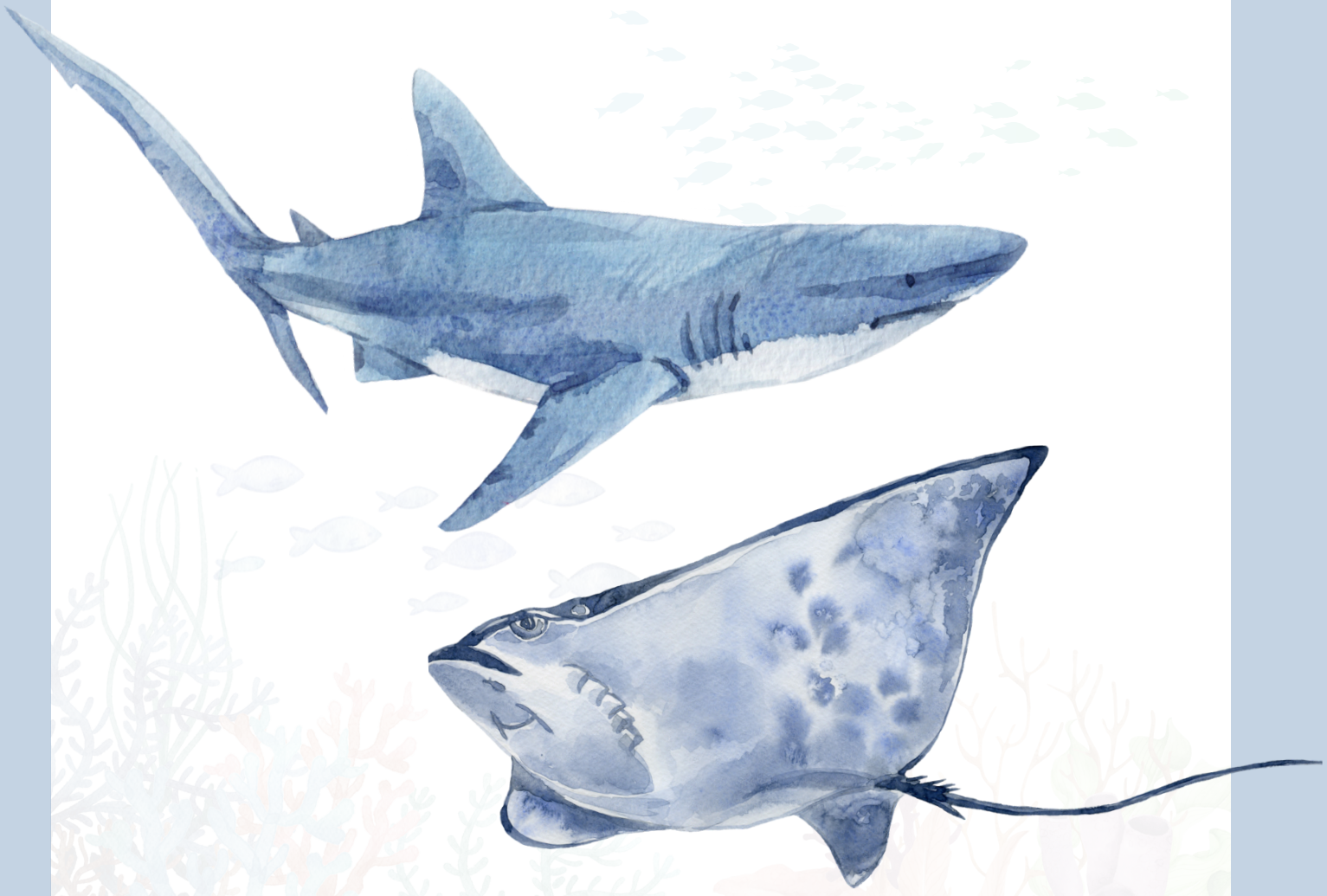
SHARKLAB supported by UN environment programme | Mediterranean Action Plan Barcelona Convention | SPA/RAC | MINISTERO DELL'AMBIENTE E DELLA SICUREZZA ENERGETICA

Handle with CARE

Guidelines for safe handling and release of sharks, skates and rays



SHARKLAB *supported by*

This brochure, **"Guidelines for the Safe Handling and Release of Sharks, Skates, and Rays"**, was prepared under the auspices of UNEP/MAP – SPA/RAC and MASE, as part of their support to the implementation of the 2024–2025 Work Programme of UNEP MAP - Barcelona Convention. The work was developed with the financial support of the Global Environment Facility (GEF) through the FishEBM MED project.

Author: Andrej A. Gajić, Ph.D. (res.vet.med.), Lead scientist at Sharklab ADRIA

Photos: Andrej A. Gajić, Emina Karalić / Sharklab ADRIA

Illustrations: Vincent Roberts / Sharklab ADRIA, Canva Pro license and DALL·E 3

Publisher: Sharklab ADRIA Research center and rehabilitation clinic

Supported by: UNEP MAP Barcelona Convention (SPA/RAC

The Italian Ministry of Environment and Energy Security (MASE)

The Albanian Ministry of Environment and Tourism

Contact e-mail: agajic@sharklab-adria.org

URL: www.sharklab-adria.org

Understanding the factors determining the survival outcomes

The survival of sharks, skates, and rays after capture is influenced by a complex interaction of biological traits, capture conditions, and handling practices. Recognizing these factors is critical to improving post-capture survival, ensuring sustainable fisheries and conservation outcomes.

GEAR TYPE

The type of fishing gear directly determines the degree of physical trauma (e.g., crushing, abrasion) and capture-related (exertional or trauma-induced) stress.

DURATION

Gear time in the water is a key predictor of survival. Long tows/soak times elevate stress, increase lactic acid, induce hypoxia, and reduce recovery capacity after release.

DEPTH

Depth of capture significantly influences survival, as rapid ascent can induce barotrauma (e.g., gastric eversion), with internal hemorrhage and severe stress.

AIR EXPOSURE

Air exposure induces immediate oxygen deprivation, disrupting gill perfusion and gas exchange, and causing ocular and dermal damage.

TEMPERATURE

Sudden temperature changes induce thermal shock, elevate metabolic demand, and intensify hypoxia, severely compromising recovery potential.

HANDLING

Improper handling causes severe skeleto-muscular trauma (e.g., vertebral and mandibular fractures), extensive dermal abrasion, and internal organ injury.

BIOLOGY

Intrinsic traits such as body size, reproductive status, metabolic rate, and ecological niche affect how individuals respond to capture stress.

Handle the Animal Right Way

Correct handling is essential for enhancing the post-release survival and reducing stress or injury. Use wet hands or gloves, support the body evenly, and keep time out of water minimal. Never lift by head, eyes, gills, or spiracles - hold securely below the pectoral girdle and at the base of the tail, or by pectoral fin and tail whenever possible.

- Stay calm to avoid injury
- Support the body evenly and minimize the handling time
- Gently return the animal to the water

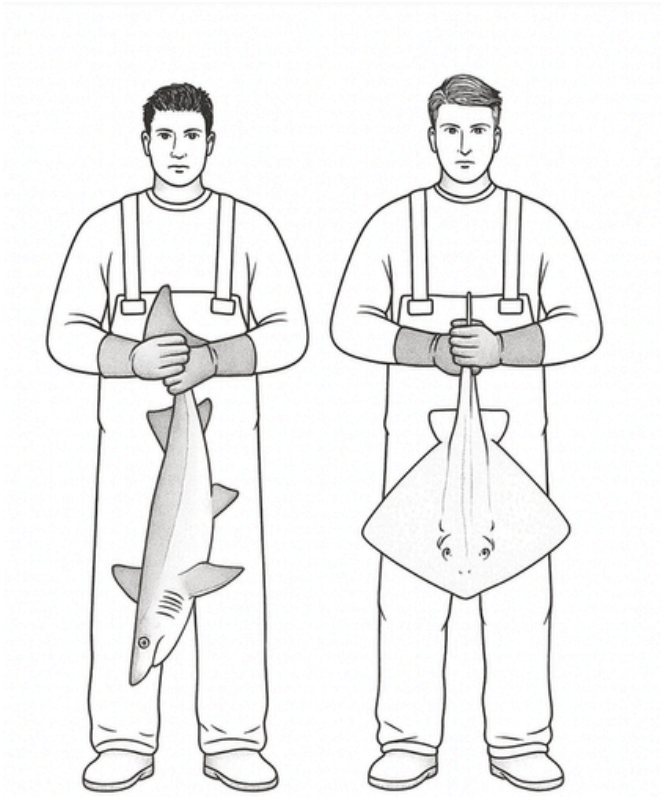
Don’t Harm the Animal Or Yourself

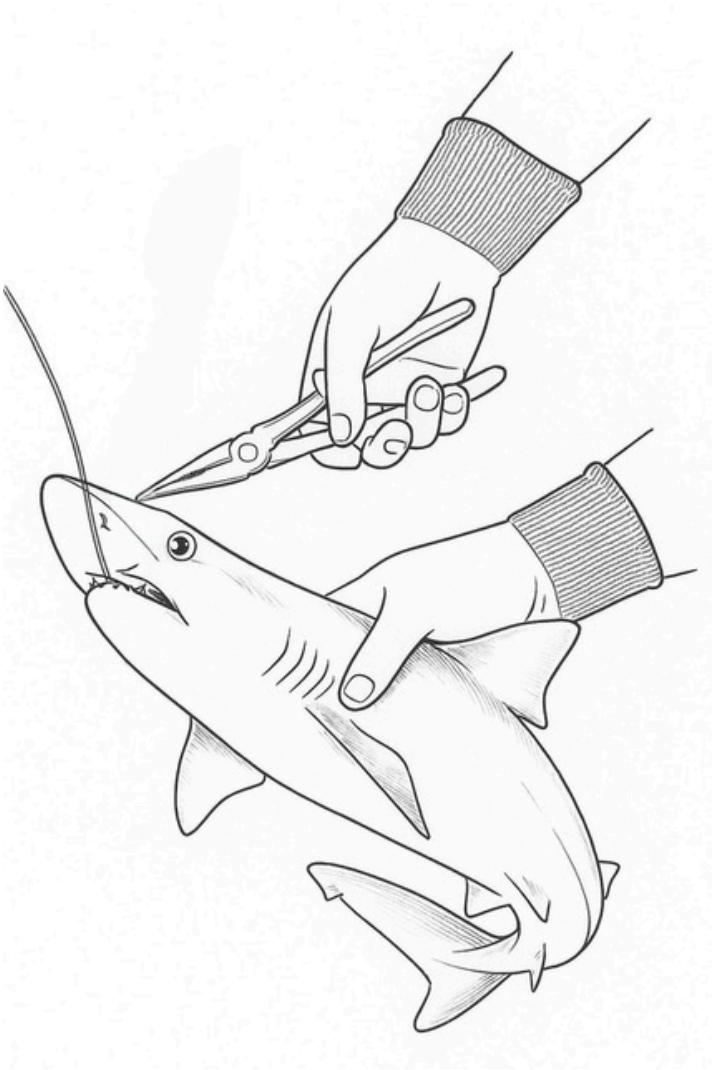
Improper handling can cause direct mortality in elasmobranchs and serious injury to the handler.

- Never touch or insert fingers or tools into the mouth and gill openings.
- Never handle or lift the animal by the spiracles - this can cause internal injury to the arches and disrupt normal respiration.
- Do not press on the abdomen, which can damage internal organs.
- Do not lift stingrays by the tail; their spine can whip forward.

DO’s

DON’Ts





How to Remove the Hook ?!

- Work quickly but calmly; minimize handling and keep the animal in the water whenever possible.
- Always use appropriate tools (long-nose pliers, de-hookers, line/bolt cutters) rather than improvised objects.
- Never insert fingers into the mouth, spiracles or gills; use tools to maintain safe distance.
- Never lever or wrench the hook against the jaw — as this causes fractures and severe avulsions.
- Support the body evenly. For sharks, control just behind the head and at the tail base. For rays, avoid the tail spine.
- Assess the hook position: if shallow gently back the hook out, if deep - do not attempt to rip free.

HANDLING SMALL SHARKS

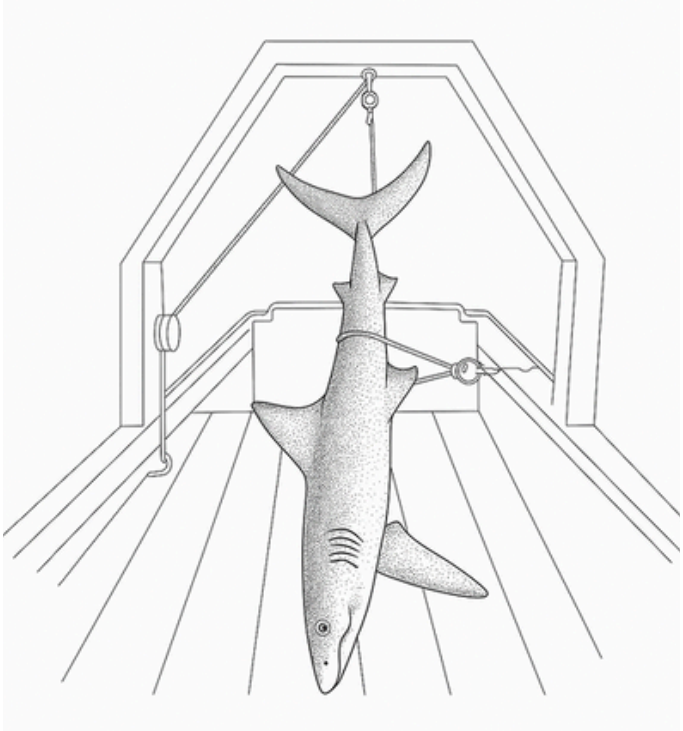
Stabilize by placing one hand gently on the back while removing the hook, keeping the animal supported in the water at all times, if possible.

Caution! Even small sharks can bite suddenly. Be aware of strong, unexpected tail movements that may injure you or cause the animal to slip from your hands.

SPECIAL CONSIDERATIONS

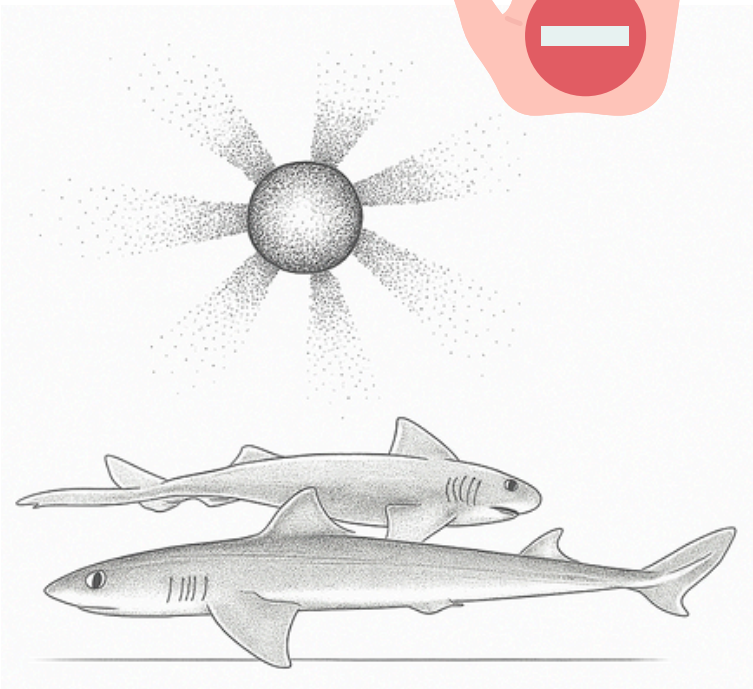
If the hook cannot be removed safely, cut the leader as close as possible to the hook. Leaving part of the hook is less harmful than tearing the tissue.

Most modern hooks corrode within weeks; leaving a deep hook is preferable to lethal removal attempts.



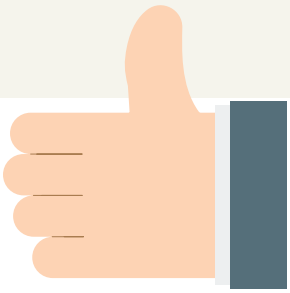
Never lift or drag the animal by the tail

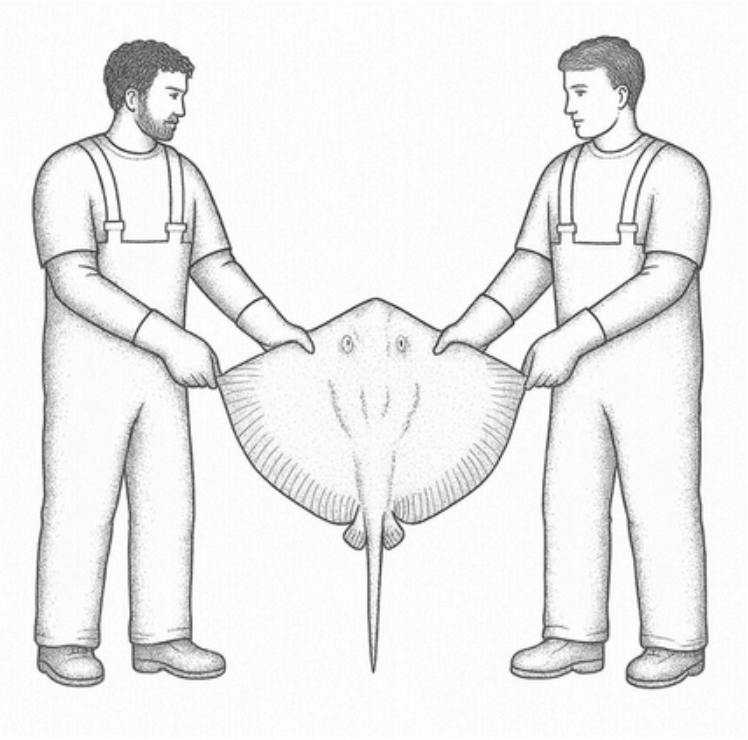
Sharks and rays should never be lifted by the tail or dragged across surfaces, as such handling can cause internal trauma, including spinal dislocations, skeleto-muscular tears, and damage to vital organs.



Never leave the animal exposed to sun or heath

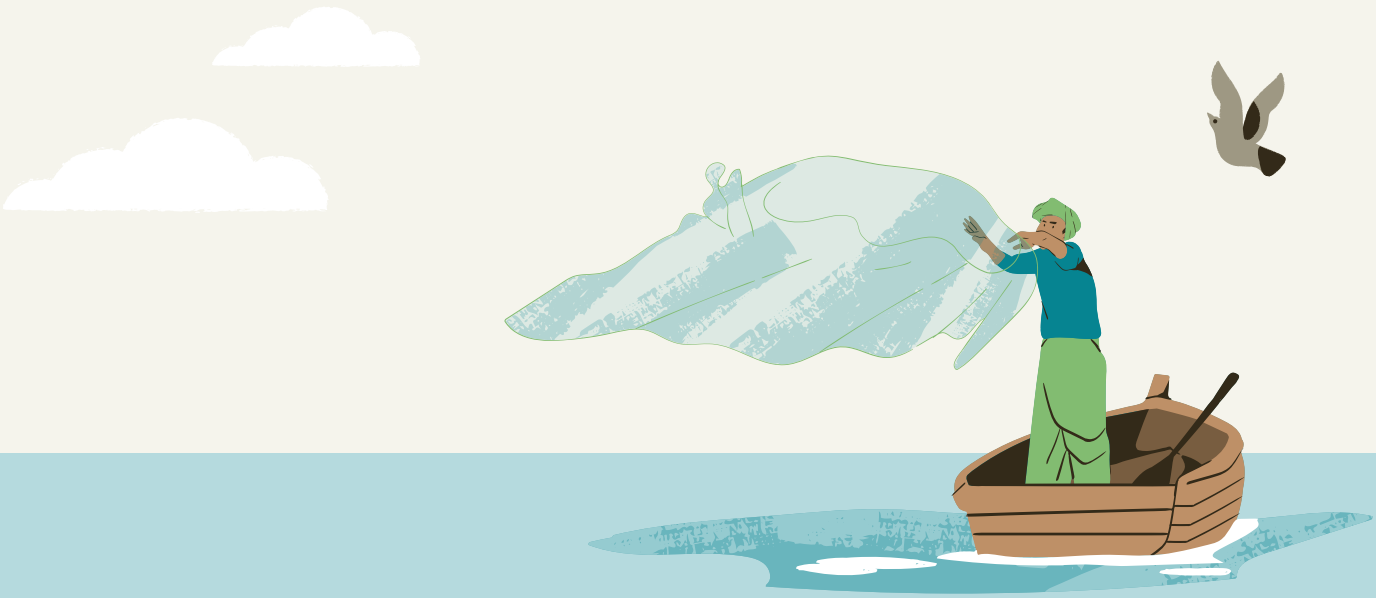
Exposure to sun or elevated temperatures can rapidly induce thermal shock. The gills are especially vulnerable, as drying during sun exposure can impair gas exchange, leading to respiratory failure and death.





Handling the large skates and rays

Approach cautiously from the front or side, avoiding the tail at all times. Never drag the ray by the tail or over rough surfaces. Support the body evenly under the pectoral discs. Never squeeze the abdomen or touch the spiracles. If entangled, carefully cut only visible net or line without pulling near the mouth, gills, or spiracles. When releasing, lower the ray gently back into the water, allowing it to recover and swim away on its own. Do not throw or push forcefully.



Trawl fisheries

- Prioritize the separation and release of all elasmobranchs before processing the target catch, whenever possible. Prolonged retention of sharks and rays at the surface severely reduces their survival probability.
- Remove entangled netting carefully, avoiding mouth, gills, and spiracles.
- For large individuals, use release doors, chutes, or ramps when available; avoid throwing the animal overboard as it might cause internal damage.
- NEVER pull the animal by the head, mouth, gills, or spiracles - instead, lift gently by supporting the body evenly, as previously outlined.
- NEVER drag sharks or rays across the deck or hot/dry surfaces as this causes severe internal trauma and damage to eyes, gills and skin.

Longlines

- Keep sharks in water whenever possible; do not haul onto deck.
- Use especialised tools (e..g, long-handled cutters or dehookers) to remove or cut gear close to the hook, depending on the situation.
- Avoid gaffing, tail-lifting, or dragging; instead, control with tail rope if necessary for safety.
- If hook removal exceeds a few minutes, monitor respiration! Keep water flowing over gills. Always release sharks head-first into water.
- Never attempt to rip out deep or gut-hooked gear – cut leader as close as possible.

Purse seine

- Detect and release early: if sharks are observed during gear retrieval, release them before the final sack-up stage to minimize stress and injury.
- Reduce net tension when sharks are entangled; prioritise cutting the mesh strands rather than pulling animal through.
- Use cargo nets, canvas slings, or release ramps to lift and return/release large sharks smoothly and with no risks for the crew.
- Avoid retrieving the animal on deck whenever possible. If on deck, support body evenly; keep wet and release immediately.
- NEVER lift animal by its mouth, gills or spiracles. When needed, lift the animal by supporting the body evenly, as previously outlined.

Gillnets

- For entangled sharks/rays, prioritise cutting the netting around the body rather than pulling it as this can cause serious damage.
- Keep animals wet during disentanglement, follow the handling protocols and return to water as quickly as possible.
- If animal is alive but exhausted, hold in water until it shows strong swimming before release whenever possible
- Do not insert hands in gills or mouth; use tools and protective gloves. Support disc (for rays) or body evenly; never lift by tail or spiracles.
- Never pull or yank sharks out of the net and never throw animals onto the deck as this can cause fatal internal damage, particularly in rays.

General practices for safe releasing of sharks and rays

Correct release is just as important as correct capture and handling. By minimizing stress, both fishers and scientist can greatly improve the survival of sharks and rays after tagging or accidental capture.

Whenever possible, do not lift the shark or ray onto the boat or shore. Handle as little as possible and to only what is absolutely necessary.

Always keep the animal upright and avoid bending its body. Do not push the animal backwards, as the water must enter the gills from front to back.

Whenever possible, lower the animal into deeper water. Once the animal is active and swimming on its own, release gently and monitor swimming.

If you suspect gravidity, never press on the abdomen — pressure can injure developing embryos or fetuses and also cause premature abortion.

The safer and quicker the release, the higher the survival chances

Never keep the animal out of water longer than necessary — even short air exposure can trigger hypoxia and tissue damage.

Never drag the animal over nets, ropes, or hard surfaces, especially when on abdomen, as this can damage skin and also cause (severe) internal injuries.

Never throw nor forcefully push the animal back into the water as impact trauma or disorientation can prevent recovery.

Do not release in very shallow water, surf or near rock, as animals may strand or re-injure themselves, significantly reducing survival outcomes.

Correct handling of small stingrays caught as trawler bycatch during brief examination prior to release. Photo: Mirjana Momirović / Arte TV / Sharklab ADRIA

FURTHER READING ON SPINY BUTTERLY RAY

Gajić, A., & Karalić, E. (2024). Rediscovery and urgent conservation needs for the critically endangered Spiny butterfly ray (*Gymnura altavela*) in the Adriatic Sea. *Animal Conservation*, 27, 581-584.

Gajić, A., Karalić, E., Beširović, H., & Sulikowski, J. (2023). The first record of gravid Spiny butterfly ray (*Gymnura altavela*) in the northern Mediterranean, with description of near-term foetuses. *Journal of Fish Biology*, 102(6), 1506 - 1509.

Understanding trauma and injuries caused by fisheries is essential to identifying the factors that limit post-capture survival in sharks and rays. By integrating this knowledge into management frameworks, it becomes possible to design more effective conservation strategies, reduce bycatch mortality, and promote animal welfare. Ultimately, such insights are critical for ensuring both the sustainability of fisheries and the long-term persistence of vulnerable elasmobranch populations.

From capture to revival: clinical examination, controlled rehabilitation and release

Upon arrival at Sharklab ADRIA center, each shark undergoes a standardized clinical evaluation that includes a external examination, assessment of visible trauma, and application of the Reflex Action Mortality Predictor (RAMP) to determine overall condition and predict survival likelihood.

RAMP scores are standardized yes/no tests of reflexes that correlate with survival probability:
1. Righting response: the animal immediately rights itself vs. sluggish or no response
2. Evasion response: strong tail beat or active attempt to escape vs. weak or absent movements
3. Buoyancy test: maintaining equilibrium vs. loss of balance, rolling, or sinking
4. Ocular response: normal eye movement or nictitating membrane reflex vs. absence of reaction
5. Bite response: jaw closure or movement following gentle oral stimulation vs. no reflex response
6. Spiracle/gill irrigation response: regular, rhythmic ventilation vs. irregular or absent movement

Post-assessment, sharks are transferred to tanks equipped with controlled aeration, temperature regulation, advanced sump filtration, and reduced light levels to mimic natural habitat and minimize stress. During the treatment, species-specific rehabilitation protocols are applied, with treatment plans adjusted according to clinical findings and overall condition.

A. Gajić conducting final clinical assessment of an adult angular rough shark (*Oxynotus centrina*) upon full rehabilitation at the Sharklab ADRIA research center and clinic, photo: E. Karalić.

Adult Angular rough sharks successfully rehabilitated at the Sharklab ADRIA research center and clinic after being retrieved from commercial trawlers operating at depths of 150–450 m, off Vlore, Albania. The sharks were landed in severe clinical decline, fully rehabilitated and subsequently monitored to evaluate post-release survival. Photo: A. Gajić / Sharklab ADRIA

Surgical retrieval and in-vitro rehabilitation of fetuses from deceased gravid females

In cases where gravid females are retrieved dead from fisheries, viable near-term fetuses (in placental viviparous, histotrophic, or oophagous species) or embryos (in lecithotrophic viviparous species) may be surgically removed, rehabilitated, and released to maximize conservation outcomes. The procedure involves a mid-ventral incision and the careful extraction of each fetus with minimal trauma using bandage scissors, followed by immediate transfer to controlled rehabilitation tanks. Extraction method depends primarily on the stage and reproductive mode. Within the tanks, in-vitro incubation protocols replicate natural conditions, ensuring stable temperature, ossmotic pressure, salinity, and dissolved oxygen. Individuals are continuously monitored, with manual tube-feeding applied when spontaneous feeding is delayed or absent. Regular clinical examinations (external inspection, reflex testing, and physiological assessments) are conducted to evaluate growth, health, and survival potential. As development progresses, juveniles are gradually acclimated to natural prey and environmental enrichment. Once independent feeding, normal reflexes, and strong swimming are achieved, animals are released into suitable habitats. Survival seems to be species- and reproductive-mode dependent.

The basic overview of protocols for surgical retrieval and fetal in-vitro rehabilitation

1. Retrieve gravid female as soon as possible after death.
2. Perform mid-ventral incision with sterile tools (22 or 24 blade recommended) and carefully extract embryos/fetuses with bandage scissors to minimalize trauma.
3. Transfer immediately to artificial uterine fluid or conditioned seawater.
4. Place in incubation chambers allowing fluid exchange but preventing trauma; and use soft, non-abrasive surfaces to avoid pressure ulcers.
5. Maintain stable conditions: temperature, salinity, dissolved oxygen, ammonia; and monitor continuously; ensure filtered, oxygenated water flow.
6. Record developmental progress and growth, observe yolk sac absorption (if relevant).
7. If feeding is delayed, provide manual or tube-feeding with suitable diet keeping in mind that this is highly sensitive step and is species-specific.
8. Conduct regular and detailed clinical checks: external inspection, reflex tests, and wider health assessments. Adapt gradually to seawater conditions.
9. Define release criteria: independent feeding, strong swimming, normal reflexes; and release only into species-appropriate habitat (depth, prey availability).

Near-term fetuses of the vulnerable blackspotted smooth-hound (*Mustelus punctulatus*) in a quarantine tank. At Sharklab ADRIA, they are stabilized for up to seven days before release into natural nursery areas during SCUBA diving. Photo: A. Gajić.

Tube-feeding with an appropriate diet of a near-term fetus of the critically endangered spiny butterfly ray (*Gymnura altavela*) at the Sharklab ADRIA research center and rehabilitation clinic, following the first fecal discharge. Photo: A. Gajić.

De-hooking injuries and post-capture survival following longline capture

Recent study (Gajić & Martin, 2025) provides the first empirical evidence that small benthic sharks caught as bycatch can exhibit long-term survival despite sustaining severe traumatic injuries, resulting from improper handling during de-hooking. Blackmouth catsharks (*Galeus melastomus*) were observed with healed and partially healed mandibular fractures and soft tissue avulsions directly attributable to longline capture. These individuals not only survived but resumed normal feeding and reproductive activity, demonstrating a capacity for resilience even after extensive trauma. Nevertheless, survival is not universal. Another study (Gajić & Sulikowski, 2024) emphasize that while some species might have high mortality rates due to capture-related stress, physiological collapse, or cumulative injury. Together, these studies underscore the urgent need for standardized, species-sensitive handling and release protocols.

Gajić, A., & Martin, A. G. (2025). The first evidence of long-term survival of the deep-sea Blackmouth catshark (*Galeus melastomus*) following release from bottom longline fisheries. *Fisheries Management and Ecology*, 32(5), 349-353.

Gajić, A., & Sulikowski, J. (2024). From rarity to reality: the hidden abundance of critically endangered deep-sea little gulper shark (*Centrophorus uyato*) in the southern Adriatic Sea. *Mediterranean Marine Science*, 25(3), 641-649.

Healed and partially healed traumatic mandibular fractures with soft tissue avulsions in catshark caused by de-hooking from bottom longlines. Photos: A. Gajić/Sharklab ADRIA

Vulnerability of deep-sea sharks to bottom trawl fisheries

Recent study (Gajić, 2024) revealed that the poorly known sharpnose sevengill shark (*Heptranchias perlo*) captured in deep-sea trawl fisheries suffered extensive trauma and exceptionally high mortality, underscoring its vulnerability to capture stress. Likewise, another study (Gajić, 2025) on the vulnerable kitefin shark (*Dalatias licha*) demonstrated immediate or near-immediate mortality following trawl capture, even in cases where no obvious internal lesions were detected, suggesting that physiological disruption alone can be fatal. These findings confirm that certain deep-sea sharks are unable to withstand the combined impacts of capture-related stress, gear-induced trauma, and handling. Mortality in these species is driven by a cascade of factors, including different stress, metabolic exhaustion, and asphyxiation.

Gajić, A. (2025). Documenting the first neonate and juvenile rare deep-sea kitefin shark (*Dalatias licha*) in the Adriatic Sea, with insight into fishery-induced trauma. *Environmental Biology of Fishes*, In press.

Gajić, A. (2024). Exploring the elusive deep-sea sharpnose sevengill shark (*Heptranchias perlo*) in the Adriatic Sea: novel records, health assessments and conservation implications. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 34(3), e4122.

Deep-sea bycatch from a single trawler at 600 m off Vlore, Albania, including *Dalatias licha*, *Etmopterus spinax*, *Heptranchias perlo*, *Galeus melastomus*, *Dipturus oxyrinchus*, *and Chimaera monstrosa*. Photo: Sharklab ADRIA.

SHARKLAB

www.sharklab-adria.org

Research center and rehabilitation clinic
for sharks, skates and rays

Program supported by UNEP MAP - Barcelona Convention (SPA/RAC) and Italian Ministry of Energy Security and Environment (MASE)