

PROCEEDINGS OF THE
FISHSMART BAROTRAUMA WORKSHOP

March 15th-17th

Atlanta, Georgia

Prepared by

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Executive Summary

Over a three day period in March, 2011, recreational anglers, charter operators, representatives of the sportfishing industry, management entities, and environmental groups met with leading scientific experts in the field of release mortality in marine recreational fisheries. The purpose of this FishSmart Barotrauma Workshop was to evaluate the current state of knowledge related to improving the survival of angler caught-and-released fish and explore ways that both release and fisheries management techniques could be improved.

A major conclusion of the workshop, based on evidence provided by Pacific Coast rockfish scientists, was that recompression is more effective for many of these west coast species than traditional “venting” (releasing gases from a fish’s body cavity by inserting a small hollow needle into the fish’s body). Recompression has been shown to offer several benefits over venting for some Pacific rockfish. Additionally, some recompression gear (e.g., release baskets) provides protection from predators on the way back down and reduces the potential for additional physical injury to fish. However, recompression may not be possible in all cases, at which time venting would become the preferred method.

In the Gulf of Mexico and South Atlantic, additional research is needed to determine if rapid recompression may be a preferred alternative to venting. Currently, federal law requires venting bloated reef fishes before release in the Gulf of Mexico. Rapid recompression techniques may currently be used in conjunction with venting, but the use of recompression devices also requires research into whether their use promotes human/dolphin/marine mammal interactions that may conflict with provisions of the Marine Mammal Protection Act. Some rapid release devices such as release baskets may be effective for releasing fish and may not cause harm to dolphins and other marine mammals, whereas release devices with hooks and weights may not be appropriate in cases where marine mammals are prevalent.

During the workshop, participants discussed current research findings and developed guidelines for the release of saltwater fish (focusing on those caught at deep depths), recommendations for improving management of fisheries with high release mortality, and identified crucial gaps in research that are impeding managers’ ability to make improvements in the way that these fisheries are managed.

These findings also provide the basis for reforming the way that some areas closed to recreational fishing are managed. Data are needed from closed areas in order to adequately manage the fish stocks; anglers that are trained and certified in maximizing the survival of released fish using recompression could potentially provide these data by collecting it during specially permitted fishing trips while maximizing the survival of released fish.

Workshop results clearly indicated that development of species-specific advice on release techniques and management needs to be developed through regional workshops similar to the national workshop. General findings from the workshop are included in this document, but will be refined and communicated in messages to anglers.

The workshop was part of the larger FishSmart effort, a program lead by the sport fishing community to work with anglers and industry to improve the survival of caught and release fish. The initial phases of FishSmart are being funded by NOAA Fisheries through a grant to the Atlantic States Marine Fisheries Commission.

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Introduction

The number of fish released in U.S. marine recreational fisheries regularly exceeds 200 million each year, reaching nearly 270 million in some years and routinely accounts for 60 percent of all fish caught in these fisheries¹. In some fisheries, the mortality of these fish after being released is constraining the rebuilding schedules for these stocks and limiting the opportunities for recreational anglers to fish for these species. Developing and implementing mechanisms to help anglers improve the survival of released fish is not only a good conservation strategy but also will likely pay dividends to anglers in the form of enhanced angling opportunities.

On March 15-17, 2011, the Atlantic States Marine Fisheries Commission, in conjunction with NOAA Fisheries and the recreational fisheries community, hosted a workshop to address the growing issue of the impact of high release mortality in marine recreational fisheries, focusing particularly on fisheries subject to barotrauma-related mortality. The workshop is part of a larger effort named “FishSmart”, an outreach program in conjunction with the recreational fishing community to reduce the mortality of angler-caught and released fish. There is compelling evidence that angler behavior and gear choice can affect the success of catch-and-release as a management and conservation strategy. Because anglers often look to natural resource agencies for guidance, and have significant insight on how to handle and release fish properly, there is a need to ensure that outreach materials are readily accessible and provide the necessary and correct information on the subject.

Goals of the Workshop

The intent of the barotrauma workshop was to identify best practices for anglers and regulatory agencies to increase the survival of angler-sought saltwater fishes, with emphasis on reef fishes, and develop guidance to communicate to anglers. In addition, actions that management bodies can implement to reduce the interaction between anglers and species that they must release, while still allowing for angling, were addressed.

The identified best practices have three applications:

- 1) Develop messages directed to anglers to employ in their interaction with saltwater species;
- 2) Provide guidance to regulatory bodies to reduce the interaction with and survival of affected species through the imposition of management actions such as time/area closures, gear modifications, restrictions, usage, and size restrictions.;
- 3) Provide guidance to regulatory agencies on how to account for and incorporate live release mortality/survivability into the regulatory process.

¹ Based on NOAA Fisheries Marine Recreational Fisheries Statistics Survey, B2 “released alive” estimates.

Background Information

Keynote Opening

Eric Schwaab, Assistant Administrator of NOAA

Eric Schwaab opened the conference, outlining for participants the history and purpose of the FishSmart Barotrauma Workshop. Schwaab emphasized that this workshop was a direct result of the Recreational Saltwater Fisheries Summit held in April 2010, which identified priorities for NOAA Fisheries with respect to recreational fisheries issues, and demonstrated NOAA's commitment to addressing recreational fishing priorities. Addressing the issues related to recreational fisheries constrained by high release mortality, particularly with barotrauma-related mortality, was identified as a priority during that Summit. Schwaab further noted that the goals of the workshop clearly recognize that science-based recommendations are critical to underpinning efforts to reduce mortality of angler caught and released fish

This FishSmart Barotrauma Workshop should be oriented toward achieving the following:

- 1) Identifying best practices for anglers and agencies to adopt to address the issue of barotrauma-related mortality;
- 2) Develop an outline for communication with anglers to convey these best practices to those individuals who will implement them on-the-water;
- 3) Provide guidance to management bodies on management techniques to alleviate constraints to fishing activity in these fisheries;
- 4) Identify gaps in current knowledge that can be addressed in future research;
- 5) Ultimately, reduce fishing mortality through the implementation of the workshop's science based findings.

Schwaab stressed that the workshop is just the beginning, not the end, of the process of reducing release mortality in recreational fisheries. Simply identifying additional research needs without actions that could be implemented in the short term would not satisfy the goals of the workshop.

To communicate messages to anglers, the FishSmart effort will be partnering with the Recreational Boating and Fishing Foundation (RBFF) and tap into their extensive marketing and communications infrastructure. However, existing communication tools such as the national Sea Grant network, state fisheries agencies, and others should also be utilized. To be effective, FishSmart needs the involvement of the entire recreational fishing community, including anglers, manufacturers, retailers, media, and the agencies responsible for managing fishery resources as well as the environmental community who have shown interest in addressing this issue. It is a program driven by the angling community, not a top-down government program.

In response to questions about how to encourage the Regional Fishery Management Councils to implement management measures that might reflect progress made in understanding release mortality, Schwaab noted that Councils can use their scientific committees to ensure that the best available science informs management decisions. Additionally, grassroots angler involvement can affect Council decisions and actions, so the angling community should be prepared to work with the Councils directly to develop ways that the results of the workshop can be integrated into fishery management plans (FMPs).

FishSmart Initiative

Gil Radonski/Andrew Loftus

(see www.fishsmart.org/workshop_agenda.htm for full presentation)

The FishSmart Program is a proactive approach to reduce the release mortality of fish stocks while enhancing the fishing experience. This will be accomplished through two basic approaches:

1) developing fishing techniques and management approaches that reduce the catch of unwanted species or sizes, and; 2) improving the survival of released fish. The measure of our success will be at the angler/fish interface.

FishSmart is a program driven by the angling community, not a top-down government program. It is patterned after an effort in Australia named *Gently Does It!*, that was the largest single investment by the Australian government into a recreational fisheries initiative over an eight year period. The outreach component of *Gently Does It!* was very successful, employing a combination of a TV ad campaign, printed materials, and outreach by the recreational fishing industry. A professionally structured assessment of effort revealed that thirty-five percent of the anglers exposed to outreach materials said it effected changes to their fishing practices and gear to increase the survival of released fish.

FishSmart will emulate successful aspects of the Australian effort, and will utilize several approaches:

- 1) Collating and expanding our knowledge and understanding of released fish survival;
- 2) Developing and employing new technologies/equipment where necessary to enhance released fish survival;
- 3) Promoting the adoption of careful release techniques (best practices) to anglers, and; developing an angler communication infrastructure to disseminate best practices.

In short, FishSmart is a nationwide program to marry the scientific knowledge of the survival of released fish with on-the-ground implementation by the anglers.

The information gathered as part of the FishSmart Barotrauma Workshop process will form the foundation for the information used in the communication and outreach program, specifically integrating into the established communication infrastructure of the Recreational Boating and Fishing Foundation (RBFF).

Future efforts will be needed to enhance and expand the outreach component through state agencies and other communication mechanisms and to develop the information and communication infrastructure to address freshwater fisheries.

Results of FMP Analysis and Literature Synopsis: Summary of What We Know

Gil Radonski/ Andrew Loftus

(see www.fishsmart.org/workshop_agenda.htm for full presentation)

The objective of this analysis was to consolidate information on how release mortality is being applied to marine fisheries management and to provide an inventory of known information and assumed information. It is not intended to be a comprehensive literature review of barotrauma.

Regional Fishery Management Councils were asked to provide information on fishery management plans (FMPs) that utilize release mortality rates for recreationally caught and released species (voluntary or regulatory) and if those rates are based on empirical data or are assigned through some other mechanism.

Information was obtained for 60 FMP's as follows (Appendix III):

New England – Cod and Haddock, Winter Flounder, Pollock
Mid Atlantic-Summer Flounder, Black Sea Bass, Bluefish, Spiny Dogfish
South Atlantic - Black Sea Bass, Red Snapper, Vermillion Snapper, Mutton Snapper, Goliath Grouper, Red Grouper, Black Grouper, Gag Grouper, Red Drum, Spanish Mackerel, King Mackerel, Greater Amberjack, Red Porgy,
Gulf of Mexico-Red Snapper, Vermillion Snapper, Gag Grouper, Red Grouper, Greater Amberjack
Pacific – 20 species of Pacific rockfish, Cabezon, California scorpionfish, Kelp Greenling, Lingcod, Pacific Cod, Flatfish, Sharks and Skates, Dogfish
North Pacific- Demersal Shelf Rockfish, Pacific Halibut
Other (Atlantic States Marine Fisheries Commission) - Striped Bass, Red drum, Tautog, Weakfish, Atlantic Croaker.

In general, most release mortality estimates are based on studies. Some of these studies are on “closely related species” rather than the actual species. Depth-based mortality estimates are being developed in the Pacific rockfish, Gulf Red snapper, and Gulf Red Grouper fisheries. Some consideration of gear-based mortality estimates is also developing. See Appendix III for the complete list.

Frame the Overall Issue of Barotrauma and Release Mortality

Steve Theberge, Florida Sea

Please visit www.fishsmart.org/workshop_agenda.htm for full presentation.

Steve Theberge summarized the issue of barotrauma and release mortality by highlighting that many different species had many different unique needs when it came to releasing them with high survival. Physiological differences in swim bladder structure and different responses to handling stress necessitated different ways for reducing mortality.

Common release methods for dealing with barotrauma include:

- Venting body cavity (Puncture Method)
 - Fast, cheap; equipment requires little space
 - Possible to vent large numbers of fish coming in quickly
 - Infection concern
 - Going too deep or in wrong place and puncturing other organs
 - Improper handling and venting
- Recompressing fish using containers or hooks and weights (Hook and Drop)
 - No possible damage to viscera from a needle
 - Less infection risk

- Equipment is small, inexpensive
 - If not done correctly fish may fall off hook before getting in water (especially in rough weather with high sided boats)
 - Requires dedicated rod
 - Takes more time from fishing
 - Some vented fish may float
- Avoiding fish that cannot be harvested
 - Skirting hot spots
 - Using selective gear

Other Mortality Factors that should be considered include:

- Predation (“Barotrauma vs. Barracuda” or lingcod, sharks, dolphins, etc.)
- Handling (dropping, damaging gills, etc.)
- Bleeding
- Temperature

Some advice for releasing barotrauma-impacted fish includes:

- Quickly returning fish to depth is critical
- Do not high grade fish caught in deep water
- Balancing convenience, effectiveness, and unknown or inconclusive survival information

Other Factors

Collaborating with anglers is essential

- Easy to confuse anglers with conflicting messages about how to release fish
- Need to get angler buy-in
- Education: Getting Information out to anglers
- Community outreach to fishing groups and organizations

Regional Issues

Gulf of Mexico

Karen Burns, Gulf of Mexico Fishery Management Council

Please visit www.fishsmart.org/workshop_agenda.htm for full presentation.

The Gulf of Mexico accounted for greater than 40% of All U.S. Marine Recreational Fishery Catches in 2006; 56% of this catch was released out of a total of 193 million fish (not including Texas).

The Gulf Council manages 70 species, of which 42 are reef fishes mostly in the snapper/grouper complex.

Various sources of mortality beyond barotrauma make present challenges to effectively reducing mortality by addressing barotrauma alone. These sources include

- Hook wounds
- Predation (while retrieving and after release)
- Thermal shock
- Infection from hook wounds and stress
- Species-specific physiological characteristics

Release mortality estimates for red snapper and grouper are applied on a depth basis since studies have shown that fish caught at deeper depths have higher mortality. Venting and release tools are regulatory requirements in the Gulf of Mexico reef fisheries.

South Atlantic

Chip Collier- South Atlantic Fishery Management Council

(see www.fishsmart.org/workshop_agenda.htm for full presentation)

The Atlantic coast can be roughly divided into two Large Marine Ecosystems: Northern and Southern, governed by three fishery management councils. The top recreational species harvested are:

Species	% Released Alive (B2)
Summer Flounder	88
Atlantic Croaker	57
Bluefish	23
Striped Bass	85
Spot	36
Black Sea Bass	83
Atlantic Cod	72
Red Snapper	82
Groupers	75

Numerous studies have been conducted on various species. Depth is a key factor in mortality. Hooking mortality as well as barotrauma effects play a role in release mortality. The South Atlantic council does not mandate the use of venting tools as in the Gulf, partly due to the findings in the summary article on the subject by Wilde et al. (2009). Most recently, the Council has decided not to go with the large area closures temporarily. There is a need for a more thorough evaluation of the social and economic impacts of closing large areas. Until such time as alternative approaches are identified, however, closures may be the most effective approach. However, area closures can push effort into other areas (unintended consequences). If very significant ecological sites can be identified, then targeted closures may preclude large area closures. There is interest in the Southeast in exploring re-compression approaches. Perhaps the threat of large scale closures has provided the opportunity for research and management to move in this direction.

Pacific

Dan Wolford, Pacific Fishery Management Council

(see www.fishsmart.org/workshop_agenda.htm for full presentation)

The Pacific Coast encompasses approximately 7,000 miles of coastline across Alaska, Washington, Oregon, and California, consisting of four major ecosystems:

- Bering Sea/Aleutian Islands
- Gulf of Alaska
- California Current (WA, OR, Northern California)
- Warm Water System (Southern California bight)

In Alaska, over 30 species of rockfish are most susceptible to barotrauma. In Oregon, Washington, and California, the groundfish fishery (which includes more than 64 species of rockfish) is the most subject to barotrauma related release mortality. Issues in these fisheries include area based

management, modified gear, depth-specific mortality rates, Get-That-Rockfish-Down, recompression (widely used), and enforcement.

Enforcement issues may seem like less of an issue on the West Coast, but it was revealed that approximately 40 wardens patrol the entire California coast. As part of Pacific Coast management process, enforcement consultants are used to get input on effectiveness, enforceability of management measures. There is a need for a leader in the recreational community to step up and change general behavior. This can go a long way to reducing the emphasis on enforcement.

The transition to alternative practices may be easiest to accomplish in the for-hire fisheries. In terms of enforcement and monitoring the for-hire community often provides the most “do-able” opportunities. It is not necessary to re-descend barotrauma affected fish all the way to the bottom; Boyle’s Law – first 100 ft are the most critical. This makes re-descending more feasible since not as much line / time is required. Customers may even enjoy being involved in re-descending (recompressing) fish.

Issue Resolution

The four workshop issues, Avoidance, Size, Fish Friendly Tackle, and Venting/Recompression, were addressed through two primary mechanisms. First, keynote speakers framed each issue, highlighting the major aspects that needed consideration by the workshop participants. Following those presentations, the participants broke into two groups with each addressing all four issues. The groups came back together and discussed the findings of each.

Avoidance

The issue of “avoidance” is a broad term to capture management approaches and fishing techniques designed to prevent encounters of unwanted species/sizes. Dr. Gene Wilde, Texas Tech University, presented the overall scope of the issue in a presentation Please visit www.fishsmart.org/workshop_agenda.htm for the full presentation.

This background presentation was used by the two break out groups as a basis for discussion on the topic. The follow actions were recommended for avoiding the catch of fish that would be required to be returned to the water

Best Recommended Practices/Advice

1. Pre-trip planning by anglers: Anglers should develop a plan before leaving the dock so that they try to avoid fish that they would need to return. This would require deciding at the outset of the trip if they might be faced with the situation of releasing fish and if so preparing the necessary equipment to do so.
2. Gear selection: Anglers should be encouraged to select gear that reduces the possibility of catching fish that would be returned. For example, this would include larger hooks that avoid catching fish smaller than what is allowed to be retained, “weak hooks” that bend or break when large fish are hooked, and low test leaders that break to avoid boating fish larger than what can be retained.

3. Fishing Practices: If possible, anglers should educate themselves on habitats and depths where the species and sizes of fish that cannot be retained are located and avoid those areas. This would include, for example, such practices as not fishing below a certain depth if larger fish that cannot be retained are in deeper waters, moving fishing locations to avoid over sized or undersized fish that are routinely caught, etc. *In general*, mortality of fish will increase as they are caught deeper than 60 feet.
4. Avoidance starts with knowing what to avoid. Anglers need to be proficient in identifying different species (particularly when fishing in areas where closely related species are found together). Anglers may need incentives to become more proficient, such as workshops or other training opportunities. Charter boat Captain Training programs offer another model for that sector (i.e. Alabama – C-Fish).

Management bodies should consider the use of carefully planned area closures (areas closed to fishing) if absolutely necessary and as part of an overall management strategy. These areas should be as small as possible to achieve management objectives, designed in cooperation with the recreational fishing community, reviewed regularly, and not be closed in perpetuity.

In appropriate situations, management bodies should implement programs to reward angler behavior with access to closed areas given certain criteria such as a certified angler program or lottery, with the intention to establish incentives for adoption of best practices as well as improve collection of data needed by managers to monitor fish stock health and responses to management actions.

Information Gaps (needs)

The following gaps in information were identified that, if filled, would facilitate the effective use of avoidance techniques in managing fish stocks with high release mortality:

1. Anglers need better information about strategies for avoiding certain species and sizes of fish. The recreational fishing community and fisheries managers should implement programs that encourage the distribution of information to anglers on such techniques, practices, and gear.
2. Gear Development: New innovative gear types and configurations that will help minimize unwanted catch should be developed. While some of these gear developments may be universal (applicable to many different fisheries), it is likely that some gear development will be oriented toward specific fisheries and geographic regions.
3. Management: Management bodies need to consider factors of species life history that may maximize the effectiveness of actions to prevent anglers from encountering fish. These include knowledge of spawning aggregation areas or other considerations that allow delineation of closed areas at finer geographic scales. Fishery dependent data is often lacking for species that are protected by area closures that prevent such information from being developed. Management bodies need to consider both cost of closed areas (e.g., loss of data) as well as the benefits when deciding where and how to implement closed areas.
4. Marine Mammal Considerations – need to be able to avoid, discourage, and minimize predation on released fish while not triggering provisions of the Marine Mammal Protection Act (MMPA) or other considerations.

Other

The implementation of avoidance techniques or adoption of avoidance practices by anglers needs to differentiate between generally applicable advice versus regional or species-specific advice. Management bodies (NOAA Fisheries, Councils, Commissions, and States) should identify fish stocks that are negatively impacted by recreational releases early on and involve scientists, Council Scientific and Statistical Committees, Sea Grant, and anglers in developing appropriate avoidance measures (including educational programs) . NOAA should work with entities such as the National Fish and Wildlife Foundation and others to establish funding for identification of regional priorities associated with increasing the survival of angler released fish.

To encourage the innovation in gear development, funding opportunities (such as S-K funds) should be identified and communicated to the recreational fishing industry to address priority species and regions.

Regional workshops that build from this national workshop would be the appropriate forum through which to develop region-specific advice in conjunction with the Councils, science centers, state agencies, etc. and translate the scientific information into practical advice for anglers in each region to use.

Size

Dr. Chris Lunsford, NOAA Fisheries, Alaska Fisheries Science Center addressed the issue of the effect of catching (and removing from the population) various sizes of fish had on stock sustainability. Please visit www.fishsmart.org/workshop_agenda.htm for the full presentation.

The size of fish being released has implications for:

- stock sustainability: larger female fish are generally more fecund and their removal from the spawning stock has greater impact than smaller individuals
- survivability: in some species, larger fish may have a lower chance of survival after release than smaller individuals
- handling techniques: larger fish may require different handling when releasing than smaller fish.

Best Recommended Practices/Advice

The following practices are recommended for anglers and management bodies:

1. Anglers should utilize gear to accommodate different considerations related to the size of fish that will be retained (or conversely, released). This should include gear to avoid fish that they do not want to retain (see “Avoidance”), and gear that is appropriate for releasing fish of various sizes (e.g., larger descending weights for returning large fish to depth).
2. Anglers should consider offsetting concerns about barotrauma and predation risk as they relate to size. Smaller fish may be subject to predation after release or if being returned to depth using a descender device that does not protect them. Particular care should be taken with

larger animals especially when those individuals provide a significant contribution to reproduction.

3. Anglers should be aware that large fish may need different handling than small fish. Whenever lifting large fish, the full body weight of the fish should be supported when possible (e.g., hold the fish horizontal rather than lifting by the lip).

Management bodies need to consider alternatives to minimum size-based approaches such as:

- Catch stop, meaning that once a limit is reached anglers need to stop fishing for that species to avoid high grading or catching more fish that need to be released
- Mechanisms for enhancing survival of large fish in fisheries where it is desirable to catch, but not necessarily retain, large fish. This may include educational programs with the angling community.
- When modeling fish populations, consider the changes in reef fishes where reproductive capacity is reduced by removing large individuals

Management and scientific entities should identify species or stocks where minimum size management is not the ideal approach where alternative approaches that specifically protect large fish would be more appropriate.

Information Gaps (needs)

Anglers need to be made aware of the impact of all aspects of size-related mortality, including the impact of removing larger, more fecund fish from the stocks, and additional measures needed (if any) to increase survival of larger fish,

Venting and Recompression

Dr. Alena Pribyl, National Research Council Post-doctoral Fellow, NOAA Fisheries Southwest Fisheries Science Center provided an overview of the techniques and appropriate uses of various decompression and recompressions techniques for releasing fish. Please visit www.fishsmart.org/workshop_agenda.htm for the full presentation.

Since 2008, recreational anglers fishing for any species of reef fish in Gulf of Mexico have been required to possess and use a dehooking device and a venting tool for releasing fish. This regulation was based on best available science at that time for those species. Other techniques, including “recompression” (sending a fish back down to depth using a release weight, basket, or other device) used in other fisheries show promise as an alternative to venting. Dr. Pribyl highlighted some of the successes with recompression in the Pacific coast rockfish fisheries.

Best Recommended Practices/Advice

1. Trip Planning
 - First and foremost, anglers should abide by all fishing regulations, including the use of venting devices where required. Anglers should also be aware that some fish may not be legal to bring onto the boat and must immediately be released in the water

- Fishing at the shallowest depths needed to reach target fish reduces likelihood of decompression injuries and discard mortality
 - Generally speaking, if anglers are fishing in depths greater than 60 ft, they should have recompression/decompression gear ready for use
2. Landing the Fish
 - Regardless of the chosen release method, anglers should minimize the amount of handling of fish that are to be released, being particularly careful not to drop the fish onto a hard surface (e.g., boat deck). The amount of time out of the water is one of the most critical aspects affecting survival – fish should be returned to the water as soon as possible.
 3. Venting
 - Venting is required in the Gulf of Mexico, but in other fisheries should be considered an alternative choice compared to recompression. Regional differences and specific fishing conditions may preclude recompression entirely. However, venting may be the only viable option when conditions (e.g., crowded head boat) make recompression techniques impractical.
 - The efficacy of venting varies tremendously by species, and by fishing situation. Venting should be considered only under conditions and for species where evidence supports its use, to be specified in the regional workshops
 - Need to train anglers on appropriate venting – particularly not to puncture the stomach while thinking that it is the swim bladder
 4. Recompression
 - Small fish recompress easier - to depth where caught or 60 feet small fish; 100 feet for large fish (if in doubt 100 feet)
 - Information needs to be provided to anglers via multiple avenues on various recompression products that are available
 - If fish are brought up from depths greater than 60 ft it may be safer to recompress them regardless of apparent condition, but especially when showing evidence of barotrauma
 - Faster recompression gives better results, especially in the first two minutes after landing. Anglers should try to get fish to be released back in the water and back to depth as soon as possible, with minimal handling
 5. Special Considerations
 - The thought was raised that on large headboats and some charterboats a basket or other holding device could be used until captains/mates had time to vent or recompress. However, this may create some law enforcement concerns for fish that are unlawful to be retained.

Information Gaps (needs)

1. Angler awareness/buy-in to specific techniques
 - Better information is required about the current awareness of the fishing public related to barotrauma injury and patterns of fishing behaviors that affect discard mortality, including the prevalence of the use of recompression strategies and other best practices. Questions related to use of venting and recompression should be incorporated into dockside monitoring such as conducted through the MRFSS/MRIP program.
 - Need general increase in familiarity with recompression gear.
 - Specific information is required on what gear is appropriate under what circumstances

- Need to develop videos that show success of release methods that charter captains could use as selling point
2. Research
- Research on swim bladder morphology should be included as part of our understanding of the issue.
 - Little is known about the effects of rapid decompression on fishes with small or non-existent swim bladders.
 - Need to understand predation as related to different kinds of recompression devices
 - In Gulf of Mexico, additional research needs to be conducted on recompression before regulatory changes are considered.
 - Need authoritative scientific advice to generate recommendations on ideal depth to return fish to.
 - Need better scientific information on mortality rates if recompression is used, particularly in the Gulf and South Atlantic.
 - In almost cases, scientific studies need to be cited to support quantified advice (i.e., time out of water at various temperatures and depth advice).
 - Simulation exercises based on stock assessment models are needed to predict the benefits to anglers (e.g., increased bag limit) associated with a certain level of improvement in discard survival due to adoption of recompression techniques.
 - Need to know the extent to which regional considerations such as marine mammal or other sources of predation constrain or define best practices for recreational release techniques.

Other

Specific advice to anglers will vary from region-to-region, particularly in the Gulf which currently has special legal requirements pertaining to the release of reef fish. Regional workshops that build from this national workshop would be the appropriate forum through which to develop region-specific advice in conjunction with Councils, science centers, state agencies, etc. and translate the scientific information into practical advice for anglers in each region to use.

Fish Friendly Tackle

Steve Theberge, Florida Sea Grant, provided an overview of techniques and gear for improving the survival of released fish accompanied by an extensive display of such equipment. Please visit www.fishsmart.org/workshop_agenda.htm for the full presentation.

The breakout groups concurred on the following items:

Best Recommended Practices/Advice

- Choose hook types to maximize survival – in some fisheries circle hooks are recommended but fishing technique is different from traditional “J” style hooks.
- Limit number of hooks used on the line to minimize unnecessary hooking.
- Where appropriate, consider using “weak hook technology” to reduce incidence of bringing fish on board that will be released.
- Conversely, larger hooks reduce catch of small fish if anglers want to catch and retain larger fish only.

- Use techniques such as long leaders between the weight and the hook to avoid bottom-dwelling species.
- Release tools should be matched to fish size.
- Fish Descenders need to be the appropriate design for fish being caught (size and number need to be considered, see www.sportcon.org).
- Use Knotless rubberized landing net for landing fish.
- Fish high in water column- use top shot or mark line to maintain depth of where you are fishing.
- Anglers and charterboat operators should be encouraged to leave a buffer before reaching their legally allowed limit early in day so that they do not fill their bag limit at the first few stops and end up high grading.

Information Gaps (needs)

- Need to develop information on the effects of various fishing styles on release mortality
- Need to develop a code of fishing practices specifically related to barotrauma
- Need structured education programs to reach anglers with information about release techniques and gear (see “Communication” section later in this report).

Measuring Success

Measuring the success of angler adoption of techniques and the effect of those techniques on reducing mortality is of paramount importance.

1. We need to track benefits and develop metrics (angler metrics – management metrics) for measuring aspects such as:
 - Have education/outreach programs changed practices – angler behavior (equipment in possession & use of equipment)?
 - Has the program resulted in conservation benefits?
 - Do practices result in opened areas/increased fishing opportunities?
 - Quantify conservation benefits by:
 - Measuring the proportion of anglers catching fish
 - Conducting a sensitivity analysis to determine how effective various levels of reduced mortality are for achieving management objectives (e.g., stock rebuilding and sustainability).
 - Developing minimum data elements for recreational statistics programs (including fishery independent and dependant)
 - Disposition of fish released (on surface, vented, recompressed, preyed upon, released dead)
 - Depth (range) fished for majority of trip
 - Distance from shore
 - Release device aboard – was it used
 - Circle / barbless hooks used or not
 - Mortality rate for different release devices and descenders for various fish species & conditions

- Develop a marking system for returned fish to identify recaptured survivors (may be illegal in some states if done by anglers without a scientist being involved)
- 2. Developing exempted fishing permit studies will help fill some measure success by:
 - Allowing controlled access to closed area will provide the opportunity for structured studies to evaluate the effectiveness of release practices and gear.
 - Anglers could be certified in release techniques before they are allowed to fish in these area and participate in studies
 - The objective of opening in a specific closed area to fishing is to get data on the impact of the closure on fish stocks and obtain greater angler involvement in the management of these areas.
 - These programs would increase trust between anglers and management bodies
 - Develop a sportfishing cooperative research program
 - Data from these programs needs to be species specific

Communication Issues

Micelle Lampher, Vice President for the Recreational Fishing and Boating Foundation (RBFF), provided details of the communication infrastructure of RBFF that could be utilized to reach specific target audiences (e.g., angler populations). RBFF’s main outlet for information is through www.takemefishing.org, which currently hosts 4 million unique visitors and growing. They partner with state natural resources agencies (48 states currently partner with them) and have several other programs. Through these programs, they reach 1 million K-12 students and 200,000 educators, giving them a foothold to influencing the future generation of anglers on issues such as proper release techniques. “Catch and Release” was one of the top three conservation issues identified by the RBFF Conservation Roundtable.

It is important to recognize that the takemefishing.org website is not a static “post the information and let anglers find it approach.” The RBFF program is oriented around a comprehensive professional marketing and advertising campaign designed to drive anglers to the information. One application for applying this to fisheries where reduced release mortality is desired is to implement a direct marketing/advertising campaign in specific markets to reach those anglers that will be most likely to implement improved release techniques and adopt appropriate gear. For more information, visit: www.takemefishing.org or www.rbff.org.

In the short term, the FishSmart effort will begin to integrate information from this workshop and others into the existing infrastructure of RBFF. Other thoughts for improving communication to anglers include:

- Need to keep in mind that there are millions of anglers that we need to connect with – to accomplish this we need to utilize all possible avenues of communication including recreational fishing industry advertising
- Most states (as well as NOAA Fisheries) have established angler communication and education programs of varying intensity. We should engage with these programs to the extent possible to develop and deliver consistent messages (note that the Association of Fish and Wildlife Agencies has endorsed partnering in the FishSmart program)
- Partner with regional Sea Grant programs, but be aware that in some regions Sea Grant is viewed as more “commercial fishing” oriented then recreational

- Re emphasize Ethical Angling Program as a part of this – focus on best practices – add more detailed information.
- Angler education is key to all aspects of this issue; if it doesn't make it into the hands of anglers it won't have much effect.
- Need to be sure that any new regulations or recommended practices are practical or we lose respect
- Need to find a way to use the MRIP program to both evaluate adoption of practices and communicate information on best practices.

General Guidelines for Releasing Marine Recreational Fish

At the conclusion of the workshop, participants agreed on the following guidelines for releasing fish and specific guidelines for releasing those caught in deep water. It should be recognized that these guidelines may be modified as new information is developed or discovered and may also become more refined for region-specific fisheries after regional workshops are conducted.

Note: These guidelines are generally acceptable practices available on state, federal, and nonprofit websites. They will be refined in the future and links provided to sources of additional information.

1. Plan Ahead – decide whether you might release fish on any given trip and prepare the equipment necessary to do so.
2. Avoid encountering fish that you are required to release. If catching fish that you cannot, or do not want to keep, changing the depth that you are fishing, moving to a different area, or using different bait are just a few techniques for avoiding unwanted catch.
3. Use gear suited to the size of fish that you are trying to catch. Consider using “weak hooks” that allow you to catch fish of the size that you want but break if you catch fish too big. Use circle hooks where recommended and be aware that circle hook fishing techniques are different from normal “J” style hook techniques.
4. When landing fish, don't play them to exhaustion; use line strength to minimize playing time.
5. Land the fish as quickly as possible. If possible, leave them in the water rather than bringing them on board. If you must handle them, use knotless rubberized landing nets, rubberized gloves, or wet towels to avoid removing the slime layer from their body. Support the body when lifting large fish.
6. When releasing fish, determine whether you need a release tool (dehookers, venting tools, recompression tools) to successfully release your catch.
7. Time is of the essence! – release fish as soon as practical and do not keep them out of the water longer than necessary.

Guidelines Specific for Saltwater Fish Caught in Deep Water

Some saltwater fish that are caught in deep water may be suffering from “barotrauma,” an expansion of swim bladder gases that makes it difficult or impossible for them to swim back down. Generally, fish caught deeper than 30 feet will suffer some effects. Starting in mid 2011, more specific guidance will be available at www.takemefishing.org and www.fishsmart.org. Until then, follow these tips:

IMPORTANT: The use of venting tools and dehooking devices is required by law when participating in the recreational reef fish fisheries in the Gulf of Mexico.

1. When anglers are not required by law to use venting tools, recompression is generally the first choice for returning fish to the depth from which they are caught. A variety of recompression tools are on the market, including descender devices, release weights, release baskets, and others. A complete inventory of such devices will be available from www.takemefishing.org and www.fishsmart.org.
2. Return fish to the depth of capture. If catching fish at very deep depths, returning them to at least 60 - 100 feet will dramatically improve survival.
3. If recompression is not possible, venting is a second option (use established guidelines for venting such as found at <http://catchandrelease.org/>). Note that the fish's stomach may protrude from its mouth. Do NOT puncture the stomach.

Summary Guidance to Regulatory Bodies

The FishSmart Barotrauma Workshop developed recommendations for regulatory bodies (agencies and fisheries management councils/commissions) including:

- Workshops should be held in each region similar to the national workshop to develop region specific guidance on species-specific handling and management techniques available in each region.
- Incorporate metrics into the FishSmart efforts, including:
- Measure the success of outreach efforts to the angler – who is being reached and how is it changing behavior.
- Measure impact of different release mortalities on stock assessments
- Measure impact of reduced release mortality on harvestable surplus
- Exempted fishing permit studies –explore certifying anglers in release techniques for fishing in an MPA or other closed area for the purposes of collecting fisheries data in the closed area and enhancing angler involvement in the management of these areas.
- Begin evaluating changes to the legal framework (particularly related to the Marine Mammal Protection Act and venting tool requirements) that *might* be needed if recompression tools are proven to be a preferred alternative in the Gulf of Mexico.

Summary Gaps in the Current State of Knowledge

- Research is needed on the effectiveness of recompression techniques for specific areas/fisheries where information is not currently available (e.g., red snapper in the Gulf of Mexico and South Atlantic)
- Additional research is needed on how far down to release fish
- Priority research is needed to quantify the impact of different release mortalities for fisheries assessments/catch estimation within season as a tool to use in management process.
- Species specific effects of barotrauma, predation and hook mortality.
- Need know the effect of water temperatures on caught and released fish survival.

Appendix I. Participants in FishSmart Barotrauma Workshop March 15-17, 2011

Jim Armstrong	Mid Atlantic Fishery Management Council
Holly Binns	Pew Charitable Trust, Pew Environment Group
Doug Boyd	Coastal Conservation Association/GOM Fishery management Council
John Budrick	California Department of Fish and Game
Karen Burns	Gulf of Mexico Fishery Management Council
Noreen Clough	Bass Anglers Sportsman Society
Chip Collier	NC Division of Marine Fisheries
Russ Dunn	NOAA Fisheries
Ben Fairey	Charterboat Operator, Orange Beach Fishing Assoc.
Terry Gibson	North Swell Media
Marty Golden	NOAA Fisheries, Pacific Recreational Fisheries Coordinator
Ken Haddad	American Sportfishing Association
Duane Harris	South Atlantic Fishery Management Council
Doug Haymans	Georgia DNR Coastal Resources Division
Sam Hochhalter	Alaska Department of Fish and Game
Todd Kellison	NOAA Fisheries, SEFSC
Michelle Lampher	Recreational Boating and Fishing Foundation
Andrew Loftus	Loftus Consulting
Chris Lowe	California State University, Long Beach
Rudy Lukacovic	Maryland Department of Natural Resources
Chris Lunsford	NOAA Fisheries, AFSC, Juneau;
Jim Martin	Berkley Conservation Institute
Layne Nakagawa	Hawaii
Mike Nussman	American Sportfishing Association
Alena Pribyl	Oregon State University/NOAA Fisheries
Doug Rader	Environmental Defense Fund
Gil Radonski	Loftus Consulting
Tom Raftican	Marine Fisheries Advisory Committee
Beverly Sauls	Florida Fish and Wildlife Commission
Eric Schwaab	NOAA Fisheries
John Stevely	Florida Sea Grant
Clay Tam	Pacific Islands Fisheries Group, Hawaii
Steve Theberge	Florida Sea Grant
Roger Thomas	Golden Gate Fishermen's Association
Joe Welsh	Monterey Bay Aquarium
Gene Wilde	Wilde Texas Tech University
Dan Wolford	Pacific Fishery Management Council
Dorothy	Zimmerman Florida Sea Grant

Appendix II. Agenda: FishSmart Barotrauma Workshop

March 15-17, 2011 Atlanta, Georgia

Workshop Goals:

1. *Identify best practices and equipment* to employ by anglers and regulatory agencies to increase the survival of angler-sought saltwater fishes, with emphasis on reef fishes under a variety of conditions/fisheries.
2. *Develop outline for messages* directed to anglers to employ in their interaction with saltwater species, and
3. *Provide guidance* to management bodies to reduce the interaction and lethality of such interactions, with those species by anglers through the consideration of management actions such as time/area closures, gear modifications, restrictions/usage and size restrictions and account for and incorporate release mortality/survivability into the regulatory process.
4. Identify gaps in the current state of knowledge in need of additional research efforts/funding

Tuesday, March 15: Plenary

8:00 Welcome & Logistics –Andrew Loftus

8:10 Introduction –Eric Schwaab, Assistant Administrator for NOAA

8:30 FishSmart Initiative – Gil Radonski/Andrew Loftus

9:15 Results of FMP Analysis and Literature Synopsis: Summary of What We Know-Gil Radonski/Andrew Loftus

9:45 Break

10:00 Frame the Overall Issue of Barotrauma and Release Mortality-Steve Theberge, Florida Sea Grant

11:00 Questions/Discussion

12:00 Lunch

1:15 Framing Regional Barotrauma Impacted Recreational Fisheries

- Gulf – Karen Burns, Gulf of Mexico Fishery Management Council (30 minutes)
- Pacific- Dan Wolford, Pacific Fishery Management Council (30 minutes)
- Atlantic- Chip Collier, North Carolina Division of Marine Fisheries (30 minutes)

3:00 Break

3:20 Tee Up Issues (15-20 minutes each) The intent is not to provide a comprehensive overview of each issue. Rather, these brief descriptions will provide a *scientifically-based* summary that can be used to guide discussion on the topic within break out groups. (Presenters to be identified)

- ◆ Avoidance: Management techniques and Fishing Techniques designed to prevent encounters of unwanted species/sizes –Gene Wilde, Texas Tech University
- ◆ Size: Effect of catching various sizes of fish on stock sustainability-Chris Lunsford, NOAA Fisheries, Alaska Fisheries Science Center
- ◆ Venting *and* Decompression/Recompression: Techniques and appropriate uses of various decompression techniques. –Alena Pribyl, National Research Council Post-doctoral Fellow, NOAA Fisheries Southwest Fisheries Science Center
- ◆ Fish Friendly Tackle: Techniques and gear for releasing fish –Steve Theberge

4:20 Questions/remarks

5:00 Adjourn

Wednesday, March 16

Breakout groups:

The attendees will be assigned to one of two breakout groups. The purpose of each break out group is to delve into the current state of knowledge of each of the four issues, describe what is known about the issue and address each of the four workshop objectives

8:00 Convene in plenary for 20 minute orientation

8:30 Regroup in break out sessions –Each group addresses all 4 issues in the context of workshop goals. Loftus/Radonski group leaders.

12:00 Lunch

1:15 Regroup in breakouts

3:00 Break

3:20 Meet in plenary

- ◆ Breakout reports-20 minutes each-each group reports on the results of their discussions addressing the 4 issues. Commonalities and divergences between groups will be identified.

4:20 Group Discussion

5:00 Adjourn

Thursday, March 17

8:00 Development of Message Content: How Will We Use It? - Michelle Lampher, Vice President, Marketing, Recreational Boating and Fishing Foundation

8:45 Facilitated Group Collaboration (plenary): Develop final recommendations on best practices, angler messages, and management guidance (3 workshop goals). –Andrew Loftus/Gil Radonski facilitators

Using the previous day outcomes, develop:

- ◆ *Best practices and gear* for anglers to increase the survival of angler-sought saltwater fishes under variety of conditions (species, temperature, depth caught, hook size, etc.
- ◆ *Develop the outline of messages* directed to anglers to employ in their interaction with saltwater species, and
- ◆ *Develop guidance* to regulatory bodies to reduce the interaction (avoidance) and lethality of such interactions, with those species by anglers.
- ◆ Catalogue gaps in the current state of knowledge in need of additional research efforts/funding

10:00 Break

10:20 Finalize Recommendations

11:30: Wrap Up- Russ Dunn, National Policy Advisor for Recreational Fisheries, NOAA Fisheries

12:00 Adjourn

Appendix III. Release Mortalities Incorporated in Fishery Management Council Management Plans or Stock Assessments for Barotrauma-Afflicted Species and Select Others

<u>New England</u>			
Species	Release Mortality	Study Or Other Source?	Citation
Cod & Haddock	0%	Assumed	
Winter Flounder	15%	Study	Durso and Iswanowicz 1982
Pollock	100%	Study + Assumed	Rec catch a small part of the harvest

<u>Mid Atlantic</u>			
Summer Flounder	10%	Study	Multiple Studies
Black Sea Bass	25%	Study + Delphi model	Bugley and Shepherd 1991
Bluefish	15%	Study + modified	Malchoff 1995
Spiny Dog Fish	25%	Assumed	Based on similar species

<u>Atlantic Other (ASMFC)</u>			
Striped Bass	8%	Study	Diodati and Richards (1996)
Red Drum	5%	Study	Murphy 2005
Tautog	2.50%	Study	Simpson and Gates 1999
Weakfish	10%	Study	Multiple Studies
Atlantic Croaker	10%	Assumed	

<u>Gulf of Mexico</u>			
Red Snapper	15%	Multiple studies	Fish caught 20-40m
Red Snapper	40%	Multiple studies	Fish caught 40m +

Gag Grouper	11-42%	Multiple studies	Depending on depth zone
Red Grouper	10%	Study	Wilson and Burns 1996
Greater Amberjack	20%	Assumed	

South Atlantic			
Species	Release Mortality	Study Or Other Source?	Citation
Black Sea Bass	15%	compilation of studies	Collins et al 1999, Low 1981, and Vaughn et al. 1995, etc.
Red Snapper	41% For-Hire; 39% private recreational	Gulf of Mexico Studies	iBurns et al. 2004 and others
Vermillion Snapper	25%	Unpublished data	
Mutton Snapper	15%	Assumed	Based on similar species, including red snapper
Goliath Grouper			Not reported as a separate source of mortality
Red Grouper	20%	Assumed from Gulf of Mexico studies	Wilson and Burns 1996 and Burns et al. 2002.
Black Grouper	20%	Assumed	
Gag Grouper	25%	Studies	Rudershausen et al. 2005, Burns et al. 2002, Overton and Zabawski 2003, McGovern et al. 2005, and Wilson and Burns 1996.
Red Drum	8%	Studies	Murphy 2005, Vecchio & Wenner 2007, Anguilar et al 2002, and Gearhart 2002

Spanish Mackerel			Not reported as a separate source of mortality
King Mackerel	at 33% for live releases in the headboat fishery ; 20% of (B2 in the MRFSS		Observation; also Edwards 1996.
Greater Amberjack	20%	Assumed	
Red Porgy	8%	Study	Collins 1996.

Pacific				
<i>ROCKFISH</i>	0-10 fm	11-20 fm	21-30 fm	>30 fm
Black	11%	20%	29%	63%
Black & Yellow	13%	24%	37%	100%
Blue	18%	30%	43%	100%
Bocaccio	19%	32%	46%	100%
Brown	12%	22%	33%	100%
Calico	24%	43%	60%	100%
Canary	21%	37%	53%	100%
China	13%	24%	37%	100%
Copper	19%	33%	48%	100%
Gopher	19%	34%	49%	100%
Grass	23%	45%	63%	100%
Kelp	11%	19%	29%	100%
Olive	34%	45%	57%	100%
Quillback	21%	35%	52%	100%
Tiger	20%	35%	51%	100%
Treefish	14%	25%	39%	100%
Vermilion	20%	34%	50%	100%
Widow	21%	36%	52%	100%
Yelloweye	22%	39%	56%	100%
Yellowtail	10%	17%	25%	50%
<i>OTHER</i>				
Cabezon	7%	7%	7%	7%
California scorpionfish	7%	7%	7%	7%
Kelp Greenling	7%	7%	7%	7%
Lingcod	7%	7%	7%	7%
Pacific Cod	5%	32%	53%	97%

Flatfish	7%	7%	7%	7%
Sharks and Skates	7%	7%	7%	7%
Dogfish	7%	7%	7%	7%

North Pacific			
Pacific Halibut- Circle Hooks	3.50%	Assumed	Based on longline study
Pacific Halibut- J Hooks	10%	Assumed	Based on other marine species studies
Demersal Rockfish	100%	Assumed	