the line between the dorsal fin and fluke led to the remaining line coming off on its own.
Fate of Dolphin: Successful, complete, disentanglement; the dolphin was observed frequently over the next 8 years.

Dolphin: C797 (yearling calf of FB79)
Date: June 17, 2011
Location: Sarasota Bay, Florida
Entanglement Description: Multiple recreational fishing gear entanglements over much of the body, with some embedded in tissues, fish hook in mouth.
Disentanglement Gear Used: Long-handled cutting tool. The cutting blade broke while pulling on the line, but the remaining boat hook portion secured the line and the dolphin was brought to the boat, where all of the gear and hooks were removed (see photo below), and the extremely emaciated calf was released and swam back strongly to its nearby mother.
Fate of Dolphin: Five days later, the mother was seen without the calf; the calf is presumed to have died.

Dolphin: Dit (UFMARTt2313)
Date: August 9, 2023
Location: Cedar Key, Florida
Entanglement Description: Calf was entangled in plastic mesh associated with clam farming, beginning to embed in its body.
Disentanglement Gear Used: Working with the Cedar Key Dolphin Project and the University of Florida Marine Animal Rescue team, we were able to use a long-handled grappling tool to remove the mesh from the calf's body.
Fate of Dolphin: The gear-free calf has been observed on multiple occasions post-intervention, doing well.

Dolphin: 2094 (2-yr-old calf of F209)
Date: January 11, 2023
Location: Sarasota, Florida
Entanglement Description: Recreational fishing line embedded in flukes and trailing behind several meters, with much biofouling, acting as a sea anchor.
Disentanglement Gear Used: The long-handled cutting tool was able to remove about 2 m of the biofouled trailing line (see photo below). Unfortunately, the rest of the line remained on the fluke, acquiring additional biofouling materials.
Fate of Dolphin: The calf ceased using its fluke as the remaining line acquired more biofouling, drafting mom instead for forward movement, and leading to the need for a catch-and-release rescue on February 21, 2023. The rescue was successful, the calf has regained full use of its fluke, and it has been observed frequently over the year since its rescue. At the very least, the remote disentanglement reduced the severity of the continuing injury and bought time to mount a catch-and-release rescue.