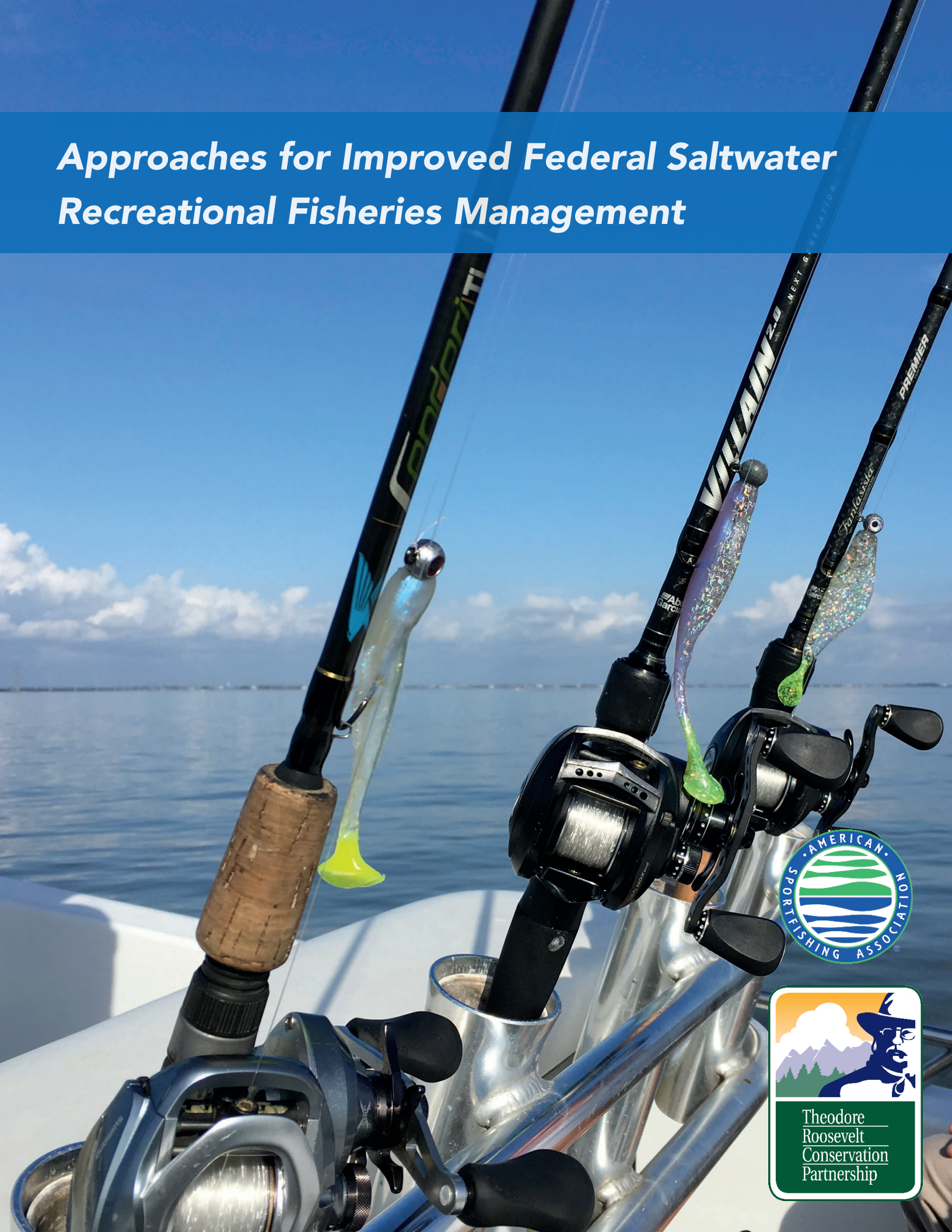
Approaches for Improved Federal Saltwater Recreational Fisheries Management



Saltwater recreational fishing is an essential part of America's conservation-based sporting heritage and culture and is vital to the economies and long-term sustainability of communities across the country. More than 11 million Americans enjoy saltwater angling annually, supporting 454,000 jobs and generating more than 70 billion in economic activity.

Anglers are also at the root of fisheries and habitat conservation in America, generating more than $1.5 billion annually in excise taxes, license fees and direct donations that result in better fisheries science, management and habitat creation and restoration.

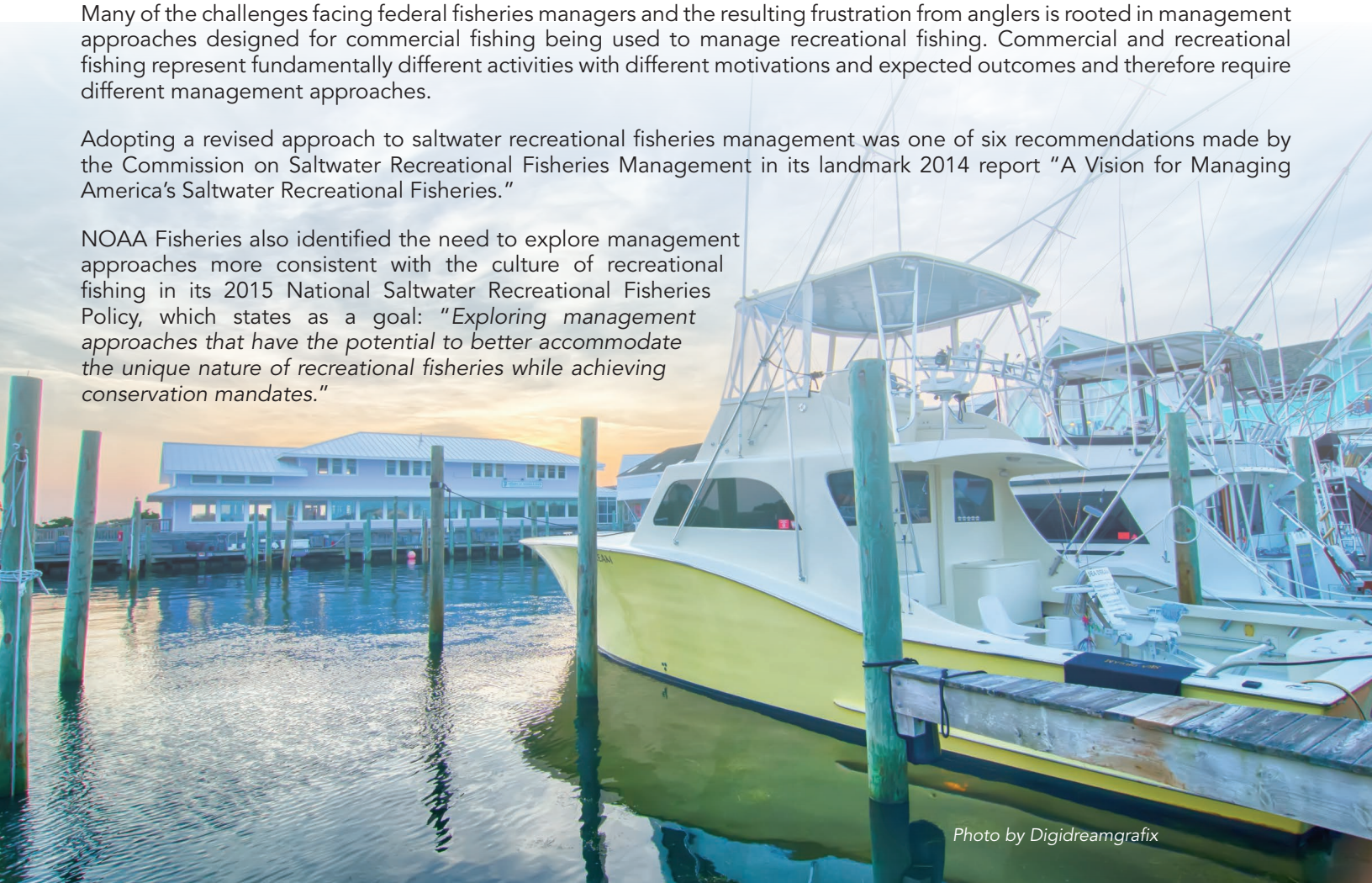
Despite the enormous popularity and positive economic and cultural effects of recreational saltwater fishing, federal fisheries managers continue to struggle to devise management approaches and data collection methods that fit the needs of anglers and the businesses and communities that support angling in federal public waters. Thanks to a host of measures to help stock recovery including limiting harvest and reducing bycatch, overfishing in the U.S. is at an all-time low and many iconic commercially and recreationally-vital species are experiencing historic increases in stock sizes and range.

However, in many cases these stock size increases have, ironically, resulted in shorter, less stable seasons for recreational fishers in federal public waters, leading to frustration and distrust of federal management among anglers and industry.

Many of the challenges facing federal fisheries managers and the resulting frustration from anglers is rooted in management approaches designed for commercial fishing being used to manage recreational fishing. Commercial and recreational fishing represent fundamentally different activities with different motivations and expected outcomes and therefore require different management approaches.

Adopting a revised approach to saltwater recreational fisheries management was one of six recommendations made by the Commission on Saltwater Recreational Fisheries Management in its landmark 2014 report "A Vision for Managing America's Saltwater Recreational Fisheries."

NOAA Fisheries also identified the need to explore management approaches more consistent with the culture of recreational fishing in its 2015 National Saltwater Recreational Fisheries Policy, which states as a goal: "*Exploring management approaches that have the potential to better accommodate the unique nature of recreational fisheries while achieving conservation mandates.*"



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Considering New Approaches

The First Workshop:

To help facilitate the goals of NOAA's National Saltwater Recreational Fisheries Policy and the recommendation of the Commission on Saltwater Recreational Fisheries Management, the Theodore Roosevelt Conservation Partnership, American Sportfishing Association and several other sportfishing conservation organizations worked with NOAA Fisheries staff from across the country to organize an "Alternative Management" workshop in Tampa, Florida May 17-18, 2016 to answer the following questions:

- Where and for what fish is current federal management not working well and why?
- What are some possible alternative approaches to that management that could work better?
- What potential legislative and/or regulatory changes would be needed to achieve management changes?

The workshop was facilitated by fisheries staff from the Florida Fish and Wildlife Conservation Commission and was attended by a wide-range of state and federal fish and game management agencies, commissions and councils, representatives from sportfishing conservation and trade organizations and academic institutions.

The meeting involved two days of detailed discussions of existing state and federal saltwater fisheries management approaches, inland fisheries management, migratory waterfowl management, state and federal fisheries data collection and federal fisheries law and policy. Participants included scientist, economists, conservation leaders and state and federal fisheries managers.

The Second Workshop:

A second workshop to discuss potential alternatives to current federal management was conducted by TRCP, ASA and their sportfishing partners June 20, 2016 in Washington D.C. The focus was to discuss the findings from the first workshop and answer questions from congressional staff working on federal fisheries law as well as staff from environmental organizations working on fisheries law and policy. Staff from the House Natural Resources Committee, Senate Commerce Committee and Louisiana Congressman Garret Graves' office participated in a morning question and answer session. Fisheries conservation staff from the Pew Charitable Trust, The Ocean Conservancy and the Natural Resources Defense Council participated in an afternoon session, continuing the effort of the TRCP, ASA and others to work with the broader conservation community to improve federal fisheries management.

Based on the two workshops, seven concepts were identified that warrant further examination to determine if they could be used in regional applications to better manage recreational fishing in federal waters:

- **Harvest Rate Management:** For many inland and some coastal fisheries, regulations are established based on a harvest rate. Using this approach, catch limits, season lengths and other regulations are set by determining the proportion of fish harvested from a particular stock based on a contemporary estimate of abundance and updated stock assessment, rather than on a poundage-based annual catch limit from a stock estimate from years ago. Harvest rate management approaches can provide more stable seasons over time compared to the current federal management approach, which is important to anglers and the angling industry.

- **Depth/Distance Based Management:** Longer recreational fishing seasons may be achieved while meeting conservation goals by setting a maximum distance from shore or a maximum depth at which a certain species of fish can be recreationally harvested. The area beyond the defined distance or depth would be closed to fishing for specific species. This approach can allow for longer seasons in the open areas while conserving the fishery by leaving the majority of the stock in areas that are off-limits to angling. This approach seemed to be most applicable to fish like red snapper because a significant portion of the brood stock generally lives on habitat in water deeper than 150 feet.

- **Harvest Tags:** Harvest tags are relatively common tools for managing big-game hunting for deer, elk and other wildlife but are largely untested as a method for limiting recreational fishing effort. In many cases, tags are issued as a way to account for animals harvested during hunting but not used to restrict access to those who want to hunt. While discussions at the workshops and beyond have identified tags as a potential option to allow harvest of fish that have very low annual catch limits, their widespread use to manage popular recreationally-sought species poses significant challenges.

- **Improved Angler Harvest Data:** In many cases federal fishing seasons are short and inconsistent due to using the federal Marine Recreational Information Program (MRIP) in a way for which it was never designed. MRIP is designed to determine annual estimates of catch at the regional level, but is now being used to estimate when annual catch limits have been reached in season, resulting in imprecise estimates. State fisheries agencies in the Gulf of Mexico have developed more precise data collection surveys that rely on more frequent in-season surveys and identify those anglers fishing for offshore species. Other data-collection improvements include the use of smartphones and electronic reporting to get more timely data. Expansion of these improved data collection methods could lead to expanded fishing opportunities.

- **Release Mortality Reduction:** Some saltwater species experience relatively high mortality rates when anglers attempt catch and release injuries caused by changes in water pressure, known as barotrauma. These discard mortalities are estimated and subtracted from catch quotas which can lead to fewer fishing days. Over the last decade there has been an effort to increase the use of barotrauma reduction devices that improve the survival rates of released fish. Voluntary or mandatory use of these devices as well as the incorporation of improved survival rates into NOAA Fisheries' catch estimates could lengthen seasons while improving the overall conservation of the resource.

- **Conservation Equivalency:** A one-size fits all approach to fisheries management across states and jurisdictions can be problematic. Anglers in one state may prefer to fish weekends while anglers in other states may want a season that is open seven days a week. Because of weather or school or work schedules, anglers in some states may prefer shortened seasons with larger creel limits than longer seasons with smaller creel limits. Conservation equivalencies give managers in different states and regions the option to tailor fishing opportunity to the needs of their anglers while still ensuring conservation targets are met.

- **Reevaluating Optimum Yield:** Optimum yield is sometimes interpreted by federal fisheries managers and regional councils as "Maximum Sustained Yield (MSY)." MSY is the maximum amount of fish that can be harvested without causing the spawning stock to decline. While this approach benefits commercial fishing for which maximum harvest is generally the goal, recreational fishing goals include having the best chance to encounter fish, perhaps catch several, hopefully a big fish and sometimes to bring some home to eat. For some recreational fishing interests, catch and release and leaving fish in the water may produce a more optimum yield than simply catching and keeping a limit of fish. Therefore, a different interpretation of "optimum yield" than MSY is warranted for most recreational fisheries.

All of these conclusions are detailed further in the body of this report. It was not the goal of the discussion to prioritize any of these potential management approaches. The goal was to identify and explore options that have been suggested in the past and evaluate new approaches that can possibly be incorporated into federal management that help achieve the goals of the NOAA Fisheries national policy as well as the Commission on Saltwater Recreational Fisheries Management marine vision report. None of these approaches are viewed as a blanket approach to resolving the challenges of federal recreational saltwater management in all regions. The hope is that these options will give regional fisheries managers and fisheries policy and lawmakers some flexibility in tailoring management to the unique needs of the different coastal regions.

Harvest Rate Management

Harvest rate management sets management targets based on the rate of removals caused by fishing, rather than a poundage-based ACL rooted in past harvest.

The current federal fisheries management approach prescribed by the Magnuson-Stevens Fishery Conservation and Management Act and interpreted by NOAA Fisheries is to set annual catch limits (ACLs) in pounds for each federally-managed fishery to achieve optimum yield. If an overage is predicted to occur or occurs, accountability measures may be triggered that require commensurate reduction in quota either in-season or in future years to account for the overage.

This approach is fitting for commercial fisheries, which are managed for yield. The commercial fishing sector of a given fishery contains relatively few harvesters, all with the same goal – to catch as many fish as possible as efficiently as possible in order to maximize profit from the sale of whatever species they harvest. Commercial landings can usually be counted or weighed in real time, therefore quotas can be enforced in real time. This allows managers to close a fishery before the allowable catch is exceeded. In short, a commercial fishery's catch can be managed in real time, based on verified landings.

Recreational fisheries, however, involve millions of individuals with diverse goals; some try to catch fish for food, some like to catch and release fish, some just fish in order to enjoy the outdoors.

There are two fundamental problems with attempting to manage recreational fisheries under the current ACL approach:

1. In most fisheries, stocks assessments are not updated frequently enough to provide annual, "contemporary" estimates of abundance
2. Angler harvest data is not available in real time

Recreational fishing participation and effort are strongly correlated with stock abundance. As fish populations increase, and fish become easier to catch, they draw more anglers into the fishery and drive up recreational effort and catch. Conversely, as populations decrease, effort and catch decline. Therefore, it is extremely important that managers have a current estimate of fish population abundance, given that recreational fishing participation and, therefore, harvest will directly respond to changes in population abundance.

Stock assessments, even on the most popular recreational stocks are done sporadically, usually every three to five years. This delay may, for example, lead to ACLs placed on a stock which are generated from a three-year-old assessment, based on four-year-old data, which likely no longer reflect the current state of the stock and the resultant allowable catch. Yet it is the current stock size, which may be significantly different than the estimate produced from an outdated stock assessment that is driving the recreational effort and catch.

This is especially problematic in a rebuilding plan where the recreational catch, driven by increasing abundance, is higher than an outdated assessment and resultant ACL would allow. A contemporary estimate of abundance may show that recreational catch is not actually harmful given the current stock size. Because managers do not account for an expected increase in angler catch as a result of increased stock size, the artificially low ACLs can be exceeded forcing the implementation of punitive management measures. Conversely, failure to detect and account for declines in abundance while maintaining regulations based on a projection of higher abundance may risk conservation of a stock.

The challenge of managing recreational fishing under the ACL approach as prescribed by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and interpreted by NOAA Fisheries is compounded by lack of timely and accurate recreational catch data. The system for estimating recreational catch, the Marine

Recreational Information Program, produces estimates, at best, 45 days after the end of each two-month sampling wave. Therefore two months pass before any real knowledge of what anglers are catching in a particular fishery can be developed, which makes it difficult to impossible for managers to make in-season adjustments to avoid overages. In addition to the time lag, these estimates often have substantial margins of error due to the inherent difficulties in sampling anglers.

An alternative approach exists that has been successfully implemented in many inland and some coastal recreational fisheries throughout the country. Harvest rate management sets management targets based on the rate of removals caused by fishing, rather than a poundage-based ACL rooted in past harvest. For primarily recreational fisheries, a harvest rate approach is more appropriate because regulations are based on the proportion of fish that are harvested from a stock, which must inherently account for the changing abundance, age structure and size structure of the stock. Harvest rate management would require annual updates on the relative fishing rates, including updating the population abundance estimate as well as annual updates of relative fishing rates and recruitment indices. If done correctly, harvest rate management also helps provide stable fishing regulations, which is preferable to anglers and the recreational fishing industry.

In addition, it does not require managing to a specific hard poundage ACL, which is a faulty management target for most recreational fisheries given the problems with timeliness and accuracy of angler harvest data.

Harvest rate management could be implemented under MSA, and should be explored for fisheries that are either primarily recreational or have a high value to recreational fishers.

Case Study:

Atlantic striped bass are managed by the Atlantic coast states from North Carolina through Maine under a Fishery Management Plan adopted by the Atlantic States Marine Fisheries Commission (ASMFC). A harvest rate approach is used for setting recreational fishing management targets.

The Atlantic striped bass stock was essentially collapsed in the late 1970's and early 1980's by a combination of factors – unrestrained harvest, ineffective minimum size limits, habitat loss and poor recruitment. In response to the precipitous decline in abundance, Congress enacted the Striped Bass Conservation Act in 1984, giving the ASMFC the authority to promulgate management measures. Ultimate enforcement of the management measures was vested in the Secretary of Commerce, with the authority to enforce a moratorium on any jurisdiction that violated the management measures.

The stock recovered to a high abundance in the late 1990's and early 2000's and has declined somewhat since, due largely to below average recruitment.

The ASMFC recognized striped bass were one of the premier recreationally-sought species in the mid and north Atlantic regions. They set commercial harvest at an historic level with a hard quota, and allowed the recreational fishery to respond to abundance by setting an allowable harvest rate. The recreational fishery went from catching 5700 metric tons (mt) when the stock was declared recovered in 1995, to a high of 14,000 mt in 2006, a nearly 300% increase in harvest in 12 years. Yet the target fishing mortality rate was never exceeded according to the stock assessments done at that time.

This important stock has recovered and largely done well for over 15 years, with recreational catch rising and falling with abundance, never exceeding the harvest rate target level and producing relatively stable fishing seasons.

An important source of data facilitates the implementation of this approach: an annual index of recruitment. This information, which provides an indication of the number of first-year fish entering the fishery, comes from an annual survey of juvenile striped bass in the Chesapeake Bay region conducted by the Maryland Department of Natural Resources. Recruitment success is a strong predictor of future population abundance, so having this information, as well as frequent stock assessments, improves the confidence and ability of the ASMFC to set regulations based on current population abundance.

Photo by Anthony Totah

Depth/Distance Management

In some fisheries where high catch rates and/or barotrauma threaten fishery sustainability and result in highly constricted fishing seasons, implementing spatial closures can extend fishing opportunities in the area(s) that remains open. Depth/distance-based management refers to a type of spatial closure that is based on a depth (e.g., 150 feet) or distance-from-shore (e.g., 20 miles) demarcation, creating a boundary beyond which one or more fish stocks would be protected from fishing pressure. Bag limits, size limits and seasons would apply in the open area. In theory, this would provide increased production offshore to replenish annual fishing within the fishing zone. In addition, this approach helps keep smaller boats closer to shore, therefore improving at-sea safety.

This approach could reduce discard mortality attributable to barotrauma because the effects of barotrauma are less for fish caught in shallower waters. The increased use of barotrauma-reducing devices could provide additional benefits and potentially increase fishing days.

For most species for which this approach may be suitable, there are current data limitations that would need to be explored further, such as: an improved understanding of fishing pressure spatially, the biological impacts of prohibiting harvest in deeper waters, and the replenishment rate of the population from unfished into fished waters.

Case Study:

Depth-based management been promoted in the Gulf of Mexico red snapper fishery for several years by former Gulf of Mexico Fishery Management Council Chairman Dr. Bob Shipp, who recently explained one way to implement the concept in an article in Sport Fishing Magazine :

"An alternative would be space restrictions. Let's suppose we restricted harvest of red snapper to 25 fathoms or shallower. The species is abundant to 50 fathoms and thrives to 100 fathoms, and is not migratory, so those deeper stocks would be protected. An initial seasonal bag and/or size limit could be established, and harvest could be monitored on an annual basis. Should fishing pressures be found to seriously deplete the shallower populations, adjustments could be made by moving the harvest limit to some shallower depth. But this concept is only possible if the quota mandate in the Magnuson Act is removed."

The quota mandate referred to above is Section 407(d) of the MSA, which requires the establishment of quotas for Gulf red snapper for the recreational and commercial sectors. However, a depth/distance-based approach could still be legally implemented as long as regulations are tied back to a quota, albeit with some difficulty in determining the appropriate depth and associated regulations based on available information.

Depth-based regulations have been successfully implemented on the Pacific coast for various species, including the recreationally-important rockfish. In 2002, the Pacific Fishery Management Council enacted area closures in the form of Rockfish Conservation Areas (RCAs) because of the critically low population sizes of seven overfished rockfish species. These areas are approximately based on particular depth contours and prohibit the take of rockfishes The locations of the RCA boundaries, which may change seasonally, are set primarily to minimize incidental catch of overfished rockfish by eliminating fishing in areas where, and times when, those overfished species are likely to co-occur with more healthy target stocks of groundfish.

To some degree, the current management scenario for Gulf red snapper has a depth/distance based strategy. For the private recreational fishery, current regulations vary among state and the federal waters, with Gulf of Mexico state seasons in waters to nine miles from shore, substantially longer than the federal season. The cumulative impact is that, in 2015, harvest in state waters accounted for 57 percent of the quota, while harvest in federal waters accounts for the other 43 percent. Given that 57 percent of the harvest was caught within 9 miles of shore from season lengths that vary from 66 to 365 days, it is reasonable to believe that similarly creating a nearshore boundary that is based on depth or distance-from-shore could produce a more satisfactory season length than the federal season (9 days in 2016) while staying at or under the quota. Such an approach would likely require a high level of consistency among all state and federal regulations.

Harvest Tags

While relatively common in hunting, harvest tag systems whereby an individual acquires tag(s) to allow for harvest of individual fish have rarely been implemented in marine fisheries management. However, this tool has a very limited capacity to improve fishing opportunities in specific cases where traditional management approaches are ineffective at constraining fish harvest to sustainable levels.

Harvest tags have been used in numerous wildlife management applications, including direct control of effort and data collection. The purpose of most wildlife tag programs is data collection, while some are directed specifically at controlling effort under a regional , statewide, or special management area quota-type limit.

In marine fisheries management, few examples of harvest tag systems exist. Tags are required for harvesting tarpon in Florida and Alabama, primarily for the purpose of promoting catch and release. A $50 pre-purchased tag must be used to harvest each tarpon. The cost of the tag discourages cavalier harvest.

Harvest tags are required for certain salmon species in Washington and Oregon. While these management systems limit total harvest by an individual angler, there is no limit on how many individuals can receive the harvest tags. The primary purpose of these systems is harvest data collection.

Implementing a harvest tag system in a marine fishery for the purpose of managing to a quota poses several significant challenges. Perhaps the greatest challenge is determining how to fairly distribute a finite number of tags. While harvest tags could be made available through an open lottery, depending on the popularity of the fish stock, an open lottery could create high demand whereby many anglers who enter the lottery do not win a tag. Because many anglers invest significantly in boats, fishing equipment, etc., there could be significant economic and social implications of creating a management system whereby anglers face a probability of not being allowed to harvest their preferred fish.

MSA and National Standard 4, may be interpreted to preclude any form of discrimination in the distribution of tags. Owning a boat, being a specific state resident or a coastal resident, or past history of fishing do not seem to be criteria to discriminate against entering a lottery.

However, the magnitude of these challenges is lessened for less popular species for which there are relatively few current and prospective anglers. For some species with a low annual catch limit and relatively few anglers, harvest tag systems may be an appropriate management system for controlling effort and acquiring accurate harvest data.

Case Study:

The South Atlantic Fishery Management Council spent several years developing an options paper that explored various approaches to create a recreational harvest tag program to closely control annual harvest levels of snapper-grouper species with "exceptionally low" recreational annual catch limits. For example, fishing for species like snowy grouper could benefit from this approach because it has a very low ACL, such that the MRIP catch estimates are highly imprecise. Tags may be the only logical means to allow a fishery for snowy grouper and still effectively constrain harvest within the ACL. However, due to the complexities associated with carrying out a harvest tag system, the Council has postponed further development. It should be noted that harvest tags have recently been discussed again at the Council but the fundamental questions remain.

Improved Angler Harvest Data

Much of anglers' frustrations with federal fisheries management stems from the inability of the federal recreational fishing harvest data collection system to provide data at the level of timeliness and accuracy needed for managing effort by quota-based ACLs. This system, which has evolved into the Marine Recreational Information Program (MRIP), was designed to determine annual catch estimates at the regional level and trends in recreational fishing effort. However, it is being used for ACL management, which requires a high level of precision and real-time data.

The National Academy of Sciences recently completed a review of MRIP, focusing on improvements made to the survey design over the last decade. The report is generally complimentary of progress made recently, including switching from surveying anglers via randomly calling household landlines, to a conventional mail survey.

Harvest estimates produced by MRIP may be sufficient to manage recreational fisheries that are frequently encountered and cover a large geographic range, including most popular inshore fisheries. However, for many offshore fisheries, MRIP may still not be capable of providing information as frequently or accurately as is necessary to meet current statutory requirements. The limitations of MRIP are particularly evident in fisheries with low ACLs, short seasons and/or where catch estimates are needed on small geographic scales (e.g., to manage state-by-state subquotas). Even the most popular offshore fisheries have a relatively low sampling rate within the overall scope of MRIP given the prevalence of inshore trips. This results in high error margins around the catch estimates for many offshore fisheries.

New data collection programs can supplement, or in some cases, replace MRIP and provide more timely and accurate data for fisheries where MRIP is insufficient. For example, all five Gulf States have developed or are developing state-specific reef fish angler harvest data programs to identify the pool of reef fish anglers and collect harvest data in, or close to, real-time. In the case of Louisiana's LA CREEL and Recreational Offshore Landing Permit programs, anglers supported fishing license fee increases to pay for the improved data collection system.

In addition, advances in smart phone technology hold the potential for anglers to log their catch and contribute significant data to the management system. While self-reported data sources have the potential for bias and errors, the NAS report provides sound recommendations for further evaluating electronic data, such as establishing a randomly selected pool of anglers who prospectively provide harvest data through electronic reporting.

Given the current limitations of MRIP for managing many recreational fisheries, supplemental or alternative data collection programs warrant additional exploration. The examples provided in this section demonstrate that additional data collection programs hold tremendous potential to provide supplementary angler catch data with significantly greater response rate and timeliness. Although there are challenges in ensuring these data sources are accurate and compatible with the needs of managers, these challenges should not overshadow the potential these programs have in substantially improving harvest data. Further explorations and investments in additional recreational data collection efforts are necessary to provide more precise harvest estimates for the purposes of management.

Case Study:

The Angler Action Program (AAP), which started in 2010, has been used in a variety of ways to improve Florida's fishery management and habitats.

The original development of the AAP was in response to a specific fisheries challenge in Florida. The southeastern part of the state suffered a historic cold front that killed millions of South Florida's native tropical and sub-tropical wildlife, including snook. In assessing the impacts of the extreme cold on snook in particular, the Florida Fish and Wildlife Conservation Commission (FWC) reached out to the Snook and Gamefish Foundation (SGF), and asked anglers to start recording catch data on their snook fishing trips.

Anglers logged data on the snook they caught and released – information fishery managers refer to as discard data. Discard data is particularly difficult to collect using traditional survey methods. Through the AAP, FWC staff had access to large amounts of new data, including the size and location of discarded fish. Time spent targeting the fish and other details were also captured.

Researchers at the FWC's Fish and Wildlife Research Institute (FWRI) took the angler data collected through the AAP and used them in an interim snook stock assessment that was released in the fall of 2010.

Soon after, SGF was asked to expand the program to include all marine species. A mobile smart device application version of AAP was created, titled iAngler, which allowed anglers to contribute data from their fishing trips for any species, anywhere in the country.

Since 2010, AAP data has been used in three snook stock assessments, the 2016 red drum assessment and the current (2017) sea trout assessment. The University of Florida recently published a study comparing AAP catch rates to those of MRIP for snook, red drum and speckled trout in Florida and found that regions where anglers log frequently, the data compares extremely favorably (Fisheries Journal, December 2016).

The AAP has also been used by Palm Beach County to collect data on the specific location of anglers within the Lake Worth Lagoon. This demonstrated the functionality of the habitat restoration projects in the area, and provided needed data proving that the projects benefit the area in multiple ways – from increased fish species and fish sizes, to increased economic activities in the area.

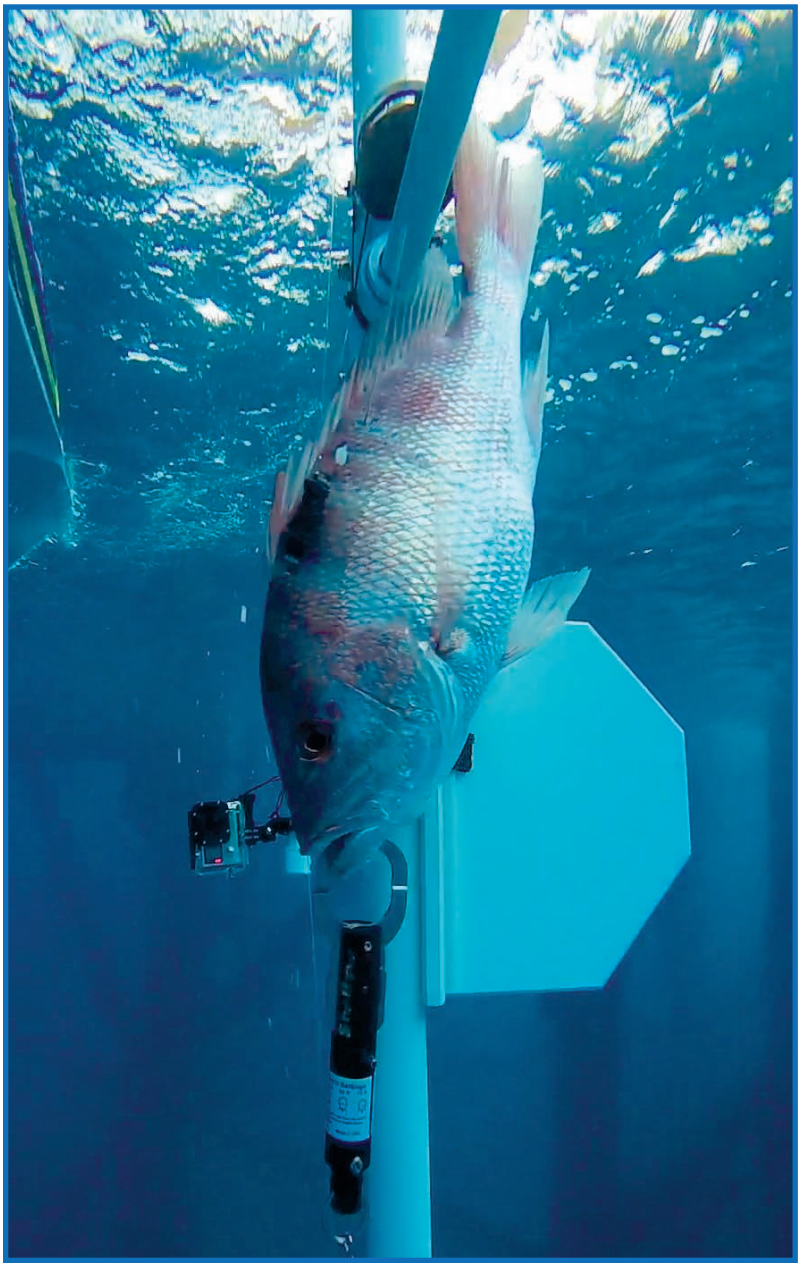
To date, SGF has brought nearly 20,000 anglers into electronic reporting through the flagship iAngler app, spin-off tournament apps, and other "skins" of the AAP that allow different clubs and businesses to collect valuable data.

Moving forward, SGF and FWRI will continue to work together to improve the AAP product, and provide needed data for commonly targeted species as well as lesser-understood species such as tripletail, cobia, barracuda, and a variety of snappers and groupers.

Release Mortality Reduction

Catch and release has become a ubiquitous conservation approach for popular recreational fresh and saltwater fisheries. While survival rates are extremely high for caught and released largemouth and smallmouth bass, red drum, snook, tarpon and many others, some caught and released fish caught offshore suffer relatively high discard mortality rates, which can reduce the size of the available quota. This is particularly true for fish that inhabit deeper water and suffer barotrauma due to the high change in pressure while being landed. For some species, this can result in many thousands of released fish dying, which not only hurts conservation but also results in fewer fish available to catch in the future.

In recent years, a variety of tools have been developed that can significantly improve the survival of fish experiencing barotrauma. As discussed earlier, depth based management could also alleviate the regulatory impacts of barotrauma by keeping anglers in shallower waters. Increased use of barotrauma reduction devices, and techniques that improve the survival of caught and released fish, either through voluntary or mandatory efforts, could reduce the discard mortality estimate and therefore provide better conservation and management. This could also allow for greater consideration of size and slot limits to increase the number of fishing days since these options currently have limited utility in some species with high mortality rates of released fish.



Various tools and techniques have been demonstrated to significantly increase fish survival. Increased implementation of these tools and techniques, as well as developing innovative ways to avoid catching fish for which harvest isn't allowed, can lead to higher quotas and therefore greater fishing opportunities.

Case Study:

Bottom fishing for several species of Pacific rockfish has been greatly restricted in recent decades, in terms of area closures and species-specific regulations. High discard mortality is a key factor contributing to these restrictions. In 2012, the Pacific Fishery Management Council tasked its Groundfish Management Team to investigate the research on rockfish barotrauma mitigation for canary rockfish, cowcod and yelloweye rockfish, and propose depth-based mortality rates associated with release using descending devised.

Partnering with the southern California charter fleet, researchers tested short- and long-term mortality associated with the use of descending devices for fish caught in deep water. The findings from this research allowed the Council to employ lower mortality estimates. For example, the mortality estimate for yelloweye rockfish caught in 30-50 fathoms was reduced from 100 percent to 28 percent.

Expanding the use of barotrauma reduction devices and accounting for their associated improved survival has allowed the Pacific Council and Pacific states to expanding fishing access. For example, in 2016 the Oregon Dept. of Fish and Wildlife was able to avoid a more dramatic in-season closure of their recreational fishery for rockfish when they successfully encouraged anglers to use descending devices. Starting in 2017, use of descending devices when fishing for groundfish in Oregon and Washington will be mandatory.

Conservation Equivalency

Because of regional differences in a fish stock's population dynamics and angler preferences, one-size-fits-all management whereby regulations for a given fish stock are consistent across all states/jurisdictions can create management problems. While management and conservation may necessitate a region-wide catch level, states or sub-regions may have various preferences for how to reach their share of the catch level. For example, in some states anglers may prefer a shorter bag limit in exchange for a longer season while anglers in another state may prefer the opposite. Or season dates may be set for a migratory species in a way that anglers in certain regions rarely get the chance to encounter the fishery.

This approach could be employed under the federal fisheries management system. For example, a regional fishery management council would set a catch limit and associated regulations, such as one fish per day with a four month season. A state could propose a two fish per day with a 2 month season off its coast, but would have to demonstrate it met the same goal as the council's regulations. Providing states the ability to tailor regulations to the preferences of the state's recreational fishing community and account for regional disparities in fish stocks can better achieve socioeconomic benefits while maintaining conservation goals.

Case Study:

In many of its fisheries, the Atlantic States Marine Fisheries Commission (ASMFC) employs the concept of conservation equivalency, which allows states the flexibility to develop alternative regulations that address specific state or regional differences while still achieving the goals and objectives of fishery management plans. Conservation equivalency is defined by ASMFC as:

> *"Action taken by a state which differ from the specific requirements of the FMP, but which achieve the same quantified level of conservation for the resource under management."*

In its broadest sense, ASMFC sets the conservation goal (e.g., a targeted level of fishing mortality) and allows the states to come up with their own measures (e.g., various combinations of size limits, gear restrictions and season length) to meet that goal. The appropriate management board determines whether the state's proposal achieves conservation equivalency.

Photo by Chas Champagne

Reevaluating Optimum Yield

While angler motivations may vary, in general anglers are interested in the opportunity to encounter and catch fish, sometimes to release and sometimes to keep, and perhaps even catch a trophy sized fish. Abundance and age structure are key elements to recreational fisheries since those factors govern both the rate of encounters and the size of the fish caught. Maximizing yield has little meaning in many recreational fisheries. Because more conservative fishing mortality targets produce increased abundance and a better age structure, in many fisheries they actually lead to a greater number of satisfied anglers.

Current law includes the requirement of managing towards optimum yield, which in most fisheries has been surrogated by maximum sustainable yield (MSY). The concept of producing the most yield in pounds is antithetical to managing many – but not all – recreational fisheries. MSY-based management is a risk-prone management strategy and is inappropriate for a fishery which emphasizes encounters over yield. An angler who manages to land a limit of fish over the course of a day, and releases a dozen others, will be far more satisfied than an angler who bags a limit, but catches nothing more. For anglers, the concept of optimum yield may include fish left in the water.

The MSY approach, and particularly the practice of setting ACLs just below MSY, arises largely from the commercial sector's desire to efficiently remove fish from a population. MSY management, by definition, attenuates the age structure and produces a population dominated by younger fish, so that a fishing rate set slightly below F_{msy} will result in a large stock of young fish and nearly the same yield as a population with more larger fish which, by definition, must be left in the water longer before being harvested from the larger stock.

It is worth noting that few, if any, inland fish or wildlife species are managed at or near maximum sustainable yield. They are generally managed more conservatively. One reason this is more readily accepted by inland fishers and hunters is there is no commercial sector competing for the same resource. Most anglers would gladly forego harvest in order to keep a population healthy, but that is a much tougher argument when there is another sector competing for those fish left in the water by anglers.

In general, recreational fisheries should be managed for abundance and age structure, which maximizes encounters, not yield. This dictates an approach that sets mortality targets below $F_{msy,}$ sometimes far below. Current law defines optimum yield in a way that allows catch limits to be set at levels lower than MSY:

> *The term "optimum", with respect to the yield from a fishery, means the amount of fish which—*
>
> *(A) will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities, and taking into account the protection of marine ecosystems;*
>
> *(B) is prescribed as such on the basis of the maximum sustainable yield from the fishery, as reduced by any relevant economic, social, or ecological factor; and*
>
> *(C) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the maximum sustainable yield in such fishery.*

Unfortunately, these alternative levels are seldom employed effectively in practice, as managers typically base regulations on an MSY approach.

Case Study:

Recreational fisheries respond to population abundance. As populations increase, and fish become easier to catch, they draw more anglers into the fishery and drive up recreational effort and catch; as populations decrease, effort and catch decline. In the example below, angler effort (in catch/day) and the estimated abundance of fully recruited (age 4+) South Atlantic black sea bass are illustrated from 1981 - 2011. In this example, there is a very good relationship between abundance and angler effort. It is worth noting that the fishing season was 365 days until 2011, when it was reduced to 180 and 95 days in 2012.

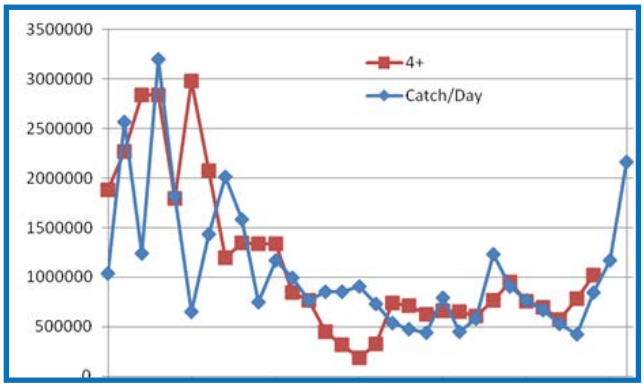


Figure 1. Black sea bass recreational catch/day and catch of 4+ fish over time. John Carmichael, SAFMC

Next Steps and Conclusion

The goal of the workshops and this report is to present options to federal fisheries law and policy makers, federal and state managers and public stakeholders that will continue to guide recreational fishing management toward approaches that are better suited to the cultural, economic and conservation needs and goals of the angling community. While the workshops were labeled as "alternative management" discussions, all of the conclusions drawn are based in some form of existing, successful fish and game management approaches.

As detailed in the descriptions of the seven options, some of these ideas can be incorporated into federal management simply by changing the mindset that hard quotas based in pounds are the only way to ensure the conservation and long-term sustainability of saltwater fisheries. Other ideas may require a change in federal law in order to be viable options. The TRCP, ASA and its partners in sportfishing advocacy and conservation including The Coastal Conservation Association, National Marine Manufacturers Association, Center for Sportfishing Policy, Congressional Sportsmen's Foundation and many others are committed to working with NOAA Fisheries, Congress, state fisheries management agencies, regional fisheries management councils and commissions, the broader conservation community and the public to ensure these options and potentially others are fully explored and considered in order to improve fisheries management, conservation, long-term sustainability and the continued holding of our nation's fisheries in the public trust.

For more information please visit our websites below:

www.trcp.org **www.asafishing.org**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