

# BEST RELEASE PRACTICES MANUAL

FOR REEF FISH &  
RELATED SPECIES



**RETURN'EM  
RIGHT**





## Introduction

*The safe handling and release of recreationally caught fish is essential to supporting healthy fish populations. Although an individual angler may catch and release relatively small numbers of fish each time they go fishing, millions of saltwater recreational anglers in the Gulf of Mexico collectively account for a significant portion of total fishing effort. The cumulative impact is millions of reef fish discarded each year, with a substantial portion of them dying upon release.*

### **This manual is intended to:**

- 1.** Provide a standard set of best release practices that anglers can use to increase survival of discarded reef fish, specifically in and around the Gulf of Mexico.
- 2.** Provide fisheries managers and outreach experts with best release practices that are grounded in science and guided by anglers to be used in future education and outreach efforts.

Fishing techniques and conditions vary across the region, and anglers control the choices they make on fishing trips. Return 'Em Right hosted a workshop to identify best practices related to different aspects of a fishing trip, such as preparing for it, selecting a fishing location, effectively handling and releasing fish, dealing with encounters with predators, and concluding the trip. This manual provides detailed guidelines on making informed decisions at each of these stages, accommodating the diverse fishing techniques and conditions found across the region.

## Background

Environmental, management, and legal issues have inspired a greater focus on the reduction of release mortality in the past couple of decades:

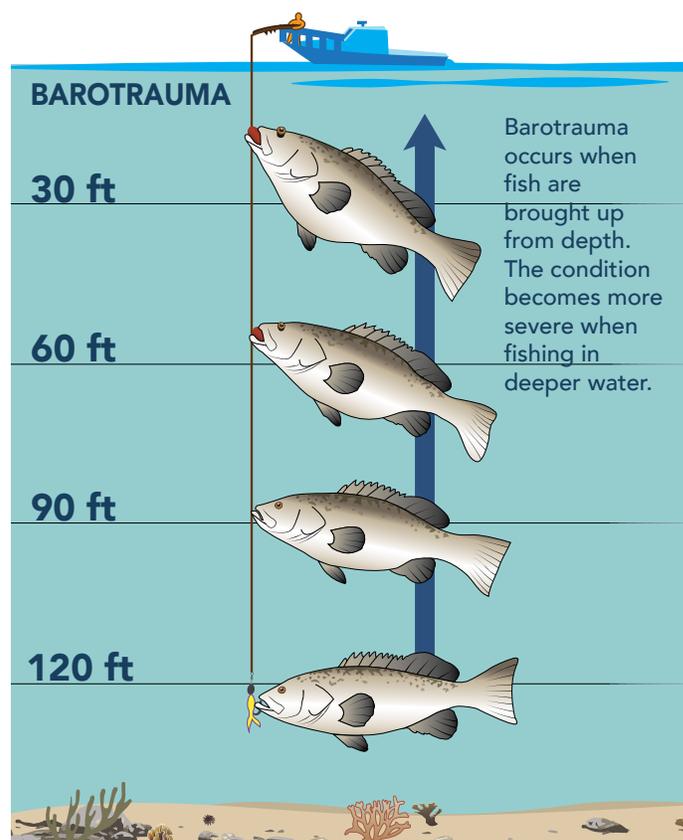
- Increased fishing effort and efficiency and related management changes, including the use of annual catch limits, has resulted in increased regulatory discards.
- The 2010 *Deepwater Horizon* oil spill injured many reef fish, including a variety of grouper and snapper species. Oil spill settlement funds support several programs, such as **Return 'Em Right**, that are designed to restore injured species (Open Ocean TIG, 2019).
- The U.S. Congress recognized the need to safely handle and release fish when it passed the Direct Enhancement of Snapper Conservation and the Economy through Novel Devices Act of 2020 (DESCEND Act), which requires anglers in the Gulf of Mexico to have a venting tool or descending device rigged and ready to use when fishing for reef fish.

As part of an overall effort to ensure safe handling and release practices, the Gulf of Mexico Fishery Management Council hosted a workshop in 2019 to create an action plan for the recreational fishery to promote the use of barotrauma mitigation tools, enhance data collection efforts, and incorporate the results into stock assessments and management (GMFMC 2019). This was followed up in December 2021, when Return 'Em Right sponsored a workshop for recreational for-hire captains, private recreational anglers, managers, and scientists in St. Petersburg, Florida. The workshop was designed to begin the process of developing a set of standard best practices for handling and releasing recreationally caught fish. The overall goal was to:

1. Determine the major decision points that anglers are likely to encounter during a fishing trip,
2. Determine actions that anglers can take to improve a fish's chance of survival upon release, and
3. Produce a manual with the results of the workshop.

Scientists and managers, often in collaboration with anglers, have studied the impacts of catch-and-release. Reef fish experience changes in barometric pressure as they are brought to the surface from depth. This pressure change causes gasses trapped in the swim bladder to expand and can result in internal injuries and

mortality (Benaka et al., 2016; Campbell et al., 2010; Davis, 2002; Rummer and Bennett, 2005). Injuries including displacement or compression of internal organs, which may manifest as external protrusion, stomach eversion, ruptured swim bladder, and bulging eyes, are referred to as barotrauma (Rummer and Bennett, 2005). In general, and for a given species, fish retrieved from deeper depths suffer higher degrees of injury. Barotrauma can impair reflexes and reduce the ability of the fish to return to depth, increasing the fish's exposure to surface stressors such as higher temperatures and predation (Campbell et al., 2010; Collins et al., 1999, Davis, 2002; Diamond et al., 2011).



Credit: Florida Sea Grant

Over the past 10 years, various studies have examined post-release survival and barotrauma in reef fishes. Curtis et al. (2015) compared survival of red snapper released off Texas using venting, non-venting, and descending treatments over three seasons and two depths, and found that fish released using venting and descending tools had higher survival rates than non-treated surface-released fish. Another study found that descender devices benefitted red snapper released off North Carolina (Runde et al., 2021). The benefits of descender devices are not restricted to red snapper.

For example, studies have shown substantial increases in post-release survival for descended black sea bass (Rudershausen et al., 2023), Pacific rockfishes (Wegner et al., 2021), and several species of deepwater groupers (Runde and Buckel 2018; Runde et al., 2020).

In addition to focusing on the effects of release practices, some scientists have focused on angler decision-making related to releasing fish experiencing barotrauma. Scyphers et al. (2013) surveyed recreational and tournament anglers and found that two-thirds of anglers vented fish they released offshore and perceived venting to be effective for improving survival rates. Crandall et al. (2018) used an online survey to learn that anglers used venting tools more often than descending devices due to perceptions that descending devices were more time-consuming, difficult to use, and expensive. In addition, Curtis et al. (2019) found that angler preference for using descending devices increased following distribution of devices to anglers. A survey of Southeast Florida and South Carolina anglers, conducted for the Nature Conservancy by the survey firm Responsive Management, revealed that anglers consider the following factors when deciding to use venting or descending devices: obvious signs of barotrauma, depth of water where the fish was caught, the type and size of fish caught, and the presence of predators (Responsive Management 2022).

Researchers have also found that descending devices are not always equally effective across species. A study by Bohaboy et al. (2020) indicated that red snapper released with descending devices had significantly lower discard mortality within the first two days after release, whereas descending devices had no significant effect on discard mortality of gray triggerfish. Research has also focused on a related and controversial release mortality topic: predation during fish release. Anglers often believe that descended fish are eaten by sharks and other predators (Drymon and Scyphers 2017). Drymon et al. (2020) also found that the use of descender devices did not increase opportunities for predation in an artificial reef area off Alabama, and Runde et al. (2022) determined that predation on reef fish released with descender devices was uncommon off North Carolina.

### **In general, release mortality can depend on a variety of factors, including:**

1. Angler knowledge, which can come from research, on-the-water experience, and practices of fellow anglers.
2. Decisions made by anglers (e.g., fishing location, type of gear used) before and during a fishing trip.
3. Environmental conditions (e.g., sea surface temperature).
4. Physiology of captured fish (Burns and Restrepo 2002).
5. Biological conditions of the environment (presence of other species/predators).



# Decisions Made on Angling Trips

Effective catch and release is situational, so best practice guidance cannot be prescriptive. Rather, it should focus on presenting anglers with the information necessary to make decisions based on individual situations.

A fishing trip generally consists of the following decision points:

1. Preparing for a fishing trip.
2. Choosing a fishing location.
3. Fighting fish.
4. Handling and releasing fish.
5. Encountering predators.
6. Wrapping up a trip.

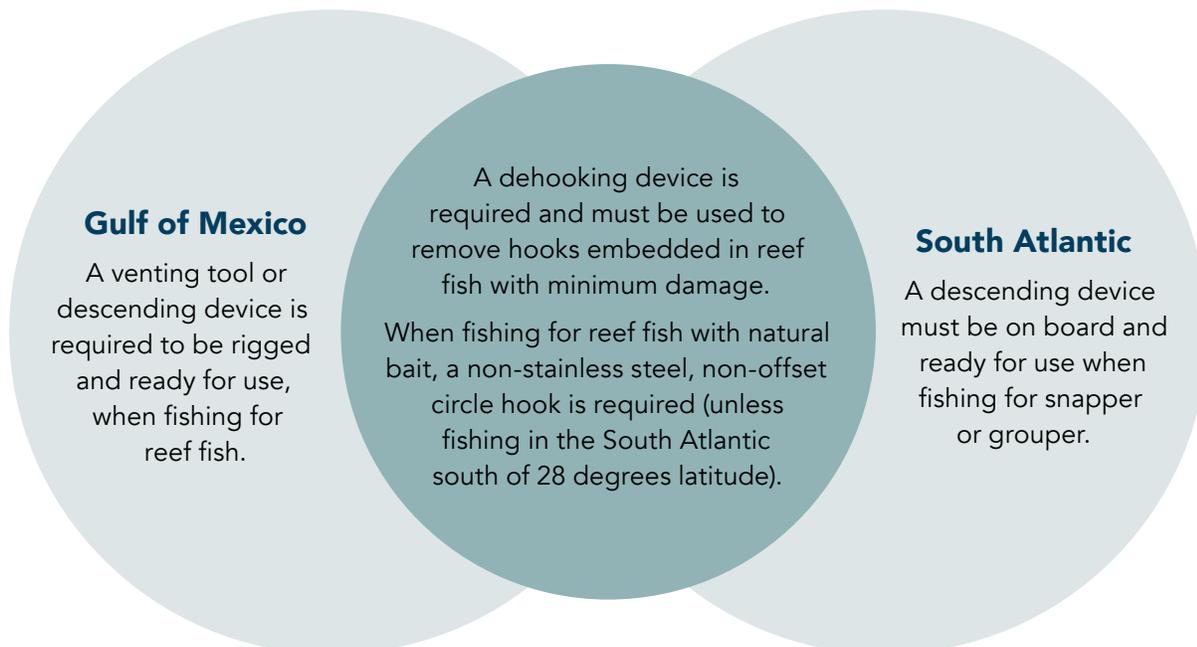
The following sections present best practices related to each of these stages of a fishing trip.



# 1. Preparing for a Fishing Trip

**Anglers can take multiple steps prior to a trip so they are prepared to use best release practices and increase their chances of a successful trip:**

- Set expectations for the type of trip that you plan to embark on. A successful fishing trip can include varying definitions: Do you aim to fill the freezer? Do you aim to catch dinner? Or is the trip primarily for the experience of fishing? Considering these possibilities can set reasonable and conservation-minded expectations.
- Understand federal regulations related to releasing fish<sup>1,2</sup> (see diagram below)
- Ensure the boat is equipped with proper gear, including:
  - Release gear, such as lip grips, descending devices, weights, designated rods for descending fish, venting tools, heavy tackle, dehookers, and nets.
  - Fishing tackle and bait appropriate for the target species. Keep in mind that usage of various types of bait and tackle might help reduce or eliminate catch of non-target species. This gear may encompass various hook sizes and styles, including barbed or barbless; line types; weights; and even rod and reel packages, including smaller rod and reel combinations for smaller anglers. Larger hooks (e.g., 8/0 or 9/0 circle hooks) in particular may decrease the chance of catching undersized fish.
- Utilize training resources (e.g., at [returnemright.org](https://returnemright.org)) to ensure proper use of venting and/or descending gear.
- Ensure proper licenses and endorsements for desired target species are onboard.
- Know which species can be targeted and their associated regulations. An app such as Fish Rules provides all the rules and regulations, including seasonal and spatial closures that could influence the number of fish that would need to be released on a fishing trip.
- Plan how to handle and release non-target species that may be caught at a given fishing destination, as well as how best to take photos (if desired) in a way that minimizes time out of water and handling stress.



1 50 C.F.R. § 622.188 (2023)

2 50 C.F.R. § 622.30 (2023)

# 1. Preparing for a Fishing Trip (cont.)



## Additional best practices for operators of for-hire vessels when preparing for a trip.

- Preparing guests for trips via website videos, reminder email messages, pre-trip seminars, and phone calls.
- Defining and setting trip expectations and empowering guests to be responsible for their own catch or to follow protocols set by the crew.
- Educating guests on regulations including seasons and limits, as well as why fish should be released as quickly as possible.
- Providing novice anglers with additional assistance catching fish and teaching them best release practices.
- Acknowledging differences in approaches for charter boat (customized with more client input) versus headboat trips (pre-planned trips where the captain selects target species and location), and the best release practice implications for both kinds of trips.
- Participating in or even creating a training program for captains and first mates to help them effectively demonstrate knowledge of best release practices in conjunction with hospitality and customer satisfaction experiences.



### Descending Device

- Is an instrument capable of releasing a fish at the depth from which the fish was caught.
- Must be rigged and ready for use when fishing.
- Is a weighted hook, lip clamp, or box that will hold the fish while it is lowered to depth.
- Must have a minimum of a 16-ounce weight and a minimum length of 60 feet of line attached to the descending device.

### Venting Tool

- Must be capable of penetrating the abdomen of a fish to release the excess gasses accumulated in the body cavity when a fish is retrieved from depth.
- Must be a sharpened, hollow instrument that allows air to escape, such as a hypodermic syringe with the plunger removed.
- Must be, at minimum, a 16-gauge needle, which has an outside diameter of 0.065 inches.

**Note:** A tool that is not hollow, such as a knife or an ice pick, does not meet the requirements of a venting tool.



## 2. Choosing a Fishing Location

Once anglers have prepared for their fishing trip, they will need to choose their fishing location, either before departing the dock or soon thereafter. Fishing location affects which fish you will encounter and impacts how you can effectively release fish.

### Best practice recommendations when choosing a fishing location include:

- Make an initial stop in shallower waters. This may serve to pace your harvest and increase the likelihood of survival upon release because thermoclines will be less pronounced. It will also allow inexperienced anglers a chance to fish at a slower pace and better learn best practices for handling and release before proceeding to a location where fishing activity and catches may be more intense.
- Consider relocating to other locations if catching too many fish that must be released (due to size, wrong species, excessive presence of predators, etc.) or catching fish experiencing barotrauma at a higher rate than those being kept.

What to consider	Why it matters
<b>Target species</b>	Some areas will be more likely to produce non-target species that will have to be discarded
<b>Length of the fishing trip</b>	Pacing your anticipated harvest may reduce the number of discards
<b>Depth of fishing</b>	It may not be necessary to fish deep to catch certain fish; when possible, fish for your target species in shallower depths or higher up in the water column to reduce impacts of barotrauma
<b>Presence of Predators</b>	Reducing interactions with predators should result in less predation
<b>Season and water temperature</b>	In hotter weather, reduced dissolved oxygen and/or a more pronounced thermocline can increase the chances or severity of barotrauma

## 3. Fighting Fish

Once an angler hooks a fish, they can choose how intensely to fight it. Anglers should consider ways to minimize injury and maximize post-release survival when they are fighting a hooked fish. Because most reef fish experiencing barotrauma are unable to release gasses during ascent, there is no benefit to bringing those fish to the surface slowly. In addition, it is important to keep in mind that the larger the fish, the longer the potential fight time, which can have implications for release mortality due to increased stress, elevated oxygen demand, and exhaustion (Boyle et al., 2022).

### General recommendations for minimizing injury and maximizing survival include:

- Use single-hook rigs to limit the number of fish caught at once and minimize fight time to reduce the stress experienced by multiple fish during the fight.
- Do not fish from a rod holder as unattended hooks often lead to gut-hooking and increased mortality.
- Plan for an efficient, fast fight to get the fish to the boat as quickly as possible to minimize stress to the fish, as well as chances for a predator to attack the fish. Using appropriate reel settings (drag tension, high gear ratio, etc.), or possibly an electric reel, and appropriate line types, can decrease fight time.
- Identify the catch as it comes up and decide its fate as soon as possible.



### Additional best practices for operators of for-hire vessels fighting fish:

- If fishing on a multi-passenger boat where lines may become tangled, ask other anglers near the hooked fish to reel up their lines and avoid entanglement that could prolong the fight.
- Captains should provide clients with simple instructions on how best to reel in fish. Captains also should communicate with deck hands so that they can assist clients when fish need to be unhooked.

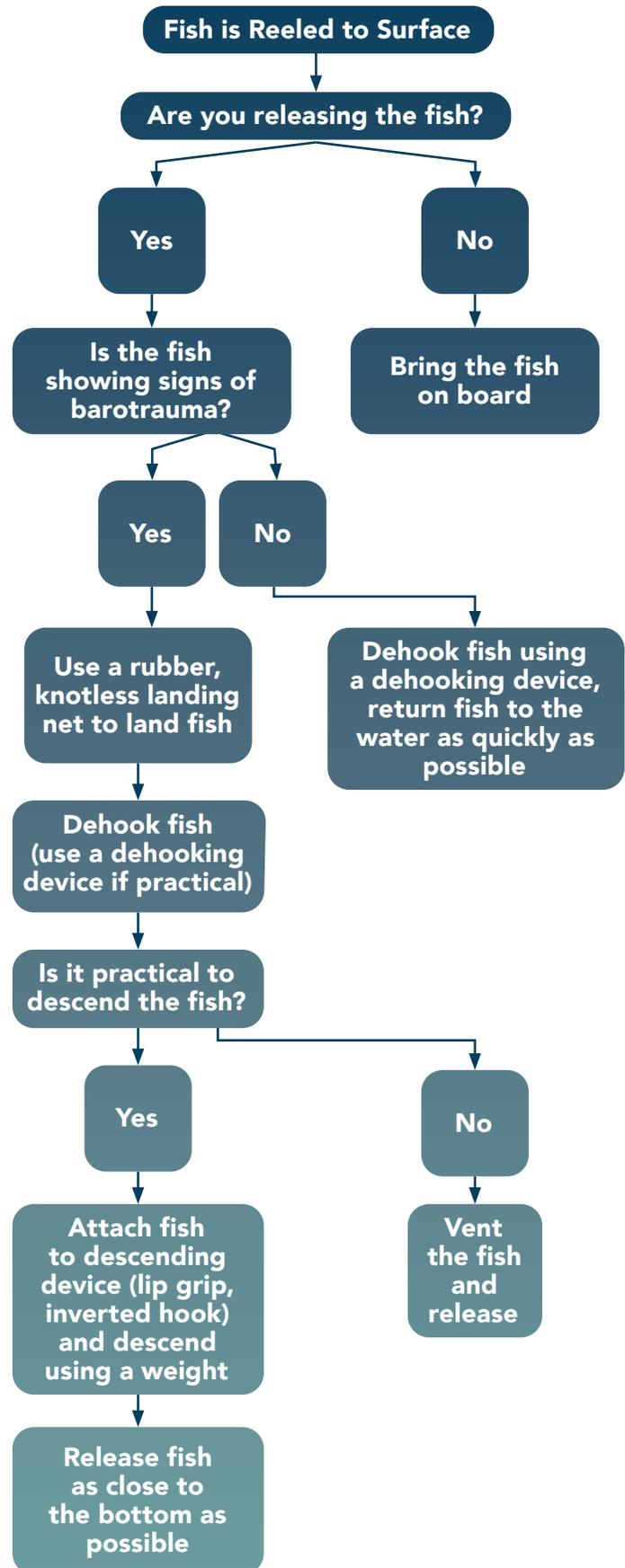


## 4. Handling and Releasing Fish

The next important decision point on a fishing trip is deciding what to do when a hooked fish is reeled to the surface. It is important to identify the fish as soon as possible, keeping in mind current bag limits and seasons, as well as how many of that species you already have in your possession, so you do not waste valuable time trying to figure out whether you can or should keep the fish. If you are going to keep the fish, then the method for bringing a hooked fish onto the boat is not so important.

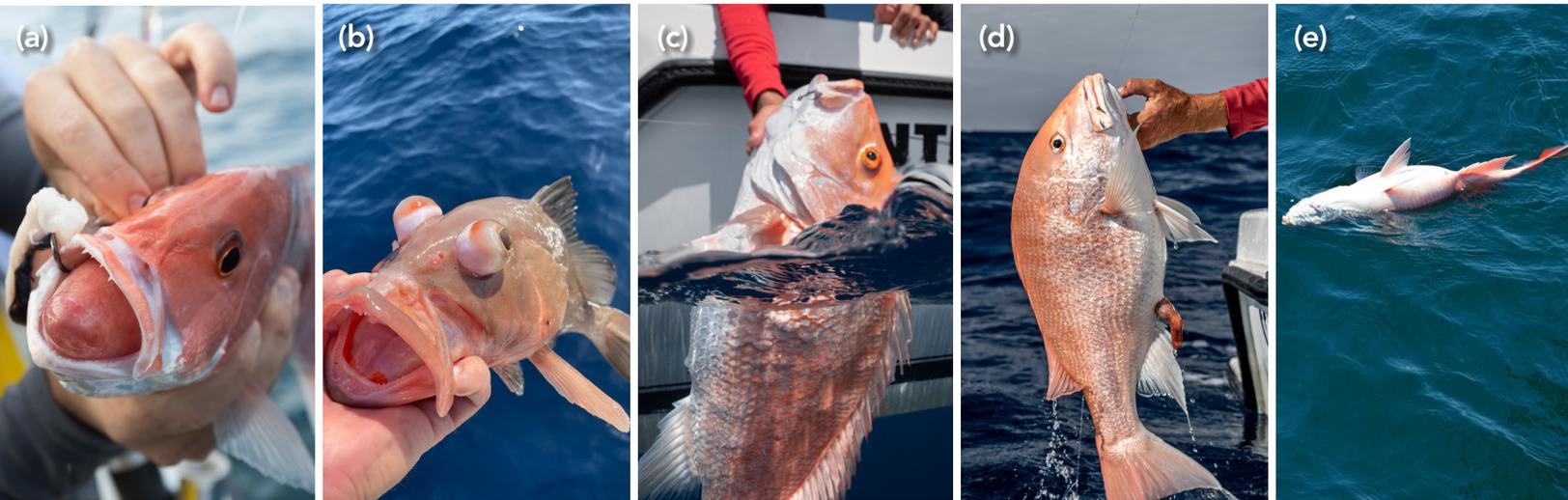
**However, if you need to bring the fish on board because you are unsure if you can keep it:**

1. Do not gaff the fish. Rather, use a rubber, knotless landing net to land the fish.
2. Have your measuring equipment available and ready beforehand. If you need to measure the fish, measure it on a wet surface.
3. If possible, use wet gloves, or wet hands if no gloves are available, to handle the fish.
4. Avoid placing your hands or fingers under a fish's gills when lifting or holding down a fish to measure or vent it, because this can damage the gills. Instead, use a lip grip device when handling fish.
5. If the fish is gut-hooked, do not yank the hook out. Simply cut the line as close to the hook as possible.



## 4. Handling and Releasing Fish (cont.)

If you plan to release the fish, take a moment to assess whether it is exhibiting signs of barotrauma. The two most important things to remember when releasing a fish are to minimize handling and get the fish back in the water quickly.



*Barotrauma symptoms include the following: (a) protruding stomach, (b) bulging eyes, (c) bubbling scales, (d) distended intestines and (e) swollen belly*

### What to do if a fish **IS NOT** exhibiting signs of barotrauma:

- Use a dehooking device to release the fish as quickly as possible. However, even if a fish taken from deep water is not showing signs of barotrauma, it still may be helpful to descend the fish. This should only be considered if it can be done quickly.

Descending in the absence of evidence of barotrauma can be helpful for a couple of reasons:

- Barotrauma can be present even if external signs are not obvious.
- Releasing a fish close to the bottom can help reduce the risk that a predator will eat the released fish.
- Lip-attached descending devices can flush water over a fish's gills and help the fish to recover before it is released, which is similar to revival techniques used in inshore and freshwater fishing (e.g., see Robinson et al., 2015).

### What to do if a fish **IS** exhibiting signs of barotrauma:

- Dehook the fish using a dehooking device, when appropriate.
- Decide whether it's more appropriate to vent or descend the fish. Note: You should not need to do both when using the proper amount of weight to descend.

When done properly, both descending and venting can increase survival upon release; however, descending is preferred because it is less invasive and promotes long-term survival of released fish (Bohaby, 2020; Runde et al., 2021; Stallings et al., 2023).



## 4. Handling and Releasing Fish (cont.)

### If you decide to vent:

1. Lay the fish on its side on a cool, wet surface.
2. Lay down the pectoral fin, which marks the location to vent the fish (two or three inches past the base of the pectoral fin).
3. Follow the trailing edge of the pectoral fin and slide a sharp, hollow needle device under a scale at a 45-degree angle to pierce the fish's swim bladder. Listen for a hissing sound, similar to the sound of a tire losing air.
4. Once you hear the hissing sound, stop inserting the venting tool. Once the hissing sound stops, remove the needle and release the fish head-first into the water.

*Venting should be used when descending is not possible (for example, when too many anglers are on a boat or too many fish are being caught at the same time) and should only be done after proper training (i.e., at [returnemright.org](https://returnemright.org)).*



### Descending

#### Pros

- Less potential for injuring the fish.
- Documented reversal of barotrauma symptoms during descent.
- Quick descent can protect fish from predators by releasing them close to habitat.

#### Cons

- Time required to descend the fish.
- Need for heavy weights and a dedicated rig.

### Venting

#### Pros

- Quick.
- Inexpensive equipment.

#### Cons

- Tools can clog or break easily.
- Injuring the fish is common due to incorrect placement or over-insertion of the venting tool<sup>1</sup>.
- If not enough gas is released, fish may not be able to return to depth.
- Inappropriate tools including knives, ice picks, hooks, and reuse of dirty tools can promote bacteria and infection.<sup>2</sup>

<sup>1</sup> Schypers (2013) found over 70% of the anglers surveyed vented fish in the wrong location.

<sup>2</sup> Survey results from 2022 indicated that at least 15% of anglers that vent use inappropriate tools that don't meet regulations (<https://www.gsmfc.org/publications/GSMFC%20Number%20312.pdf>).

## 4. Handling and Releasing Fish (cont.)

### If you decide to descend:

1. Attach the fish to a descending device (lip grip, inverted hook, fish elevator, etc.).
2. Descend the fish using a weight; one pound of weight for every five pounds of fish is a good rule of thumb.
3. If practical, release the fish as close to the bottom as possible. This can increase the chance that the fish might be released near structure or a school of fish, providing additional protection from predators. If it's less burdensome to release fish mid-water column, descend to at least 20 meters to improve survival (Stallings et al., 2023).



### Lip Grip Device

(e.g., Seaqualizer, RokLees)

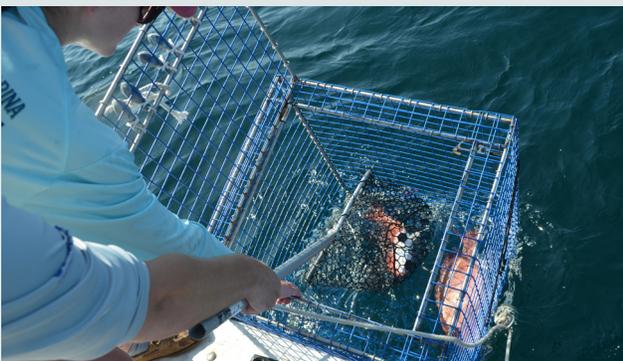
These devices clamp to a fish's lower jaw. If the device is a pressure-release device, set the depth of release closest to the bottom (without surpassing bottom depth) and the fish will release automatically at that depth. If it does not have a pressure release, manually release the clamp by jerking up on the rod once the fish reaches the desired depth or the bottom.



### Inverted Hook Device

(e.g., Shelton, Roy's Fish Saver)

There are several different styles of inverted hooks that all work similarly. An inverted, barbless hook is inserted either where the original hook hole was from reeling the fish up, or you can gently pierce the soft tissue under the fish's lower jaw. Once the fish is dropped to the desired depth, you simply reel up and the hook slides out of the fish's mouth.



### Fish Elevator

Fish elevators is a general term used to describe descending devices that are made using weighted crates, baskets, or cages. These weighted devices are capable of releasing multiple fish at a time. Consider having a multi-functional device such as a weighted crate that can be used to store gear and also release fish.

## 4. Handling and Releasing Fish (cont.)

**Photographing fish on the boat should be done with care, with these best practices in mind:**

- Do not insert your hands into the fish's gills or eyes.
- Make sure your camera is ready beforehand, and try to keep the fish in the water to minimize stress while waiting for the camera if the camera is not quite ready.
- Keep fish handling and release equipment nearby, rigged and ready for use.
- When appropriate, minimize handling or contact as much as possible by using a lip grip-style device, such as a boga grip, to secure the fish's head.
- As you remove the fish from the water, think about how long you can hold your own breath as a guide for how long the fish should be out of the water.
- Hold the fish horizontally, using a hand to support the fish's abdomen.
- Take photos quickly and consider only taking photos of fish you plan to keep.
- Consider limiting sharing of photos of boat decks covered with fish (i.e., "meat haul", "kill shots").



**Additional best practices for operators of for-hire vessels when handling and releasing fish:**

- Prioritize release based on time out of water, as well as use of whatever method is most efficient for clients and/or deck hands to release fish experiencing barotrauma.
- Demonstrate proper descending and venting techniques, including:
  - How to place the venting tool and apply pressure when using the tool.
  - How to use the designated descending rod and device.
- When practical, encourage clients to take responsibility for releasing their own fish, using whichever method makes the most sense at the time.



## 5. Encountering Predators

Even when anglers take the time to follow best handling and release practices, predators such as sharks, goliath grouper, barracudas, or dolphins may still eat discarded catch, resulting in release mortality. In fact, this predatory activity can occur when fish are hooked and being brought to the surface, as well as when fish are released. It is important to know that it is a violation of the Marine Mammal Protection Act to seriously injure or kill a marine mammal. In 2020, NOAA Fisheries published a proposed rule describing measures to deter marine mammals from damaging fishing gear and catch, damaging personal or public property, or endangering personal safety, as long as these measures do not result in death or serious injury of marine mammals. In addition, acoustic deterrents (i.e., pingers) are not effective at deterring bottlenose dolphins from fishing gear and oftentimes act as a “dinner bell”, attracting dolphins to the gear and increasing predation.

**Although this predation challenge is being actively studied by scientists, current best practices to avoid predators while fishing include:**

- When predators are in a fishing area, anglers should reel fish up as quickly as possible and remove the fish from the water. This practice seemingly contradicts the best practice suggested in the previous section to keep fish in the water as much as possible, but that advice is for situations where anglers do not detect predators nearby.
- When feasible, boats should relocate if they are encountering large numbers of predators in a particular location or if predators are actively taking discarded fish or fish off the line.
- As research on the effectiveness of shark repellent devices (e.g., magnetic weights) shows promise (Doherty et al., 2022), anglers may consider incorporating those devices into their equipment if they anticipate encountering sharks on their fishing trips.
- The best solution to avoid predation by dolphins, at this time, is to relocate fishing areas.
- To minimize interactions with Goliath grouper, avoid high-relief artificial reefs where there are large numbers of these fish.

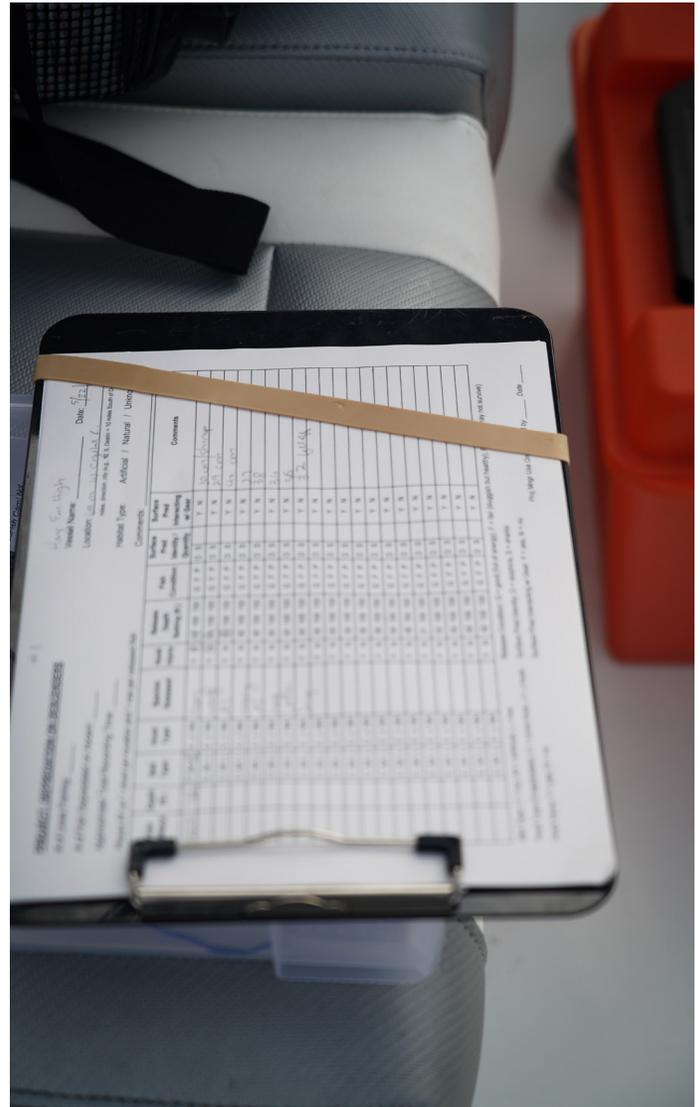
As anglers, managers, and scientists continue to look for solutions to predation problems, it will be important to remember that best practice recommendations may change and mitigation methods may vary by species.



## 6. Wrapping Up a Trip

After a day of fishing, you should keep a few things in mind as you wrap up your trip:

- Be sure to maintain your gear, which includes rinsing your descending devices and cleaning your venting tools. If any gear or devices worked improperly, fix any problems for the next trip.
- To better prepare for your next trip, make note of things you needed but did not have.
- Report your discards accurately when approached at the dock or via reporting applications such as iSnapper, Tails n' Scales and Snapper Check.



## Conclusion

Effective catch and release is situational, so prescriptive best practice guidance cannot anticipate all the different factors that may contribute to successful handling and release. Instead, anglers must be educated and empowered to make decisions based on individual situations. Taking the time to focus on the best practices outlined above and doing your best to reduce release mortality as much as possible can lead to significant conservation benefits to reef fish resources. Adopting the best practices that work for you and taking responsibility to communicate your efforts with fellow anglers will support the future health of our Gulf fisheries.

## References

- Benaka, L., L. Sharpe, K. Abrams, M. Campbell, J. Cope, F. Darby, E. J. Dick, J. Hyde, B. Linton, C. Lunsford, D. Rioux, and Y. Swimmer. 2016. Action Plan for Fish Release Mortality Science. NOAA Technical Memorandum NMFS-F/SPO-161. U.S. Dept. of Commerce, NOAA, 34 p.
- Bohoboy, E.C., T.L. Guttridge, N. Hammerschlag, M.P.M.V.Z. Bergmann, and W.F. Patterson III. 2020. Application of three-dimensional acoustic telemetry to assess the effects of rapid recompression on reef fish discard mortality. *ICES Journal of Marine Science* 77(1):83-96. <https://doi.org/10.1093/icesjms/fsz202>
- Boyle, K.S., C.L. Hightower, and S.P. Powers. 2022. Evaluation of factors contributing to post-release mortality of greater amberjack (*Seriola dumerili*) in the northern Gulf of Mexico with depth and acceleration data from acoustic tags. *Fishery Bulletin* 120(3-4):218–233. <https://doi.org/10.7755/fb.120.3-4.3>
- Burns, K.M. and V. Restrepo. 2002. Survival of Reef Fish after Rapid Depressurization: Field and Laboratory Studies. Pages 148-151 in J.A. Lucy and A.L. Studholme, editors. *Catch and Release in Marine Recreational Fisheries*. American Fisheries Society, Symposium 30, Bethesda, Maryland.
- Campbell, M.D., J. Tolan, R. Strauss, and S.L. Diamond. 2010. Relating angling-based fish impairment to immediate release mortality of red snapper (*Lutjanus campechanus*). *Fisheries Research* 106(1):64-70. doi: 10.1016/j.fishres.2010.07.004
- Crandall, C.A., T.M. Garlock, and K. Lorenzen. 2018. Understanding resource-conserving behaviors among fishers: barotrauma mitigation and the power of subjective norms in Florida's reef fisheries. *North American Journal of Fisheries Management* 38(2):271-280. <https://doi.org/10.1002/nafm.10041>
- Collins, M. R., J. C. MCGovern, G. R. Sedberry, H. S. Meister and R. Pardieck. 1999. Swim Bladder deflation in black sea bass and vermilion snapper: potential for increasing postrelease survival. *North American Journal of Fisheries Management* 19(3):828-832. doi: [https://doi.org/10.1577/1548-8675\(1999\)019<0828:SBDIBS>2.0.CO;2](https://doi.org/10.1577/1548-8675(1999)019<0828:SBDIBS>2.0.CO;2)
- Curtis, J.M., M.W. Johnson, S.L. Diamond, and G.W. Stunz. 2015. Quantifying delayed mortality from barotrauma impairment in discarded red snapper using acoustic telemetry. *Marine and Coastal Fisheries* 7(1):434-449. <https://doi.org/10.1080/19425120.2015.1074968>
- Curtis, J.M., A.K. Tompkins, A.J. Loftus, and G.W. Stunz. 2019. Recreational angler attitudes and perceptions regarding the use of descending devices in Southeast reef fish fisheries. *Marine and Coastal Fisheries* 11(6):506-518. <https://doi.org/10.1002/mcf2.10102>
- Davis, M.W. 2002. Key principles for understanding fish bycatch discard mortality. *Canadian Journal of Fisheries and Aquatic Sciences* 59(11):1834-1843. doi: 10.1139/f02-139
- Open Ocean TIG (Trustee Implementation Group), 2019. *Deepwater Horizon Oil Spill Natural Resource Damage Assessment, Open Ocean Trustee Implementation Group, Final Restoration Plan 2/ Environmental Assessment: Fish, Sea Turtles, Marine Mammals, and Mesophotic and Deep Benthic Communities.* <https://www.gulfspillrestoration.noaa.gov/sites/default/files/DWH-ARZ003947.pdf>
- Diamond, S., T. Hedrick-Hopper, G. Stunz, M. Johnson, and J. Curtis. 2011. Reducing Discard Mortality of Red Snapper in the Recreational Fisheries Using Descender Hooks and Rapid Recompression. Corpus Cristi, Texas, 52 pages.
- Doherty, P.D., R. Enever, L.C.M. Omeyer, L. Tivenan, G. Course, G. Pasco, D. Thomas, B. Sullivan, B. Kibel, P. Kibel, and B.J. Godley. 2022. Efficacy of a novel shark bycatch mitigation device in a tuna longline fishery. *Current Biology* 32(22):R1260-R1261. <https://doi.org/10.1016/j.cub.2022.09.003>
- Drymon, J.M., A.E. Jefferson, C. Louallen-Hightower, and S.P. Powers. 2020. Descender devices or treat tethers: does barotrauma mitigation increase opportunities for depredation? *Fisheries* 45(7):377-379. <https://doi.org/10.1002/fsh.10476>
- Drymon J.M., and S.B. Scyphers. 2017. Attitudes and perceptions influence recreational angler support for shark conservation and fisheries sustainability. *Marine Policy* 81:153– 159.

- Fisheries of the Caribbean, Gulf of Mexico, and South Atlantic; Snapper-Grouper Fishery Off the Southern Atlantic Region; Regulatory Amendment 29, 85 Fed. Reg. 36166 (June 1, 2020). <https://www.govinfo.gov/content/pkg/FR-2020-06-15/pdf/2020-11916.pdf>
- Fisheries of the Caribbean, Gulf of Mexico, and South Atlantic; Reef Fish Resources of the Gulf of Mexico; Requirement for a Descending Device or Venting Tool, 87 Fed. Reg. 2355 (Jan. 14, 2022). <https://www.govinfo.gov/content/pkg/FR-2022-01-14/pdf/2022-00720.pdf>
- GMFMC (Gulf of Mexico Fishery Management Council). 2019. Release Mortality Symposium Summary Report. Tampa, FL: GSMFC, 20 p.
- Responsive Management. 2022. Southeast Florida and South Carolina Anglers' Release Practices and Their Attitudes toward Descending Devices. Harrisonburg, Virginia, 76 p. <https://sedarweb.org/documents/sedar82-rd64-southeast-florida-and-south-carolina-anglers-release-practices-and-their-attitudes-toward-descending-devices-pdf/>
- Robinson, K.A., S.G. Hinch, G.D. Raby, M.R. Donaldson, D. Robichaud, D.A. Patterson, and S.J. Cooke. 2015. Influence of postcapture ventilation assistance on migration success of adult sockeye salmon following capture and release, *Transactions of the American Fisheries Society*, 144:4, 693-704, DOI: [10.1080/00028487.2015.1031282](https://doi.org/10.1080/00028487.2015.1031282)
- Rummer, J.L. and W.A. Bennett. 2005. Physiological effects of swim bladder overexpansion and catastrophic decompression on red snapper. *Transactions of the American Fisheries Society* 134(6):1457-1470. doi: 10.1577/T04-235.1
- Runde, B.J. and J.A. Buckel. 2018. Descender devices are promising tools for increasing survival in deepwater groupers. *Marine and Coastal Fisheries* 10(2):100-117. <https://doi.org/10.1002/mcf2.10010>
- Runde, B.J., N.M. Bacheler, K.W. Schertzer, P.J. Rudershausen, B. Sauls, and J.A. Buckel. 2021. Discard mortality of red snapper released with descender devices in the U.S. South Atlantic. *Marine and Coastal Fisheries* 13(5):478-495. <https://doi.org/10.1002/mcf2.10175>
- Runde, B.J., P.J. Rudershausen, N.M. Bacheler, R.M. Tharp, and J.A. Buckel. 2022. Depredation of demersal reef fishes released with descender devices is uncommon off North Carolina, USA. *North American Journal of Fisheries Management* 42(5):1196-1201. <https://doi.org/10.1002/nafm.10815>
- Rudershausen, P.J., H.M. Schmidt, J.H. Merrell, B.J. Runde, and J.A. Buckel. 2023. Effectiveness of venting and recompression for increasing postrelease survival of barotraumatized black sea bass across a range of depths. *North American Journal of Fisheries Management* 43(1):257-267. <https://doi.org/10.1002/nafm.10864>
- Scyphers, S.B., F.J. Fodrie, F.J. Hernandez Jr., S.P. Powers, and R.L. Shipp. 2013. Venting and reef fish survival: perceptions and participation rates among recreational anglers in the Northern Gulf of Mexico. *North American Journal of Fisheries Management* 33(6):1071-1078. <https://doi.org/10.1080/02755947.2013.824932>
- Southeast Data, Assessment, and Review. 2018. SEDAR 52 Stock Assessment Report. SEDAR, North Charleston, SC. 413 pp. Available online at: <https://sedarweb.org/documents/sedar-52-gulf-of-mexico-red-snapper-final-stock-assessment-report/>
- Stallings, C.D., O. Ayala, T.A. Cross, and B. Sauls. Post-release survival of red snapper (*Lutjanus campechanus*) and red grouper (*Epinephelus morio*) using different barotrauma mitigation methods. *Fisheries Research* 264 (2023) 106717. <https://doi.org/10.1016/j.fishres.2023.106717>
- Wegner, N.C., E.J. Portner, D.T. Nguyen, L. Bellquist, A.P. Nosal, A.L. Pribyl, K.L. Stierhoff, P. Fischer, K. Franke, R.D. Vetter, and P.A. Hastings. 2021. Post-release survival and prolonged sublethal effects of capture and barotrauma on deep-dwelling rockfishes (genus *Sebastes*): implications for fish management and conservation. *ICES Journal of Marine Science* 78(9):3230-3244.

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# *In Memory*

of our friend and colleague,  
Oscar "Butch" Ayala for his  
dedication and service to this  
project, and to marine fisheries  
in the Gulf of Mexico.

