Amendment 18 to The Snapper Grouper Fishery Management Plan, I do support the implementation of a LAP program for Black Bass pots and Golden Tilefish, yet I believe that current fisherman who fish this sectors should be granted and allocated their shares based on their historical productivity and new applications for the fishery would get any remaining shares or allocations. I have spoken to golden tile fishermen who have no problem with slowly reducing their productivity over a span of several years. I do support the northern expansion of the Snapper-Grouper Management Plan to Virginia and northward. On the Snowy/Gag allocations, I believe that each state department of natural resources should be the issuing agent of federal tags for such fish. It would be a simple process for tag application, and would be a data point for landings information. I support the creation of such to eliminate confusing and mismanagement of resource while being fair and equitable to each state of the South Atlantic. Of the data reporting, I support the current amendment. All data should be interpreted as Commercial, Recreational, and For-Hire for their sectors. I support the changes to the Wreckfish Individual Transferable Quota, yet I believe it should come to no cost to the quota holders.

In conclusion, I hope that my comments have helped the council in making further decisions. Thank you. Below you find an article that I recently wrote for Vita Viridis publication from Harvard's Herbarium, Vol 1. Issue 6. Dec 2008. I hope that you enjoy it.

Signed,
Joshua Giordano-Silliman

The Color of Sustainability: Red, White, Blue, and Green

by: Joshua S. Giordano-Silliman
Naturalist, Charleston, South Carolina

What color does society traditionally associate with sustainability? I believe that people have come to the consensus that it is green or of a green/brown complex.

Yet this is where I disagree. In my opinion, the color of sustainability should stand as a symbol of responsible resource management, technological exploration, alternative energy use and development, mass reforestation, and the implementation of socially and ecologically balanced economic measures. True, this isn't a color description, but it is my perspective on what the definition of the color of sustainability should include. Through my eyes, it is a red, white, blue and green sustainability.

From fishing the estuaries close to land and beyond, gathering oysters in the winter from the banks, casting nets for shrimp in the fall, our blue ocean is an intrinsic part of my own view of sustainability. For there is plenty of bounty to be had, and every time I wander the vast openness of the sea I claim the gifts from these waters.

With our slow spin of the planet among the mist of warm sun rays and the tug of our moon, this sustainability is put into motion. It is this blue that changes to a precipitous white and develops the green/brown complex, which leads to life, consciousness, and understanding.

I was fortunate enough at a young age to experience fishing offshore of my home. It was a sense of pride to have caught large quantities of fish for my family. It was completing a circle from growing a victory garden to harvesting from the sea. I have to thank my father for teaching me from the start. It was the first trip on the Carolina Clipper with my 'sea daddy' Captain Randolph Scott at the grand age of eight, that I first consciously realized the scope of human activities on a different scale. On the way back in from being approximately 40 miles offshore, I had to ask the first mate, Pete, out of curiosity, "What happens if all the electronic equipment goes out, how will we get back?" He joking said, "That's easy, we just look for the haze on the horizon in relation to the sun." Being young I didn't understand at first. So I sat back and watched the horizon. Slowly enough, it began and got bigger, the haze of Charleston. We were headed directly for it!

Through the course of twenty-one years of watching for the haze on the way in from fishing, I have seen it change color, shape, and size. I know it isn't going away, but I know the smaller it is, the better off we all are.

Another experience at a young age taught me how the blue and green/brown complex interact. It was Hurricane Hugo on September 21st, 1989 that I endured a category 4 storm at ground zero. Around midnight the eye came ashore and we went outside to look. It was an eerie mist, with no wind blowing yet it could be heard from afar. I was ten years old. That storm destroyed some of the largest carbon sinks in my hometown. Our ordinances protected such beautiful trees from human-made destruction, yet it was the blue taking from the green, with plenty of white precipitation involved. Is this the preparation for the blue to take back the green?

The ocean has changed in the past. One could drive over one hundred miles inland out of Charleston and find sandhills and seashells, which once were by the sea shore. Some of my favorite bottom fishing spots offshore was once dry land. The ocean is a key player in the cycling of carbon on this planet. It is increasing in size to sink more carbon dioxide. I believe part of that is accelerated by humans and their evolved status within the tropic levels of consumption.

And like blue, red regulates and interacts with the green/brown complex within my color view of sustainability. Red represents fire and solar rays which are the physical, chemical, and energetic changes of life. From organic back to inorganic, either as bone meal or wood ash, fire is the element of energy release and purification. Fire use in ecological restoration projects have proven to be successful to regain plant species that were considered lost under fire suppression management regimes. Fire-red's interaction can reset the green/brown complex in the absence of blue or white. And after we see the resetting through fire can the solar ray red further augment and drive the green/brown complex. Solar ray red is the energy loader of carbon based life. From the red wave length, which ranges from 680 nm to 700 nm, the great bonds of blue are broken properly, the oxygen we breathe is made, and carbon dioxide is fixed into the building blocks of life, all in the name of photosynthesis.

Where does this leave white within the color model of sustainability? Simple: white is the physical transformation of blue. It is our rivers, streams, clouds and snow covered peaks. It can reflect and refract the solar red either into space or on to the surface. White and blue together make up the hydrologic cycle. If contained properly the white/blue will absorb energy and release it. However, there is a second hue of white that exists within my model of sustainability. The second hue of white tends to be intense and short lived, and has a direct energy interaction within the green/brown complex. For it is lighting; it is the origin of red fire and it converts atmospheric nitrogen to nitrate compounds. Once the nitrate bonds with free hydrogen, it is ready to use within the green/brown complex. Those nitrates (NO_3-) are the cornerstones of growth within the green/brown complex. Without nitrates, other useable nitrogenous forms, free oxygen and water, our carbon fixation becomes limited; the same could be said for the reverse of the reaction, decomposition.

Through my seven years of studying horticulture and working and observing this living rock we call 'Earth,' I've seen for myself how this large conscience web of life is constantly being created and re-created. At the center of the web is me, and like a fly that is greatly entangled, I am entrapped by my civil nature (which is not natural). To escape the entrapment, I have to become aware, conscience, and cautious of my actions within the web of life. It doesn't take "thinking outside of the box," it takes "making the box bigger." The bigger the box becomes the harder it is to deny that it exists and slowly everyone's consciousness becomes interlocked. The interlocking is a civic duty and a patriotic response to the world that assures that future generations will be safe and have bounties to claim like the previous generations.

In conclusion, I would urge others to step back for a moment and ask oneself, "What is my color of sustainability? Is green the most suitable color of sustainability? Where am I within the web of life versus a calculated carbon footprint that has a monetary tradeoff system? How do I make the box bigger? What can I do to spread my patriotism of sustainable life?" For me, this article is only the tip of my actions. It is one of the most important actions as it begins to make people think, and as a proud American, it couldn't be anything else then a Red, White, Blue, and Green sustainability.

Mr. Giordano-Silliman - an avid fisherman, horticulturalist and innovator - lives and observes nature in Charleston, South Carolina. (Hortfire@yahoo.com)

Quote of the Month....

November 20-December 3, 2008 Harvard University Gazette/11

The Earth today may be at the brink of another step, Langmuir said. Complex life has evolved into intelligent life that dominates the planet – ecosystems, food webs, and energy flow – as no species ever has before.

Whether the planet takes the next step or not may depend on us. If we recognize humanity is an integral part of the planet and begin working for a healthy Earth, then planetary evolution could move forward to some unknown future.

On the other hand, Langmuir said, if we continue to view the Earth as something that is separate, that we merely use, then the resulting practices could damage the environment enough to stall planetary evolution, even causing it to fall back to a level where it supports just microscopic life.

"The story of the Earth is our story. We are intimately connected [to the Earth] in every fiber of our being, in every breath we take. We're inseparable from the Earth," Langmuir said.

"What lies behind us and what lies before us are tiny matters compared to what lies within us."
- Emerson

Following are comments on SG Amd 18:

I am a lifelong (>60) recreational fisherman with over 20 years in commercial fishing from NC to the Gulf of Mexico. I hold NC state permit/licenses as well as a variety of Federal permits.

-golden tile limited access
There should be no limited access in golden tilfish, especially when using such historical catches to be so recent. Many of us have moved into other fisheries and thereby gave relief to that fishery in order to rebuild. We would be punished for conservation efforts. Leave it status quo and it will sort itself out or shut it down for all and illegal to land if "more participation makes it harder to control." The recreational fishermen landing them are not being monitored or accountable.

I believe long lining should be eliminated in this fishery.

-Extending S-G north
I agree but believe the quotas and allocations should be extended as well not keeping current quota and allocations and then dividing up with more territory and fishermen

- Snowy Grouper, golden tile and grey tile
Should be shutdown for all until rebuilt because recreational cannot be monitored and accountable and there are too few fish for commercial to survive on -- let time rebuild the fish and you require better accountability of recreational take.

Data - Must be improved for recreational or shut them down or give their opportunity to harvest via the same type programs fish and wildlife do via tags, lotteries, certain harvest days, places, etc.

Require accountability by x% via logs or call-ins that are mandatory and randomly audited and have strict penalties such as loss of saltwater fishing licenses plus fines.

Strenghten Charter and Headboat reporting data collection with accountability and enforceability.

-Wreckfish ITQ
Don't do anything with it until a stock assessment has been done.

An advisory panel and/or survey of all current shareholders should be the starting point of any changes or suggestions to change.

A federal buyout should be pursued if this ITQ is either done away with or extended north because many of the original shareholders had a big investment in gear, as well as buying additional shares/coupons to hang in when the market collapsed on wreckfish and may need to recover some of that loss of investment.

Thank you,
Mike Merritt

Public hearing/ Scoping..Amendment 18

ACL's.... First off I find it both absurd and blatant that the council is wasting time seeking public comment on ACL's in fisheries that are NOT overfished when there are fisheries that ARE overfished at least according to the council that they still haven't done the same for. For instance we are now in year three of the commercial rebuilding of the snowy grouper with the hardships apparent in my area (N.C.), and yet the recreational overages continue with no apparent letup since this council chooses to put the hardships squarely on the industry exclusively. With the summer season fast approaching, it is quite obvious that the council will be remiss in continuing this inequity (charade) for another season.

Allocations by sector ..... The one thing that needs to be remembered when this is done is that recreational and for hire are one and the same. So if allocations are made between these three sectors, it should be understood that the recreational; and for hire are sectors are dividing up the recreational history and not coming after commercial history.

Limiting mortality..... The one thing that continues to jump of the page anytime I read this approach is how does this happen recreationally without gear alterations (eliminating multi hook rigs) in addressing stocks that demand 1 fish bag limits? With these fisheries so often mixed, (but not always) the issue will not be resolved until this is addressed.

As for the commercial aspect of this, size limits should be off the table in lieu of trip limits. It is always in the interest of the fishermen to target the larger size considering the price differential, but they should still be required to keep what they catch to cut down on discards

Amendment 18......

Limited Participation in Golden tile and Sea Bass.... Since I have as a fisherman always understood that my versatility is my saving grace, I naturally always bristle when I am told that I potentially will be phased out of a fishery. In the course of a year I may enter as many as 15 fisheries in my area, and contrary to managements view, the resource is better off for that ability. To "focus" as limited entry will ultimately require as management continues to pare down opportunities is both detrimental to the fisheries, the fishermen and the communities that they support.

As for sea bass which I have considerable history prior 2002, there also needs to be consideration of historical hook and line fisheries that participated in the northern sector and takes advantage of primarily Large and Jumbo fisheries.

This issue leads into another issue on this agenda or "regional autonomy" by state in all South Atlantic fisheries. Be it snowies, sea bass or b-liners, since fisheries are inherently different in Fla. v/s N.C. each state should be given it's historical share "catch history" and allowed as much flexibility as necessary to optimize it's potential.

Golden Tile fishing year.... Should be administered to give all states equal opportunity.......

Wreckfish...... This fishery is a prime example of the failure that will be LAP's ......where but one of the five permits remaining is active. Is this kind of consolidation what we want with our fisheries...where a few individuals hold reign over this nations resources.

In my area I catch wreckfish in as little as 55 fathoms as does every recreational and commercial fishermen that goes there as well. Is allowing the one permitted individual still active in the S/A sole access to this resource that is literally coming out of the woodwork ....is it .logical when everyone else is required to throw the dead ones back in the name of conservation? If you think so then you could probably qualify to be a Council member within the South Atlantic council......... or maybe even get a job with Environmental Defense pushing LAP's................

jeff oden
Hatteras N.C.

Subject: Red Snapper/Grouper Fishery

To whom it may concern:

Upon reviewing the proposed changes to the Red Snapper/Grouper regulations, I believe the agencies current strategy is ill advised and at least needs further/more reliable research. I believe your sampling techniques are outdated and don't represent an adequate cross section of recreational fishermen across the state. I believe the current bag limits/regulations are adequate until someone can prove with reliable accuracy that there has been a substantial reduction in these species.

Thanks,

Joe Wallis
904-993-3725

Dear Mr. Mahood,

On behalf of Environmental Defense Fund, I respectfully submit these scoping comments on Amendment 18 to the Snapper Grouper Fishery Management Plan. I am also attaching two documents referenced in the comments.

Sincerely,

Eileen Dougherty

<<EDF Amendment 18 Scoping Comments 02-06-2009.doc>>
Attachment A

<<Can Catch Shares Prevent Fisheries Collapse_Costello et al 2008_Science.pdf>>

Attachment B

<<Oceans of Abundance_Final.pdf>>

Eileen W. Dougherty
Fisheries Policy Specialist
Environmental Defense Fund

2182 Edisto Avenue

February 5, 2006

Mr. Robert Mahood
Executive Director
South Atlantic Fishery Management Council
4055 Faber Place Drive, Suite 201
North Charleston, SC 29405

Re: Scoping for Amendment 18 to the Snapper Grouper Fishery Management Plan

Dear Mr. Mahood,

On behalf of Environmental Defense Fund (EDF), we commend the South Atlantic Fishery Management Council (Council) for its continued consideration of individual fishing quotas and other catch shares programs. With mounting evidence that catch shares are a proven management tool and with growing support from fishermen in the South Atlantic region, the Gulf of Mexico and nationwide, we strongly urge the Council to move forward with the development of catch shares options for golden tilefish, black sea bass and other species in the snapper grouper complex. We also encourage the Council to carefully consider catch shares as a possible management tool for many other South Atlantic species as well, as they allow more flexibility for fishermen, help alleviate economic declines in fisheries, and offer an alternative to derby-style fishing, long season closures, trip limits and large area closures.

You may have seen the research study published last September in the journal *Science* (Attachment A) that found that fisheries using catch shares management were healthier, safer, and less likely to have high levels of bycatch. The recent report *Oceans of Abundance*—developed by an independent, bipartisan working group consisting of 23 prominent leaders in government, fisheries science, academia, management, policy, business and conservation—recently recommended that catch shares be considered for use in all fisheries in the United States (Attachment B). EDF and MCBI, two leading ocean conservation organizations, convened the working group to raise the profile of the crisis in the world oceans, and to demonstrate the enormous opportunity to sustain fish populations catch shares.

To this end, we respectfully submit specific comments in regard to scoping for amendment 18.

Golden Tilefish: We strongly urge the Council to fully analyze a catch shares option for the commercial golden tilefish fishery in addition to an endorsement option as a part of Amendment 18 such that fisheries managers, Council members and fishermen understand what each program offers in advance of making a decision that affects the long-term livelihoods of fishermen and the health of the resource.

While an "endorsement" option may prevent overcapitalization, it will not end the increasing "race-to-fish" or eliminate the need to impose ever more restrictive management measures to safeguard against overfishing. In contrast, a catch shares program prevents overcapitalization of the fishery, ends the "race-to-fish," provides a way for fishermen to lower costs and increases flexibility for fishermen to fish when prices are high, the market is right and weather conditions are good. A catch share program can also eliminate trip limits, create an asset for fishermen and foster a long-term stake in the health of the fishery. In sum, a catch shares program can achieve conservation and economic objectives for the fishery that an endorsement option will not.

We do not oppose a change in the start date to the golden tilefish fishing year. However, coupling a new start date with a catch shares program is the most effective way to increase access and improve the long-term profitability of the fishery for longline golden tilefish fishermen in North and South Carolina and hook and line fishermen in Florida.

Black Sea Bass: We also urge the Council to analyze a catch shares option for black sea bass in combination with other proposed options to limit participation in the fishery. Catch shares are an important tool for maintaining both the health of fish stocks while maintaining or improving the economic viability of the fishery. Efforts that simply limit the number of participants or amount of gear may not prevent a “race to fish,” which can have serious consequences for the fishermen and the resource. Often quota systems take the place of trap limits or trip limits.

We also support a control date for the black sea bass trap fishery. A control date helps to ensure new entrants to the fishery are aware of potential future limits on the fishery. We also support potential soak limits. Reports from fishermen suggest that longer soak times increase mortality of both legal and sublegal sea bass without increasing the number of fish they catch. We strongly support measures that encourage responsible fishing and maintain and/or improve the economic viability of the fishery.

Wreckfish Individual Transferable Quota (ITQ) Program: We support a Council review of the wreckfish ITQ in order to both bring the ITQ into compliance with the 2006 reauthorized MSA and to initiate regular reviews of the program, which are key to highly functioning catch shares programs. Because wreckfish ITQ holders support continuing the program, and given the success of catch shares management in other fisheries, we oppose any proposals to eliminate this program. Instead, we favor a program review that will assess the strengths and weaknesses of the current wreckfish ITQ program and will provide guidance to the Council on whether and how to strengthen the program. Catch shares management is an inherently flexible management tool and changes to the program should be able to amend the program to address current concerns and to achieve conservation and other objectives for the fishery.

Potential Catch Shares for Golden Crab Fishery: Commercial fishermen participating in the golden crab fishery have expressed interest in exploring, and possibly developing, a catch shares for that fishery. At a recent industry meeting hosted by Environmental Defense Fund (EDF) at the request of golden crab fishermen, Council member Tony Iarocci, Council staff economist Kate Quigley, EDF staff and fishermen explored the possibility of a catch shares program. Initial analyses suggest that catch shares management for the golden crab fishery could be designed to prevent overcapitalization of the fishery and future overexploitation of the resource. A catch shares program would also complement the proposed Habitat Area of Particular Concern (HAPC) for deepwater corals, which is adjacent to golden crab fishing grounds. We encourage the Council to make consideration of a catch shares program for this fishery a priority.

The recent gulf grouper and tilefish IFQ fishermen referendum conducted by the Gulf of Mexico Fishery Management Council in December showed resounding support among fishermen for catch shares management. With mounting support for catch shares both from Councils and fishermen around the country, we look forward to the Council again becoming a leader in implementing management measures that ensure healthy and profitable fisheries. We look forward to working with the Council and fishermen on well designed catch shares fisheries and encourage the Council to dedicate staff and meeting time to exploring catch shares for a number of fisheries in the South Atlantic region.

Sincerely,

Eileen Dougherty
Fisheries Policy Specialist

Kate Culzoni
Economic Business Analyst

cc: Dr. Roy Crabtree
Duane Harris

Can Catch Shares Prevent Fisheries Collapse?
Christopher Costello, *et al.*
Science **321**, 1678 (2008);
DOI: 10.1126/science.1159478

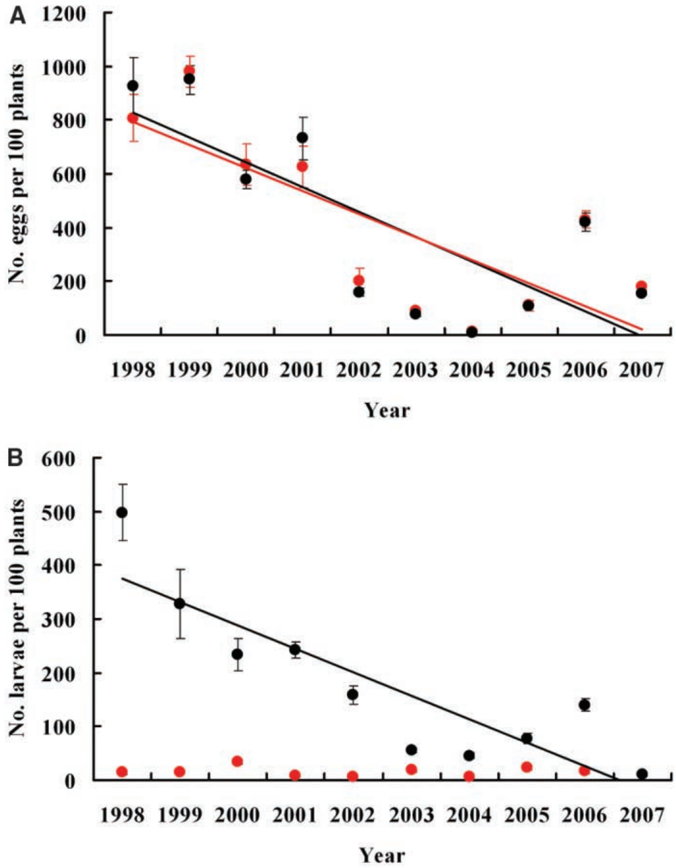

Fig. 3. Egg and larval densities of *H. armigera* on cotton at Langfang site, Hebei Province, China, from 1998 to 2007. (**A**) Relation between egg density on Bt cotton (red circles) and non-Bt cotton (black circles) and planting year of Bt cotton. Linear model on Bt cotton (black line), y = 185,476.90 – 92.42x, F = 69.05, df = 1,58, P < 0.0001, R^2 = 0.54. Linear model on non-Bt cotton (red line), y = 171,365.94 – 85.37x, F = 62.59, df = 1,58, P < 0.0001, R^2 = 0.52. (**B**) Relation between larval density on Bt cotton (red circles) and non-Bt cotton (black circles) and survey years. Linear model on non-Bt cotton (black line), y = 87,107.86 – 43.41x, F = 97.56, df = 1,58, P < 0.0001, R^2 = 0.63. Data are means ± SEM. There are six samples for each point in the graphs.

farmers. In China, a multiple cropping system consisting of soybeans, peanuts, corn, and vegetables is common. These crops also serve as hosts for *H. armigera*, and, because they do not express Bt toxin, they serve as refuges for nonresistant insects (*10*). Because cotton is not the only host crop, Bt cotton comprises about 10% of the major host crops in any province or throughout northern China. This accidental approach to refuge management appears to have, so far, warded off the evolution of resistance (*10*). Nevertheless, as a result of decreased spraying of broad-spectrum pesticides for controlling cotton bollworm in Bt cotton fields, mirids have recently become key pests of cotton in China (*18*, *19*). Therefore, despite its value, Bt cotton should be considered only one component in the overall management of insect pests in the diversified cropping systems common throughout China.

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20. This research was supported by 973 Projects Grant (2007CB109204) from the Ministry of Science and Technology of China and the National Natural Science Foundation of China (30625028). We thank A. M. Shelton (Cornell University) and two anonymous referees for comments and suggestions.

Supporting Online Material
www.sciencemag.org/cgi/content/full/321/5896/1676/DC1
Materials and Methods
Figs. S1 to S3
Table S1
References
Data Files S1 to S7

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10.1126/science.1160550

Can Catch Shares Prevent Fisheries Collapse?

Christopher Costello,[1]* Steven D. Gaines,[2] John Lynham[3]†

Recent reports suggest that most of the world's commercial fisheries could collapse within decades. Although poor fisheries governance is often implicated, evaluation of solutions remains rare. Bioeconomic theory and case studies suggest that rights-based catch shares can provide individual incentives for sustainable harvest that is less prone to collapse. To test whether catch-share fishery reforms achieve these hypothetical benefits, we have compiled a global database of fisheries institutions and catch statistics in 11,135 fisheries from 1950 to 2003. Implementation of catch shares halts, and even reverses, the global trend toward widespread collapse. Institutional change has the potential for greatly altering the future of global fisheries.

Although the potentially harmful consequences of mismanaged fisheries were forecast over 50 years ago (*1*, *2*), evidence of global declines has only been seen quite recently. Reports show increasing human impacts (*3*) and global collapses in large predatory fishes (*4*) and other trophic levels (*5*) in all large marine ecosystems (LMEs) (*6*). It is now widely believed that these collapses are primarily the result of the mismanagement of fisheries.

One explanation for the collapse of fish stocks lies in economics: Perhaps it is economically optimal to capture fish stocks now and invest the large windfall revenues in alternative assets, rather than capturing a much smaller harvest on a regular basis. Although this remains a theoretical possibility for extremely slow-growing species

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(7), it remains rare in reality. A recent study reports that under reasonable economic parameterization, extinction is suboptimal (even with low growth rates) and that biomass under economically optimal harvest is larger than that under maximum sustainable yield (*8*).

If global fisheries contain large potential profits [perhaps a present value of $1 trillion (*9*)], yet the profits are only realized if the fisheries are managed sustainably, why are actively managed fisheries systematically overexploited? The answer lies in the misalignment of incentives. Even when management sets harvest quotas that could maximize profits, the incentives of the individual harvester are typically inconsistent with profit maximization for the fleet. Because individuals lack secure rights to part of the quota, they have a perverse motivation to "race to fish" to outcompete others. This race can lead to poor stewardship and lobbying for ever-larger harvest quotas, creating a spiral of reduced stocks, excessive harvests, and eventual collapse.

Examining specific cases, Beddington *et al.* (*10*), Hilborn *et al.* (*11*), Grafton *et al.* (*12*), and Griffith (*13*) argue that rights-based fisheries reforms offer promising solutions. Rather than only setting industry-wide quotas, fishermen are allocated individual rights. Referred to as catch shares or dedicated access privileges, these rights can be manifest as individual (and tradable) harvest quotas, cooperatives, or exclusive spatial harvest rights; the idea is to provide—to fishermen, communities, or cooperatives—a secure asset, which confers stewardship incentives. Most readily implemented within national jurisdictions (that is, inside 200 miles), some international agreements attempt to serve a similar function in international waters. Although both theory and empirical evidence suggest a robust link between catch shares and economic performance of a fishery (*14*, *15*), the link with ecological performance is more tenuous. Even so, Sanchirico and Wilen (*16*) argue that "It is widely believed and supported by anecdotal evidence that once fishers have a financial stake in the returns from sensible investment in sustainable practices, they are more easily convinced to make sacrifices required to rebuild and sustain fisheries at high levels of economic and biological productivity." A recent report provides examples consistent with this widely held belief (*17*). We tested the hypothetical causal link between the global assignment of catch shares and fisheries sustainability.

Whereas individual fishing rights have been implemented on small spatial scales in traditional cultures for millennia, the adoption rate in major fisheries has accelerated since the late 1970s. To test the efficacy of catch shares, we assembled a global database of 11,135 commercial fisheries and determined which fisheries had instituted catch shares from 1950 to 2003. We matched this institutional database to the same harvest database (*18*) used to assess fisheries collapse by Worm *et al.* (*6*). Our objective is to answer the question: Can catch shares prevent fisheries collapse?

In their widely cited contribution, Worm *et al.* (*6*) correlate the species richness of LMEs with fisheries collapse. They define a fishery as collapsed in year *t* if the harvest in year *t* is <10% of the maximum recorded harvest up to year *t*. Using this definition, ~27% of the world's fisheries were collapsed in 2003. Extrapolating this trend into the future, Worm *et al.* (*6*) find that 100% of the world's fisheries could be collapsed by 2048. Although this highly controversial projection (*19*) captured most of the attention from this article, a larger focus of the work was the role of ecosystem biodiversity in preventing collapse. Fisheries in more biodiverse regions were less likely to be collapsed at any given point in history. Unfortunately, however, this greater resilience to human exploitation does not change the ultimate conclusion. Biodiversity does not prevent collapse; it merely delays it.

In our analysis, we expanded beyond the characteristics of the ecosystem to consider the characteristics of the regulating fisheries institutions, simultaneously controlling for the ecosystem, genus, and other covariates. To assemble our catch-share database, we searched the published literature and government reports, interviewed experts on global fisheries, and vetted our final database with a diverse array of researchers. In total, we identified 121 fisheries managed using catch shares—defined as variations on individual transferable quotas (ITQs)—by 2003 (*20*). These work by allocating a dedicated share of the scientifically determined total catch to fishermen, communities, or cooperatives. This provides a stewardship incentive; as the fishery is better managed, the value of the shares increases. By analyzing the data at the fishery level [rather than the aggregate level, as in (*6*)], we facilitate inclusion of fisheries institutions as independent variables in our model specification.

We adopt the Worm *et al.* (*6*) definition of collapse. Although a better measure would be based on stock (*21*), no systematic database of global fish biomass exists. This collapse metric may overestimate the frequency of collapsed fisheries (*22*), which creates a conservative test for the benefits of catch shares. Sensitivity analyses that

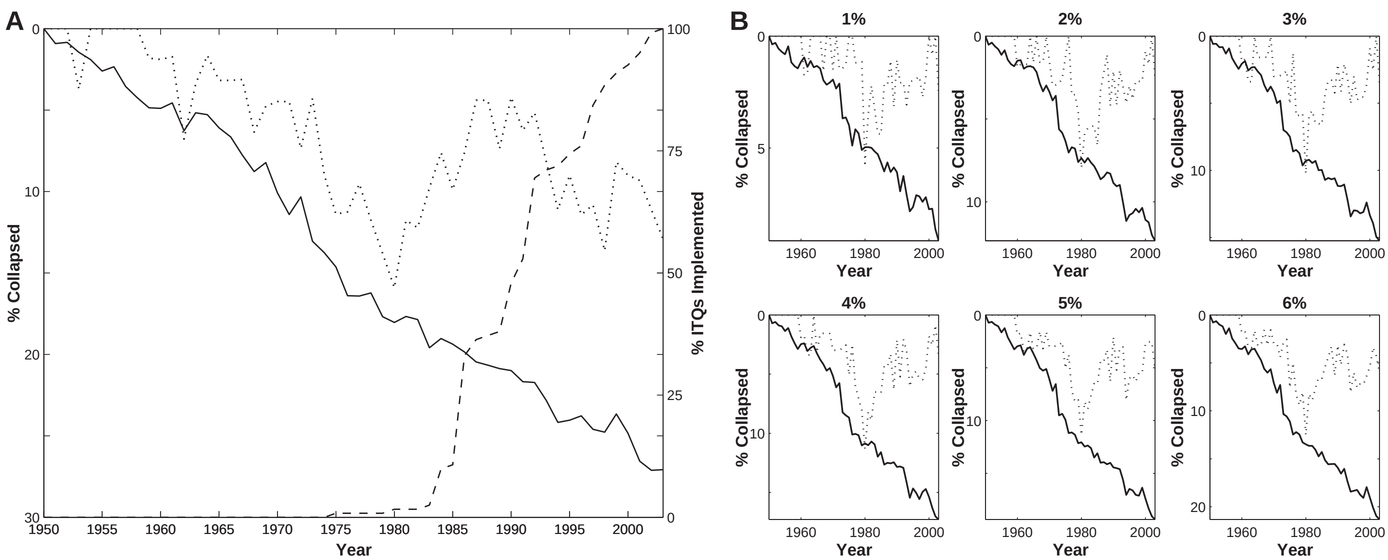

Fig. 1. (**A**) Percent of fisheries collapsed with (dotted line) and without (solid line) ITQ management using the Worm *et al.* (*6*) collapse threshold (10% of historical maximum). The number of ITQ fisheries increases through time (right *y* axis and dashed line), and the rate of implementation has been accelerating. (**B**) Percent of fisheries collapsed with (dotted line) and without (solid line) ITQ management using more conservative collapse thresholds: 1 to 6% of historical maximum catch.

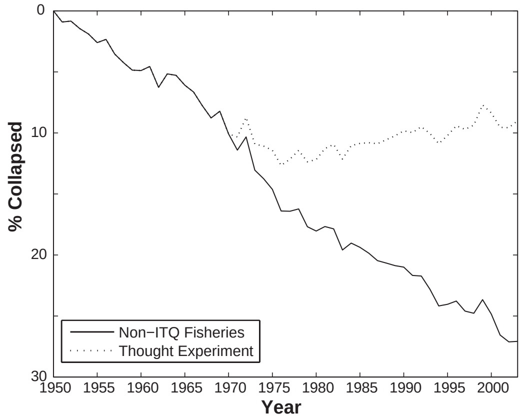

Fig. 2. Simulation of trend in fisheries collapse if all non-ITQ fisheries switched to ITQs in 1970 (dotted line), compared with the actual trend (solid line). The thought experiment assumes that the annual ITQ benefit counterbalances the global trend toward complete collapse, which is consistent with the observed trends in actual ITQs (Table 1). Fluctuations in the simulation arise from estimated interannual variability.

Table 1. Fishery-specific analyses of ITQ benefits. Each fishery is treated as a time series of collapse, with some fisheries converting to ITQ during the interval. Propensity score matching (*25*) controls for the effects of LME, genus, or species to further isolate biases that may arise from the particular places and fisheries where ITQs have been implemented. Columns 2 to 5 provide regression model results for four different propensity score models. Rows 2 and 3 provide the regression coefficients and SEs (in parentheses). Fisheries without ITQ management had an average annual percentage change of 0.54. For all comparisons, the annual benefit of ITQs roughly counters the current rate of decline in other fisheries (*23*). All estimated coefficients are statistically significant at the 1% level.

Parameter used to match fisheries	None	LME	Genus	Species
Percent ITQ difference (SE)	−7.06	−7.41	−6.79	−6.87
	(0.49)	(0.428)	(0.443)	(0.441)
Annual percent ITQ effect (SE)	−0.49	−0.37	−0.54	−0.51
	(0.136)	(0.137)	(0.136)	(0.139)

consider alternative thresholds for collapse and address other potential biases yield unchanged or stronger conclusions (*23*).

By 2003 the fraction of ITQ-managed fisheries that were collapsed (dotted line in Fig. 1A) was about half that of non-ITQ fisheries (solid line in Fig. 1A). Accelerated adoption of ITQs began in the late 1970s (dashed line and right *y* axis in Fig. 1A). In the preadoption period, would-be ITQ fisheries were on trajectories toward collapse, similar to non-ITQ fisheries. In the adoption period, the two curves diverge as ITQs are increasingly adopted (*24*). This disparity grows over time (*23*).

Demonstrating statistically a causal linkage between rights-based management and fisheries sustainability is complicated by three competing effects. First, the number of ITQ fisheries is growing, and new ITQ fisheries are drawn from a global pool with an ever-increasing fraction of collapsed fisheries. Random selection from this global pool could mask some benefits of rights-based management. Second, the conversion of fisheries to ITQs may involve a biased selection. For example, ITQs may be implemented disproportionately in fisheries that are already less collapsed, possibly giving a misleading perception of benefits from rights-based management. Finally, there may be temporal benefits of an ITQ (for instance, the longer an ITQ is in place in a given fishery, the less likely that fishery is to collapse). All of these mechanisms would lead to differences between ITQ and non-ITQ fisheries, but only the last mechanism implies a benefit from the management change.

An initial regression of the data in Fig. 1 suggests that implementing an ITQ reduces the probability of collapse by 13.7 percentage points (*23*). Because ITQs have been disproportionately implemented in a few global ecosystems such as Alaska, Iceland, New Zealand, and Australia (*25*), regional or taxonomic biases could generate misleading results. To account for potential selection bias, we used a variety of estimation strategies: (i) We restricted the sample to only those ecosystems or taxa that have experienced ITQ management. (ii) We used propensity score methods to match ITQ fisheries to appropriate control fisheries (*26*). (iii) We used fixed-effects estimation to identify the benefit of ITQs within each fishery.

The results are remarkably similar across all specifications and estimation techniques (*23*). The propensity score results are summarized in Table 1. Consistent with Fig. 1, ITQ fisheries perform far better than non-ITQ fisheries. Switching to an ITQ not only slows the decline toward widespread collapse, but it actually stops this decline. Each additional year of being in an ITQ (row 2 of Table 1) offsets the global trend (0.5% increase) of increasing collapse in non-ITQ fisheries (*23*). Other estimation techniques suggest even larger benefits. For example, fishery fixed-effects results suggest that ITQs not only halt the trend in global collapse, but they may actually reverse it (*23*).

Although bioeconomic theory suggests that assigning secure rights to fishermen may align incentives and lead to significantly enhanced biological and economic performance, evidence to date has been only case- or region-specific. By examining 11,135 global fisheries, we found a strong link: By 2003, the fraction of ITQ-managed fisheries that were collapsed was about half that of non-ITQ fisheries. This result probably underestimates ITQ benefits, because most ITQ fisheries are young.

The results of this analysis suggest that well-designed catch shares may prevent fishery collapse across diverse taxa and ecosystems. Although the global rate of catch-share adoption has increased since 1970, the fraction of fisheries managed with catch shares is still small. We can estimate their potential impact if we project rights-based management onto all of the world's fisheries since 1970 (Fig. 2). The percent collapsed is reduced to just 9% by 2003; this fraction remains steady thereafter. This figure is a marked reversal of the previous projections.

Despite the dramatic impact catch shares have had on fishery collapse, these results should not be taken as a carte blanche endorsement. First, we have restricted attention to one class of catch shares (ITQs). Second, only by appropriately matching institutional reform with ecological, economic, and social characteristics can maximal benefits be achieved. Nevertheless, these findings suggest that as catch shares are increasingly implemented globally, fish stocks, and the profits from harvesting them, have the potential to recover substantially.

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Supporting Online Material
www.sciencemag.org/cgi/content/full/321/5896/1678/DC1
Materials and Methods
SOM Text
Figs. S1 and S2
Tables S1 to S5
References

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Parasite Treatment Affects Maternal Investment in Sons

T. E. Reed,[1,2]* F. Daunt,[2] M. E. Hall,[3]† R. A. Phillips,[4] S. Wanless,[2] E. J. A. Cunningham[1]

Parasitism can be a major constraint on host condition and an important selective force. Theoretical and empirical evidence shows that maternal condition affects relative investment in sons and daughters; however, the effect of parasitism on sex ratio in vertebrates is seldom considered. We demonstrate experimentally that parasitism constrains the ability of mothers to rear sons in a long-lived seabird, the European shag *Phalacrocorax aristotelis*. The effect contributes to the decline in offspring survival as the breeding season progresses and hence has important population-level consequences for this, and potentially other, seasonal breeders.

One key ecological factor influencing the condition of parents, and therefore the potential fitness of dependent offspring, is parasitism (*1*). In sexually dimorphic species, offspring of the larger sex often require higher nutritional investment and are more vulnerable to changes in parental condition (*2*). Moreover, sex allocation theory predicts that parents in good condition should bias investment toward offspring of the sex that stands to gain more from extra resources provided at critical developmental stages (*3*). We provide experimental evidence that parasites can constrain the ability of mothers, in particular, to rear offspring of the more expensive sex. This contributes to differential mortality of sons and daughters as the breeding season progresses and could explain the seasonal decline in offspring survival that is commonly observed in this and many other seasonal breeders.

Populations of the European shag *Phalacrocorax aristotelis* frequently suffer from severe infections of gastro-intestinal parasites, in particular anisakid nematodes [*Contracaecum rudolphi* and *Anisakis simplex* (*4*)]. Although their effects are usually sublethal, these parasites compete with the host for nutrients and trigger costly immune responses (*5*) that may impair host breeding success. Shag chicks must be provisioned in the nest for ~50 days by both parents. Male-biased broods require more food than female-biased broods, and male nestlings grow faster, attain higher peak masses at fledging, and are about 20% larger than females as adults (*4*).

We experimentally manipulated parasitism levels in breeding adults just before chick hatching by treating both male and female parents with a broad-spectrum antiparasite drug (ivermectin), which removes gut parasites and prevents reinfection over a period of ~6 weeks and hence for most of the chick-rearing period. Throughout the laying period, nests were randomly allocated to either a treatment group, in which both parents were treated with ivermectin (n = 34 nests), or a control (untreated) group in which parents were exposed to natural levels of parasitism (n = 83 nests). Treated and control nests were matched for laying date, ensuring an equal spread of laying dates in each group spanning the natural range (~6 weeks). The survival of sons was higher when their parents had been treated (Fig. 1A) [generalized linear mixed model

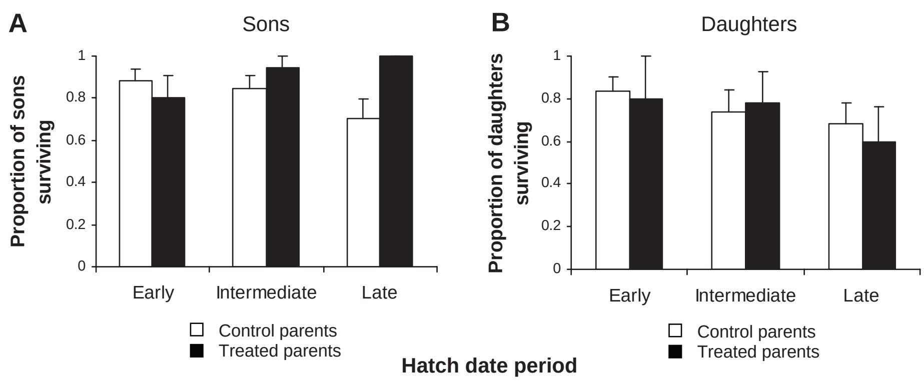

Fig. 1. Differential effect of ivermectin treatment on survival of sons (**A**) and daughters (**B**), and interaction with hatch date. Black bars represent chicks from treated parents, and white bars chicks from control parents. Hatch dates are grouped into early, intermediate and late periods, based on thirds of the distribution and corresponding roughly to 2-weekly intervals. The decline in the survival of sons is not apparent when their parents have been treated. Parasite treatment did not appear to affect the success of rearing daughters. Overall, parasitism in parents accounted for ~37% of the natural seasonal decline in chick survival. Data are means ± SEM. Effect sizes and statistics from logistic regression are given in the text.

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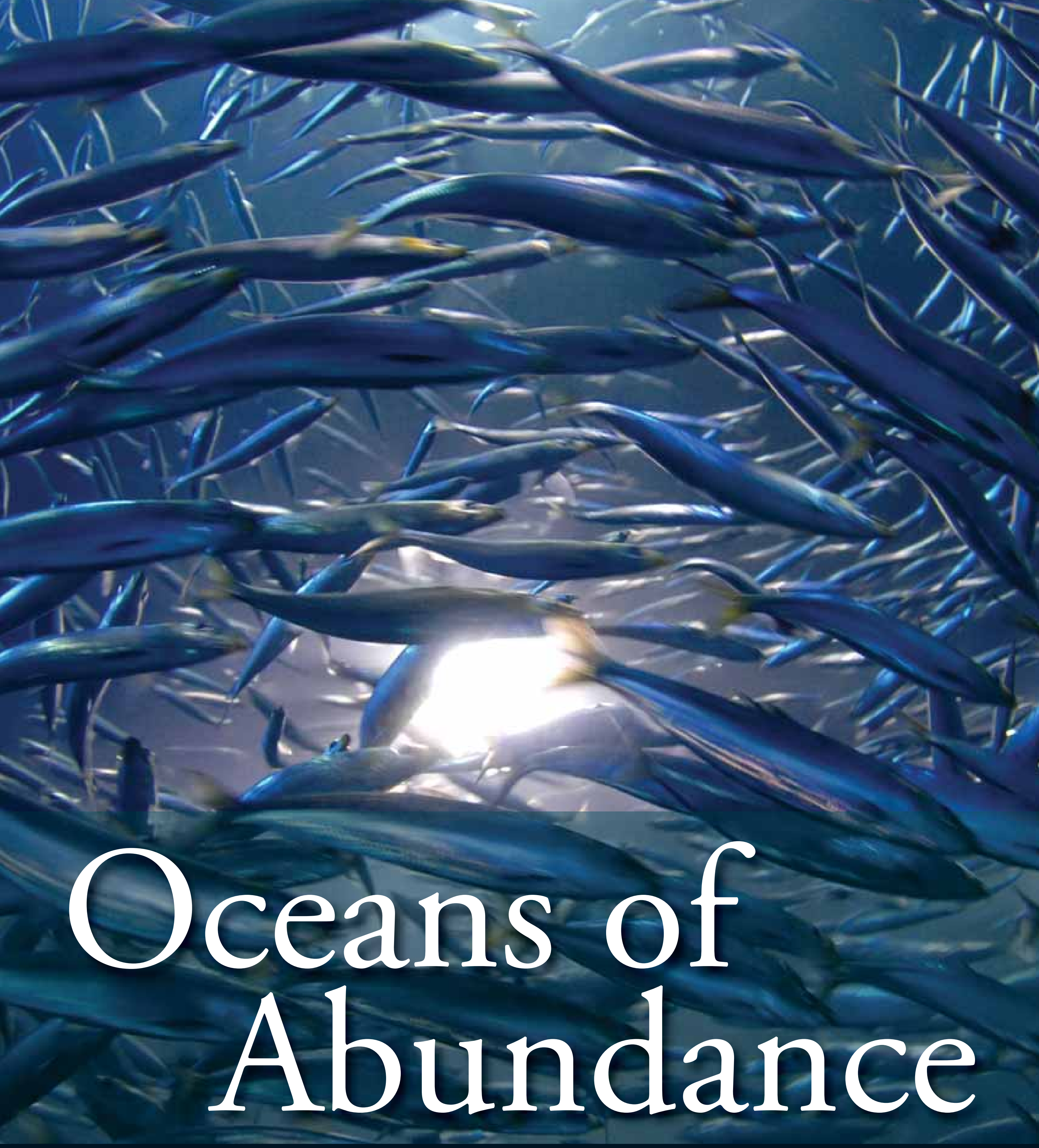


Oceans of Abundance

AN ACTION AGENDA FOR AMERICA'S VITAL FISHING FUTURE

SECRETARY BRUCE BABBITT AND CONGRESSMAN JAMES GREENWOOD, CO-CHAIRS

Secretary Bruce Babbitt, co-chair

Congressman James Greenwood, co-chair

Friends and Colleagues:

President Obama and the 111th Congress have before them a unique opportunity — to restore abundant oceans, that offer a sustainable source of food, employment and diverse wildlife for the American people. By expanding the use of "catch shares" — a performance-based management approach — in fisheries at home and around the globe, the President can lead the world in securing food for more than a billion people, growing the fishing economy, and improving and protecting the oceans.

The majority of the world's fisheries have declined precipitously for decades, and U.S. fisheries have fared little better. Barely one quarter of our fisheries are known to be sustainable. Thousands of fishermen have already lost their jobs as fish populations plummeted. Signs of ecosystem collapse are on the rise, as fishing nets get clogged with jellyfish rather than sought-after types of seafood.

President Obama has a big task ahead. He faces depleted fisheries that have caused painful job loss and a ticking litigation clock if legal deadlines to end overfishing by 2011 aren't met. Members of the 111th Congress also face important decisions as government budgets tighten and fishing families and communities suffer from shrinking economic opportunity.

The good news is that new science clearly points the way to recovery. Science-based catch shares make fish more abundant and fisheries more profitable. And catch shares will protect ocean productivity and diversity more effectively — for generations to come.

President Obama and the U.S. Congress can achieve these benefits quickly and with relatively little cost. With a straightforward change in public policy, we can end overfishing and restore the oceans — thus improving the lives and livelihoods of fishermen.

The leaders who developed the following recommendations are current and former federal and state elected officials, cabinet officers, scientists and administrators. We come from both political parties. We share a conviction that catch shares are, by far, the best way to manage the nation's fish stocks. With catch shares we can comply with conservation goals, increase profitability, and foster an industry that provides jobs and food in an otherwise unstable world. Our conclusions are rooted in science, economics, experience, and a realistic assessment of what can be accomplished over the next few years. We pledge to work with those who seek to solve this challenge by making catch shares the management and performance standard for America's fisheries.

Bruce Babbitt was Secretary of the Interior from 1993–2001 and Governor of Arizona from 1978–87.

James Greenwood is President and CEO of the Biotechnology Industry Organization. He represented Pennsylvania's Eighth District in Congress for 12 years.

Executive Summary

Captain Carey Griffith is a red snapper fisherman from Destin, Florida. A new catch share program in the Gulf has reduced wasteful discards, dramatically extended the fishing season, and increased the quality and market value of his fish.

President Obama and the U.S. Congress have a unique opportunity to lead on an economic and environmental issue of global significance: securing a sustainable supply of wild seafood. The food security of 1 billion people is in jeopardy. Recent scientific studies predict the collapse of global fisheries in our lifetimes, with an estimated 27% already in ruin. While many threats — including climate change and habitat loss — contribute to the declining health of the oceans, overfishing is the single biggest cause of depleted fisheries worldwide. The good news is that a proven solution, called "catch shares," can end overfishing and lead to abundance for current and future generations of Americans. This solution empowers individuals and communities to manage their catch effectively, while achieving scientifically set conservation targets. With a straightforward change in public policy, President Obama and the U.S. Congress can demonstrate leadership at home and around the world, by rebuilding a strong fishing economy that provides a stable supply of seafood while contributing to healthy and resilient ocean ecosystems.

"This is one environmental crisis that President Obama and Congress can actually solve in the near-term."

— *Secretary Norm Mineta, Departments of Commerce (2000-2001) and Transportation (2001-2006)*

To unleash innovation for economic and ecosystem renewal in the oceans:

- **President Obama should ensure that all federal fishery management plans are evaluated for catch shares by 2012, and that at least 50% of federal fishery management plans feature catch share management by 2016.**
- **The U.S. Congress should ease bottlenecks in order to achieve the President's goal by passing legislation to require that catch shares be considered in all fishery management plans by 2012.**

Oceans of Abundance was developed by an independent, bipartisan working group consisting of 23 prominent leaders in government, fisheries science, management, and policy.

The working group was convened by Environmental Defense Fund and Marine Conservation Biology Institute. Its purpose is to present policymakers with coherent, achievable methods — based on the most current scientific consensus — to reverse the economic and environmental decline of U.S. fisheries and the communities that depend on them. Generous support for this report was provided by the Walton Family Foundation.[1]

The Problem:

Overfishing is putting seafood supplies and the economy at risk

> "Catch shares are a powerful way to secure the fish populations that people around the globe rely on for their main source of protein."
>
> — *Dr. Jeffrey Sachs, Director, The Earth Institute, Columbia University*

Today an estimated 1 billion people worldwide depend upon fish and shellfish for their protein.[2] But the security of this important food source — as well as the 200 million associated jobs around the world[3] — is in jeopardy.

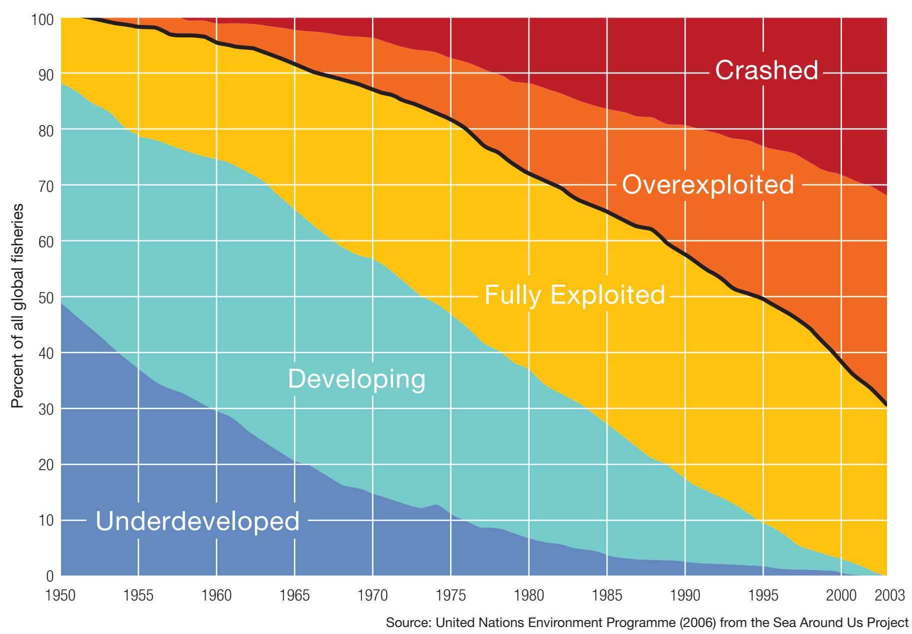
Evidence is overwhelming. The global oceans are being emptied of seafood. Scientists report that 90% of large fish — highly sought-after species like tuna and swordfish — have been removed from the oceans.[4] There is scientific consensus that fishing is fundamentally altering ocean ecosystems,[5] which are increasingly likely to yield massive swarms of jellyfish rather than food fish.[6] Even here in the United States, where we have comparatively strong laws on the books, scientists can only say for sure that about 25% of our fisheries are fished at sustainable levels.[7] Both the Pew Oceans Commission and the U.S. Commission on Ocean Policy concluded that ocean ecosystems are at risk, and that current fishery management is insufficient to reverse the decline.[8,9]

Overfishing is the biggest driver of declining fisheries globally, although many threats — including habitat loss and climate change — contribute to the problem. In fact, the United Nations-sponsored Millennium Ecosystem Assessment, the best evaluation to date of Earth's ecosystem health, concluded that overfishing is "having the most widespread and the dominant direct impact on food provisioning services, which will affect future generations."[10]

Declining fish catches translate into lost jobs and lost economic opportunity. The World Bank estimates that over the last thirty years, mismanaged fisheries have cost the global economy $2 trillion — about $50 billion per year currently.[11] But with appropriate reforms, fisheries could be a driver of economic growth. In the United States, the net economic value of commercial fisheries would likely double.[12]

To secure our seafood supply and the jobs that depend on fishing, we must solve the overfishing problem. This is not only a moral mandate; it's also mandated by law. When Congress revised the federal fisheries law, it required an end to overfishing in the United States by 2011,[13] an important deadline for the Obama Administration. But ending overfishing will be difficult and expensive if we continue to use the conventional management tools that have led us to this point.

Overfishing drives declining fisheries; 70% are crashed or overexploited



Source: United Nations Environment Programme (2006) from the Sea Around Us Project

The Challenge:
Changing the way fisheries are managed

Conventional fisheries management has proven ineffective and inefficient, causing fisheries and ocean ecosystems to suffer. Conventional fisheries management seeks to control fishermen's behavior in a way that is expensive for fishermen, for the oceans, and for government.

"Business as usual is a continued decline in global fish wealth."

— The Sunken Billions: The Economic Justification for Fisheries Reform. *World Bank/FAO, October 2008*

Over the last several decades, as overfishing worsened, regulators tried to limit the problem by imposing an ever-more-complicated array of "effort controls." These limits on when and how to fish are aimed at regulating fishing gear and method — without holding individual fishermen accountable for adhering to catch limits. Fishermen have generally complied with effort controls but, driven by their entrepreneurial spirit, have found innovative ways to catch more fish.

This cat-and-mouse game results in a "race for fish" as limited fishing seasons — even as short as two days — increase competition among fishermen to catch as much as they can as fast as they can. This burns excessive fuel, which is bad for fishermen's wallets, bad for energy independence, and bad for the environment. Fishermen are also forced to go to sea in inclement weather, risking their lives to earn their living. And the result is often a glut of fish on the market for a short time, concurrent with low earnings for fishermen. Couple this with regulations that require marketable fish to be thrown overboard, and one can imagine fishermen's enormous frustration with the current management system.

Working at such a frantic pace means that fishermen cannot be selective in their catch. Poorly tended lines and nets are often lost and continue to "ghost fish" in the ocean. The use of unselective methods and gear increases "bycatch" — the unintentional killing of target species above allowable limits, as well as non-target species such as sea turtles, birds and juvenile fish. The destruction of important seafloor habitats is another consequence of unselective fishing.

This approach often results in total catches, made up of landed fish plus bycatch, which exceed limits set by science that are essential to ensuring a sustainable fishery. Such waste in turn furthers the decline of the resource, exacerbates economic disruption, and jeopardizes fishing communities. In the United States today, many overfished stocks are yielding far less than half their potential value due to declining catches.[14]

Cod was once plentiful in New England and across the North Atlantic. Today this iconic fishery has been decimated.

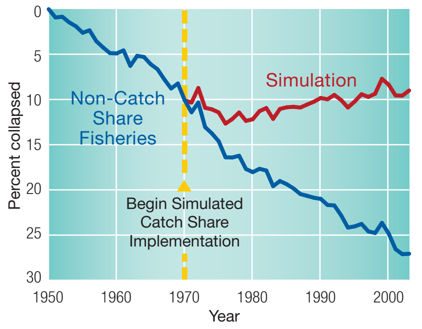
R.E. Holloway, The Rooms Provincial Archives

Catch Shares:

Fishing for the future

President Obama and the U.S. Congress can solve this problem quickly and with relatively little cost. With a straightforward change in public policy, we can end overfishing and restore the oceans — all while improving the lives and livelihoods of fishermen.

Catch shares prevent, and even reverse, the collapse of the world's fisheries



Source: Costello *et al.*, 2008

Instead of trying to restrict how fishermen do their jobs, the Obama Administration should set strict performance standards and let fishermen decide how best to meet them. The mechanism to do this is called "catch shares." Catch share programs set a scientifically allowable total catch and then allocate a percentage share of that total to fishermen. (Catch shares work for both targeted catch and bycatch.) Catch share programs can also set conservation targets (e.g. fish populations, habitat health, etc.) for specific areas — a system sometimes called "territorial use rights for fishing" (TURF) or "area-based catch shares." Shares, based on a percentage of total allowable catch or area, can be held by individuals, cooperatives, or communities.

Catch shares, regardless of their form, have been proven to restore economic and environmental health to ocean fisheries because they set a mandatory scientific target and give fishermen maximum flexibility in choosing how to meet those targets. The mandatory target holds fishermen accountable to catching only the allowable amount of fish. The flexibility gives fishermen the chance to improve their efficiency, and allows them to benefit as they help restore the oceans. The value of their shares increases as the health of the resource improves. Fishermen are thus rewarded for fishing in ways that ensure the long-term health of the ecosystem.

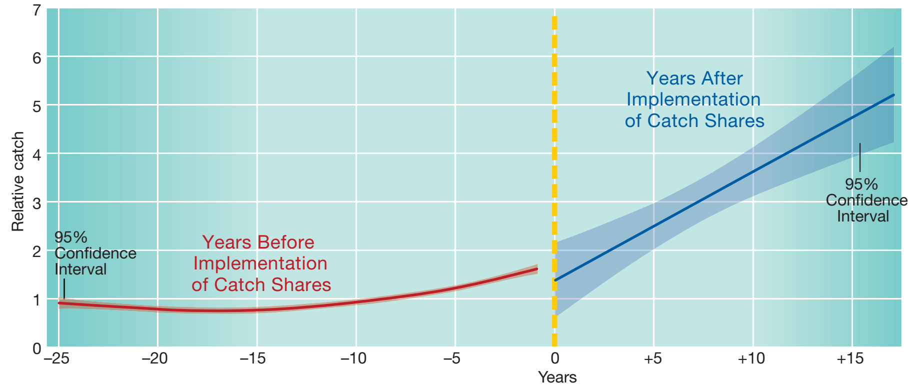
Recognizing the potential of catch shares to restore fisheries, Congress recently authorized their use. Since then, new scientific analyses have determined how powerful the catch share approach is.

The combination of private accountability and flexibility works better than having the government try to manage the details of the fishing business.

An on-board observer measures haddock from New England. Under a catch shares system, fishermen are accountable for meeting mandatory performance targets.

Amy Van Atten, NMFS

Catch share fisheries are more productive



Source: Wolfram Schlenker, modified from Heal and Schlenker, 2008

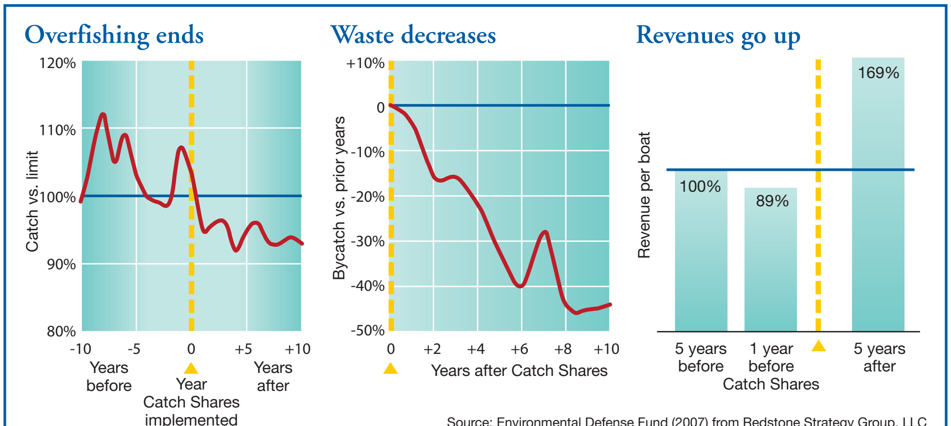
The benefits of catch shares

- **Catch shares prevent, and even reverse the collapse of the world's fisheries.**[15] The journal *Science* recently published the most comprehensive study of catch shares to date. The study, by Costello *et al.*, examined the fate of more than 11,000 fisheries around the world, and found that catch share fisheries remain stable in the long term.

- **Catch share fisheries are more productive.** Heal and Schlenker, writing in *Nature*, showed that in the 17 years after implementation, catch shares had driven a large increase in catch (on the order of four-fold) — while those fisheries remained stable.[16]

- **Catch share fisheries meet conservation targets and improve economic performance.** A detailed look at U.S. and British Columbia catch shares showed that fishermen comply with catch limits — even catching 5% less than their allowable limit. In those same fisheries, revenues per boat increased by 80% due to higher yields and higher dockside prices.[17] In addition, bycatch decreased on average 40%. In the first year of the Gulf of Mexico's red snapper catch share program, NOAA reports that commercial fishermen fully complied with catch limits and considerably reduced bycatch.[18]

- **Catch share fisheries can help restore natural wealth.** According to the World Bank, catch shares and other reforms can drive economic growth.[19] Costello and Gleason conservatively estimate that catch shares could double the net economic value of U.S. commercial fisheries.[20]



Source: Environmental Defense Fund (2007) from Redstone Strategy Group, LLC

Taken together this evidence demonstrates a path toward a more stable food supply, better economic returns, and a healthier ocean. This is strong evidence that catch shares end overfishing, and offer a welcome message of hope from leading scientists.

Catch shares provide the best strategy for protecting fishing jobs, tens of thousands of which have already been lost in collapsing fisheries. Under current management labor is needed for just a few short days. Catch shares, on the other hand, often allow fishing seasons to be dramatically extended, spreading out the economic benefits across an entire year. Until fisheries recover, the same labor hours are needed. And under catch shares the jobs are much more likely to be full-time.[21]

TODAY'S INNOVATION: MARINE PRODUCTIVITY AREAS

Complementing catch shares with additional tools that can substantially enhance fishery productivity represents a new frontier of innovation. Marine protected areas (MPAs) — places set aside for limited or no extraction — have been shown to improve the abundance and diversity of marine species.[22] Unfortunately, their ability to enhance fishery-wide productivity is often limited by size and enforceability. An emerging solution may be to design MPAs based on improving productivity.

Exciting new work suggests that when catch shares are coupled with MPAs, the important habitats where fish breed and grow can be safeguarded, and overall production can be enhanced. Protecting fish in these vulnerable life stages contributes to a healthy fishery with increased economic potential. With catch shares, fishermen are more likely to support MPAs. The Obama Administration should increase investment in research and development of this strategy, as well as complementary ecosystem-based research in universities, and support on-the-water experimental pilot projects.

> "Catch shares ensure accountability. That means we stick to our catch limit."
>
> — *David Krebs, Owner, Ariel Seafoods Inc. and shareholder, Gulf of Mexico red snapper catch share program*

RECOMMENDATIONS

> "Catch shares can provide real hope for the sustainability of American fisheries and fishing communities."
>
> — *Dr. Andy Rosenberg, former Deputy Director, National Marine Fisheries Service*

PRESIDENT OBAMA SHOULD:

1. Unleash innovation for economic and ecosystem renewal in the oceans:

- Ensure that:
  - *All federal fishery management plans are evaluated for catch shares by 2012.*
  - *At least 50% of federal fishery management plans feature catch share management by 2016.*
  - *The portfolio for transition to catch shares includes a range of fisheries based on feasibility as well as economic, social, and biological needs.*
- Establish performance standards for fisheries management by requiring plans to consider catch shares and ensuring that all fisheries deliver results comparable to well-designed catch share programs, including:
  - *Compliance with catch limits*
  - *Improved fisheries information*
  - *Reduced bycatch*
  - *Enhanced economics and safety*
- Work with Congress to make catch shares a priority in the first 100 days.
- Partner with state and regional fishery managers by providing incentives and resources to design and implement catch shares in federal and state waters.
- Place a high priority on improving the science of setting catch limits, including enhancing capacity at NOAA and universities, and establishing ecosystem-based research, monitoring, and policy frameworks at appropriate spatial scales.
- Promote the entrepreneurial spirit of fishing families and vibrant coastal communities through public-private partnerships and assistance in the transition to sustainable fishing.
- Create experiments that are designed to increase the productivity of fisheries by combining area-based catch shares with marine protected areas (including no-take reserves as needed). These projects should be based on the best available science, and designed in consultation with states and local stakeholders.
- Educate stakeholders on the performance of catch shares and the efficacy of combined catch share-marine protected area experiments.

2. Appoint committed leaders for the Department of Commerce and regional fishery management councils who will drive economic and ecosystem renewal in the oceans.

3. Lead globally by working with other nations and within international regulatory bodies to which the U.S. is party to consider catch share management.

- Develop catch share plans for Regional Fishery Management Organizations.
- Hold a high-level meeting of Arctic nations in 2009 to negotiate a new Arctic Framework Convention by the end of 2012 that includes catch shares and marine protected areas (including no-take reserves as needed).[23]
- Strongly advocate for Senate ratification of the Law of the Sea Treaty.

The President and Congress can help create full-time jobs, stimulate economic growth, and restore the oceans.

THE UNITED STATES CONGRESS SHOULD:

1. Ease bottlenecks in the economic and ecosystem renewal of the oceans:

- Pass legislation that:
  - *Requires all fishery management plans to consider catch shares by 2012.*
  - *Ensures that all fisheries deliver results comparable to well-designed catch share programs, including:*
    - Compliance with catch limits
    - Reduced bycatch
    - Improved fisheries information
    - Enhanced economic performance and safety
  - *Eliminates regional disincentives to catch shares.*
  - *Enhances coordination among federal, interstate, and state decision-makers to ensure an ecosystem-based framework for implementing catch shares.*
- Accelerate scientific understanding by funding experimental programs testing the efficacy of area-based catch shares in combination with marine protected areas and no-take reserves as needed, and provide recommendations for future use and funding.

2. Hold agencies accountable:

- Approve and support decision-makers who are committed to economic and ecosystem renewal in the oceans.
- Hold oversight hearings during the first 100 days in order to give the new Administration an opportunity to present its fisheries goals.
- Conduct oversight of the Department of Commerce, Department of State, and other relevant agencies.

3. Accelerate the transition to sustainable and profitable fisheries:

- Increase incentives and resources to design and implement catch shares.
- Establish an oceans trust fund that provides assistance in the transition to catch shares to organizations and communities through low-interest loans and grants.

"Congress has an essential role in ending overfishing as part of the sustainable management of our oceans. Catch shares may be the best management tool we have to end overfishing and continue our fishing tradition."

— *Congressman Sam Farr*
17th District, California

"Catch shares make good economic and environmental sense for reviving America's fishing future."

— *Senator Connie Mack*
Florida (1989-2001)

Conclusion

The stage has been set for the President and Congress to act. The science shows clear benefits. The tools have been tested, and they work. The law requires an end to overfishing by 2011 and authorizes catch shares. But to achieve a new future of ocean abundance means changing business as usual. President Obama and the 111th Congress must capitalize on this deadline with the strength of America's ingenuity and innovation and lead the nation to a better fishing future.

However, transformational change can be difficult. While many in industry struggle to get by under conventional management, uncertainty in tough economic times can increase anxiety about change. Fishermen and shore-side businesses from boatyards to fish houses have legitimate concerns about being left to fend for themselves during a transition to catch shares. For instance, the shift away from lots of tough, part-time jobs to fewer high quality, full-time jobs means that those who remain in fishing have a better quality of life. But what about those who can't or don't want to fish under the new system? In the face of uncertainty, vested interests can restrain or block innovation and change.

Change is made even harder by a painfully slow regulatory process. Currently it takes several years to develop a catch share program. Unfamiliar design issues, challenging procedural and programmatic considerations, plus competition for scarce resources, contribute to the delays. In that time, fisheries continue to decline, frustration grows, and costs associated with the regulatory process mount. The result is gridlock. Motivation to embrace bold, challenging visions of economic and environmental revival is replaced by faint hopes for incremental improvement. This is the formula that has allowed fisheries around the world to drift towards commercial extinction.

Presidential and Congressional leadership can break the logjam. A few well-placed steps taken now can restore the optimism that once characterized fishermen around the world. It is time to make clear that the question must not be "if" there will be profitable and sustainable commercial fisheries but "when."

AMERICAN LEADERSHIP, GLOBAL RESULTS

For many people around the world who rely on fish as their main protein source, securing a sustainable supply of seafood is critical. Indeed many Low-Income Food Deficit countries have significant overfishing problems.[24] These impacts are often compounded as fish caught by highly subsidized foreign fleets are exported with limited benefits to the countries of origin. This instability can contribute to economic and social unrest and prompt migration to other countries by people in search of food and job security.[25]

The Obama Administration can help provide American leadership, expertise, and resources to solve this global problem. By helping other nations to transition to catch shares, including their use in conjunction with marine protected areas, we can increase food security, alleviate poverty, reduce fishing subsidies that distort markets, and sustain a supply of healthy seafood to the United States and the globe. The fisheries of many countries are poised for this change.

It is essential that the United States not only lead by example, but that we actively work with our partners to promote this tool in multi-national fisheries management processes, including Regional Fishery Management Organizations. The increasing accessibility of the Arctic Ocean offers a similar opportunity. A critical step for international progress is for the United States Senate to ratify the Law of the Sea Treaty, an international standard for the responsible use of ocean resources.

End Notes

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Secretary Bruce Babbitt, Department of the Interior (1993-2001)

Working Group

Secretary Bruce Babbitt (co-chair); former U.S. Secretary of the Interior; former Governor of Arizona

Congressman James C. Greenwood (co-chair); President and CEO, Biotechnology Industry Organization; former U.S. Representative (8th District, Pennsylvania); Board of Directors, Marine Conservation Biology Institute

Congressman Sam Farr 17th District, California; co-chair, House Oceans Caucus

Congressman Wayne Gilchrest former U.S. Representative (1st District, Maryland); former chair, House Resources Fisheries and Oceans Subcommittee

Congressman Rush Holt 12th District, New Jersey; member, House Natural Resources Committee

Senator Connie Mack Senior Policy Advisor, King and Spalding; former U.S. Senator (Florida)

Secretary Norman Mineta Vice Chairman, Hill and Knowlton; former U.S. Secretary of Commerce; former U.S. Secretary of Transportation; former U.S. Representative (13th and 15th Districts, California)

Governor Christine Todd Whitman President, Whitman Strategy Group; former Governor of New Jersey; former Administrator, U.S. Environmental Protection Agency; former chair, Pew Oceans Commission

Secretary Mike Chrisman Secretary for Resources, State of California; chair, California Ocean Protection Council

Dr. Christopher Costello Professor of Environmental and Resource Economics, University of California Santa Barbara

Dr. Dan Esty Hillhouse Professor of Environmental Law and Policy, Yale University; Clinical Professor of Law, Yale Law School

Dr. Steve Gaines Professor of Ecology, Evolution and Marine Biology, Director, Marine Science Institute, University of California Santa Barbara

Terry Garcia Executive Vice President, National Geographic Society; former Deputy Administrator, National Oceanic and Atmospheric Administration

Dr. Les Kaufman Professor of Biology, Boston University; Principal Investigator, Marine Management Area Science Program, Conservation International

Dr. Jane Lubchenco Wayne and Gladys Valley Professor of Marine Biology, Oregon State University; former President, American Association for the Advancement of Science; member, National Academy of Sciences; member, Pew Oceans Commission

N.J. Nicholas, Jr. Chairman, Environmental Defense Fund; member, Council on Foreign Relations; former President, Time, Inc.

Dr. John Ogden Director, Florida Institute of Oceanography; Professor of Biology, University of South Florida

Wendy Paulson Chairman, RARE; President's Conservation Council, The Nature Conservancy

Dr. Ellen Pikitch Executive Director, Institute for Ocean Conservation Science; Professor, School of Marine and Atmospheric Sciences, Stony Brook University

Dr. Andy Rosenberg Professor, Natural Resources Policy and Management, University of New Hampshire; former Deputy Director, National Marine Fisheries Service; Commissioner, U.S. Commission on Ocean Policy

Dr. Jeffrey Sachs Director, The Earth Institute, Columbia University; Special Advisor to Ban Ki-Moon, Secretary General of the United Nations

Dr. Bob Steneck Professor of Oceanography, Marine Biology and Marine Policy, University of Maine

Christophe A.G. Tulou Principal, Christophe Tulou Associates; Director, Sustainable Oceans, Coasts and Waterways Program, The Heinz Center; Executive Director, Pew Oceans Commission

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NORTH CAROLINA MARINE FISHERIES COMMISSION
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

February 2, 2009

Mr. Robert Mahood, Executive Director
South Atlantic Fishery Management Council
4055 Faber Place Drive, Suite 201
North Charleston, SC 29405

Dear Mr. Mahood:

I am writing on behalf of the N.C. Marine Fisheries Commission regarding the South Atlantic Fishery Management Council's Scoping for Snapper Grouper Amendment 18. Our commission is concerned about reductions in commercial quotas and recreational allocations for many species, particularly in terms of ensuring each state be given a fair chance to land its share of species.

Our commission is greatly concerned about the gag recreational allocation and the uncertainty of fish available to be landed in North Carolina. Florida traditionally has had a large recreational gag fishery that occurs during the closed period of January to April each year as proposed by Snapper Grouper Amendment 16. This closed period is specifically designed to protect gag spawning aggregations. Florida anglers, however, are able to catch legal-sized gag in state waters. Legal-sized gag do not regularly appear in North Carolina state waters. Any gag caught by anglers, whether in state or federal waters, count against the total allowable catch. In fact, Florida officials have suggested in the media and to the South Atlantic Fishery Management Council (SAFMC) that they may not implement the proposed shallow water grouper closure as described in Amendment 16 in Florida's state waters. (See: SAFMC Snapper Grouper Committee and full council meeting minutes, June, September, and December, 2008 and Florida Keys Keynoter articles: "Grouper-fishing ban still awaits approval" (12-06-08) and "On reversing grouper rule, no bite yet from Commerce chief "(10-18-2008))

If Florida fails to implement rules that align with federal rules, based on landings history, a large portion of the recreational catch will occur in Florida's state waters on spawning fish that need protection for future generations of gag. Besides potentially harming the future viability of this species in the South Atlantic region, these catches likely will be deducted from the Annual Catch Limit resulting in additional management measures that will deprive North Carolina of an equitable access to the fishery. At this point, Florida has given no indication it will act in accordance with the federal rules to assure North Carolina would have equitable access. In addition, the NMFS has not documented how it will handle the situation in order to protect the ability to fish for gag grouper in other SAFMC states. The MFC feels it is imperative that Snapper Grouper Amendment 18 addresses state-by-state quotas to guarantee North Carolina anglers access to the gag fishery.

The council is also considering separating the snowy grouper commercial quota into regions/states. Again,

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our commission feels state-by-state quotas are the fairest way to manage this fishery. The low trip limits set for commercial harvest of snowy grouper has made it unfeasible for commercial fishermen to land the Total Allowable Catch (TAC). The preliminary commercial landings for snowy grouper for the past season indicated only 60.39 percent of the TAC was landed. The reason why more of the TAC was not landed was due to high trip costs associated with the fishery off the North Carolina coast. Had North Carolina been given a specific quota to manage, our fishermen could have made a limited number of profitable trips. Our commission fully supports state-by-state quotas in the snowy grouper fishery.

In Snapper Grouper Amendment 16 the council considered but rejected measures for state-by-state allocations on the grounds that "there are significant administrative impacts (particularly in terms of monitoring) with state-by-state quotas" (Snapper Grouper FMP Amendment 16 Appendix A, p. 1). Acknowledgment of support by some council members for the notion was given in the same appendix indicating "the council considered allowing each state to monitor and administrate their own quotas as a way to mitigate the potential effects to NOAA Fisheries. Such a system is used by the Mid-Atlantic Fishery Management Council, in conjunction with the Atlantic States Marine Fisheries Commission, for summer flounder and black sea bass. In the South Atlantic, however, it would not be possible to develop and implement a system that utilizes state-monitored quotas before the mandate to end overfishing of vermilion snapper expires." Our commission feels it is possible for the South Atlantic to implement a quota monitoring system. The N.C. Division of Marine Fisheries successfully manages quotas for several fisheries. We encourage the SAFMC to implement state-by-state quota management for all quota-monitored species, particularly snapper grouper species and king mackerel.

Thank you for consideration of our comments.

Sincerely,

Mac Currin

Mac Currin, Chairman
N.C. Marine Fisheries Commission

cc: Marine Fisheries Commission
Dr. Louis Daniel
Dr. Brian Cheuvront

Too: John Mcgovern:
Public comment on the intention of the council to move the management of snapper grouper species northward of the N.C. / Va. border

Having prior submitted comments on the other items involved in amendment 18, I realized later that I had somehow overlooked one of the most important items or the proposal by the council to extend it's jurisdiction northward.

I will start my comments concerning this proposal by looking back a few issues of the South Atlantic's own Fall "Update" to a comment by the regional administrator Roy Crabtree concerning a reassessment that took place concerning a age length versus otalith study on vermillion snapper that had it not taken place would have had MAJOR impacts on both the recreational and commercial sectors. I quote "In this particular case the process shows that it inherently works and we have the ability to make in stream and midstream corrections." Furthermore a council member Susan Shipman goes on to state that "we're not always going to have the latitude to have the additional data and that's something I think people need to understand."

What they didn't tell the readers of this quarterly was that it was not the agency or council that initiated this study that kept this extremely valuable fishery from a 61% reduction even though they knew of a similar study and subsequent outcome from a study done on the same species in the Gulf. It was only initiated after a fisherman and the North Carolina fisheries association interveined and got the support of Congressman Walter Jones who pressured then director Bill Hogarth for this study. They also didn't tell the readers that the fishermen have begged to help fill in the gaps via cooperative research only to be almost totally denied.

So I guess the question that needs answering is would it be in the best interest of Va. and states north to allow a council that won't even initiate the necessary studies to help stakeholders in it's own jurisdiction , especially where it SHOULD HAVE CONCERNS, to take over management of   fisheries off of their state waters. In other words if you are not doing your job why expect a raise?

Interestingly enough the two fisheries of focus that would come under this councils jurisdiction (tilefish and snowy grouper) in this area have experienced a recreational participation that shows a clearly different fishery than the rest of the safmc's jurisdiction, with the exception of N.C.,. With world records broken in each of the last two years in Va. on snowies, there is no refuting that. There is also no refuting the fact that N.C. has shown a very similar fishery, yet is constrained to the jurisdiction of a council that covers over a thousand miles.

On a rhetorical note, right now it is probalbly 75 degrees in Fla. but 30 here in North Carolina. That also says a lot about the differences in the fisheries........ So why should Va. submit to the whims of a council that is totally unreceptive to it's constituients, when it has already been proactive in it's own right on these species and stands to lose a fishery if it relents?

In a recent scathing judicial ruling pertaining to a groundfishery case in New England, Judge Harrington wrote "councils are expected to approach their work carefully and thoroughly" "This means taking their time before making decisions that affect the public"...............!

So I contend, instead of this council moving it's jurisdiction Northward when it admits that it can't be expected to carry out data concerns due to it's absurd corporate mind set and it's insistance on making the case for a LAP's in all of it's fisheries, why not at least retreat to the South Carolina line and let N.C. northward handle their own affairs in a much more professional manner than this council has shown the capabilities of doing.

After all, I am sure their is another cca petition out there somewhere to do away with commercial fishing that it can again turn it's attention too rather than actually doing it's job ....
(A side note below)

jeff oden
Hatteras N.C.

In my county of Dare in the state of N.C., a county that ranks 32nd in commercial landings and 40th in value of this nations commercial fisheries in 2007.....which also encompasses one of the if not the largest recreational boatbuilding conglomerates on the East Coast with over 20 shops turning out all sizes of recreational vessels from 20 ft to 80ft, the present state of the economic downturn allows for a little clarity in the ensuing tug of war between the sectors.

In the last three months this county has unfortunately lost over 500 jobs in the recreational boatbuilding
industry. There is not but one or two shops with a new order and of those still in business, they are finishing prior commitments. This coupled with the housing down turn has made the deck of a good commercial fishing vessel one of the more lucrative jobs availiable, and absolutely the only job in the county still hiring.

I throw this out not to make the case for reallocation such as the prior mentioned cca petition, merely to show that people who don't or presently can't afford to fish continue to eat seafood even though they might not be able to afford a boat to go get it. Simply food for thought.....

Tom Burgess Control Date Statement

I strongly support the control date for the black sea bass trap fishery in Snapper-Grouper Amendment 18 because measures are not in place to insure that newcomers to the fishery will fish in a sustainable fashion. Two of my chief concerns are that there is no limit to the number of traps that a fisher can soak, and no limit to how long traps can soak between checks of the trap. My two decades of experience in this fishery lead me to believe that 50 traps and 72 hours should be a maximum trap limit and soak time, respectively. Greater numbers of traps lead to correspondingly greater loss. Greater soak times increase mortality amongst legal and sub-legal fish (from trap confinement, storm-related swell, cannibalism, etc) without increasing catch. Without a limit on traps or soak times we have the potential to greatly increase cryptic sources of fishing mortality of an already overfished species. Paul Rudershausen (North Carolina State University) and I have submitted a proposal to investigate black sea bass mortality and trap loss rates as a function of soak time. I believe that this study - if funded - will provide the Council with valuable information on how unlimited traps and soak times may negatively impact the black sea bass fishery. There are many fisherman in the trap fishery in the U.S. South Atlantic, including myself, that believe the only way to have a viable and profitable fishery in the future is to take measures to fish responsibly now. Without checks and balances, such as limiting trap numbers and soak times, displaced fishers from other fisheries may enter the black sea bass fishery and fish in a fashion that may harm the long-term health of the black sea bass population in the U.S. South Atlantic.

Tom Burgess Sneads Ferry, NC

Hi,

I attended the meeting and had interesting conversations with Roger Pugliese and Andi Stephens. In lieu of voicing these comments at the meeting, please accept these written comments.........

Doubletree Hotel
2080 N Atlantis Ave
Cocoa Beach
3 pm - 7 pm

SAFMC February Scoping & Public Hearing

My name is Greg Clifford and I am here to speak about Amendment 18. I have been fishing the East Coast of Florida for 40 years as a recreational angler and I am President of the Sebastian Inlet Sportfishing Association, a sportfishing club with over 100 members and sponsor organizations that has existed since 1972. SISA has enhanced sportfishing in our area by participating in 8 artificial reef deployments off Sebastian Inlet and by funding research directly related to sportfish and their habitat.

Amendment 18
I disagree with any additional restrictions being placed on the public's access to the fisheries until:
There is a ban of all longline fishing, all shrimping inside of 60 fathoms is prohibited, and that there be no reductions in the present bag limit or closures until such time as there has been reliable data collected on the recreational catch.

It is contradictory that a fishery is considered to be ordered closed for a third of year, and yet one can walk in to a restaurant and purchase a sandwich or dinner of said same specie. History of wildlife management has shown that political pressure associated with the commercial take of a resource is the most threatening risk to a specie.
I urge the council to adopt a long range view that incorporates similar protective measures for ocean wildlife that have been granted to land based wildlife for decades.

I urge the council to prohibit all shrimping inside of 60 fathoms. The statistics and options as set forth in the scoping documents ignore the fact that the major cause of juvenile fish mortality is shrimping. The rebuilding of the stock must begin with the elimination of shrimping or at a very minimum, include the projected mature mass associated with such bycatch loss and habitat destruction within the commercial allocations associated with the loss of a particular species. Juvenile fish should be allowed to mature and not end up as bycatch floating on the surface behind a shrimp boat. This is mandated by National Standard 9. The destruction of the habitat caused by the shrimp trawls being drug repeatedly across the coral further damages the habitat for the fish to mature.

I also urge the council to support more proactive measures for fisheries management through the use of fish hatcheries, like the Florida Marine Fisheries Enhancement Initiative proposal currently seeking funding. I also urge the council to take a more long term proactive role in fisheries management by coordinating with other agencies and expanding aquaculture research specifically targeting farm raised species to sustain commercial fisheries.

I also wish to express our displeasure on the longline EXP permits granted a year ago. “NMFS issued the permits despite overwhelming public objection, opposition from the Florida Fish and Wildlife Conservation Commission and Florida’s own Governor Charlie Crist. This type of action by the NMFS undermines the department and the public trust of Federal fishery management in general. What better example of longline damage to a resource is the recent emergency ruling to suspend longline in gulf waters less than 50 fathoms in order to stop the killing of endangered sea turtles which exceeded many times the “NFMS accepted” mortality rate in the past 18 months. In this face of these losses, even this action by the Gulf council seemingly required threat of legal action by concerned environmentalists? It’s time to stop the indiscriminate killing of all endangered species and specifically our scarce and prized billfish populations.

Data Reporting

I do not believe that the new MRIP system will solve the problems that were encountered by the MRFSS system.

I urge the council to adopt more proven techniques in marine fisheries assessments by supporting programs similar to the Dolphin Research Project which monitors and tracks specie population in situ and to illicit first hand fish population assessments that accurately account for the state of a particular stock. Recreational fisherman have proven themselves to be stewards of the resource and could lend assistance, along with state agencies and universities. The lack of funding is not a viable excuse for a poor fish assessment program. The Dolphin Research Project has expanded our knowledge of Dolphinfish a great deal, with volunteer efforts and donated funds of less than $100k per year. It would be logical to expand this type of a program to other species of interest, thereby increasing the knowledge of the specie. This knowledge would be significant in deriving ACL's in the future.

I also urge the council to not allocate less than 50% of an ACL for recreational angling and for hire recreational anglers that do not sell their catch in the near term for any particular specie. Fairness of allocation as dictated by Congress implies this allotment in my view.

The black sea bass fishery could be well managed by the following:

- limiting traps to no more than 40 per vessel.

- requiring each vessel to bring traps in when returning to port.

When traps are left out in the ocean during rough weather, too many fish get killed.

For example, if a boat has 200 traps and the weather is bad enough, you could possibly be losing 10 - 30 pounds per trap in mortalities.

200 traps times 10 pounds = 2000 pounds

200 traps times 30 pounds = 6000 pounds

So, approximately 2000 to 6000 pounds of mortalities from negligent fishing.

Michael D. Cowdrey

PO BOX 598
Sneads Ferry, NC 28460
cowfish0909@yahoo.com
910-340-9801

Feb. 6, 2009

To: South Atlantic Fishery Management Council

Amendment 18 Snapper/Grouper Scoping Comments

A. Golden Tilefish

a) Change fishing year to August or September. This is extremely important for the bandit fishery.

b) Set up gear specific endorsement system

1) based on qualifications recommended by the tilefish workgroup.

2) Additional eligibility schemes developed by staff.

3) Endorsements should be transferable to allow new entrants into the fishery.

4) The endorsement system should be considered a temporary management solution used to bridge the gap between the current scheme and a LAPP type management.

c) There has been testimony that South Carolina fishermen are at a disadvantage based on the January 1st start date. This is not evident in Table 3 of my November 17, 2005 fishing year comments. In fact, the catch rates by month for that time period are virtually identical for both Florida and South Carolina.

d) Other options to extend the Golden Tilefish season.

1) Lower the trip limit from the current 4000 pound level.

a) 3000 pounds/ trip

b) 2500 pounds/ trip

c) 2000 pounds/ trip

2) Allow only bandit gear during the 300 pound trip limit reduction.

3) If you change the fishing year both of these options are unnecessary especially from the bandit fishery perspective.

e) Do not entertain the 10% bandit 90% longline allocation scheme which came out of the Tilefish workgroup.

1) In the past history of the tilefish fishery 100% of the landings were bandit and 0% were longline.

2) When the fishing year is changed allow a 3 to 5 year period for bandit gear to reestablish an appropriate allocation percentage.

B) Separating the snowy grouper into regions or states

a) How many fishermen from North Florida through North Carolina would make that run for 100 pounds of snowy grouper?

b) When the quota gets to the level that fishermen from the northern areas can, again, participate economically in the fishery, then use the historical percentages by area to do regional quota allocations.

C) Electronic real time monitoring would be advantageous for this fishery in the future.

D) I would encourage the Council to get public comment on changing the Wreckfish ITQ program.

E) Annual Catch Limits

a) For those species that have been under quota management and for which we have not had significant quota overruns, I would ask the Council not to step down the ABC'c derived from the stock assessment.

Thank you,

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November 17, 2005

This letter is a follow up to my public hearing comments made at the Cape Canaveral hearing held on November 9, 2005. It would be helpful to refer to that testimony before reading this letter.

Any consideration of a fishing year change should focus on two basic questions. Will a change in the fishery year have a negative impact on the total landings? That is, will it shorten the length of time the quota is open? Since the council's goal is to keep the fishery open for as long as possible, this is an important consideration. Also, will changing the fishery year have a negative impact on the landings of the individual affected states? Will it alter the balance of power? Does it give a competitive advantage?

South Carolina and Florida contribute 93.3% (Table 1) of the golden tilefish landings in the SAFMC's jurisdiction. In the interest of time, only landings of these states were considered in the analysis.

Changing the fishery year to September 1st will not negatively impact total landings (Table 2). In both projections the 295,000 pound proposed quota would be landed in the ninth month (Table 2).

Comparing average percent revenues from golden tilefish in South Carolina and Florida indicates that average revenues were, virtually, identical (SC-65.81%, FLA-65.63%) by the eight month in the September 1 fishery year (Table 3). This shows each state with an equal revenue level going into the month of quota closure.

Based on the above analysis, changing the fishery year from the calendar year to a September 1 start date has minimal impacts on average catches and revenues for South Carolina and Florida.

Changing the fishery year to September 1 eliminates the need to reduce the quota to 300 pounds when 75% of the quota is landed. This would allow hook and line fisherman of South Florida to start fishing at their traditional time of year. Bandit fishermen in South Florida usually only target golden tilefish into the month of November when either king or Spanish mackerel become the targeted species.

The change to September 1 would, also, allow longline fishermen to capture the entire quota, since there becomes no need to have a season ending harvest reduction.

Eliminating the 300 pound trip limit reduces the administrative burden on the NMFS by eliminating tracking and notification stages in the quota. It also aids enforcement by removing a trip limit from the enforcement burden.

Beginning the fishery year in September also removes several potential problems which could arise with reduction to the 300 pond trip limit. Quota tracking is not an exact science. The golden tilefish quota could be landed before the step down takes place. It has happened already with snowy grouper. If this happened before September, the traditional bandit fishery would be eliminated.

If 75% of the quota is not reached by September 1st, in the preferred alternative, the trip limit will remain at the 4000 pound level. Twenty-five percent of the proposed 295,000 pound quota equals 73,750 pounds. This is only 18.4 trips at the 4000 pound level for longline vessels. If the 75% level is reached after September 1st, the bandit fishery will, again be eliminated in a couple of weeks.

Changing the golden tilefish fishery year to September 1st allows the bandit fishermen to target golden tilefish at the traditional time of the year in the area where the longline fishing has been prohibited. Longline fishermen benefit by not having 25% of the quota designated at a 300 pound limit. Thay can continue to fish until the full quota is reached.

The NMFS benefits by not having to track or announce when 75% of the quota is harvested and enforcement has one less trip limit on the books to enforce.

Rarely can a fishing year change create a positive impact for all involved, but this one does just that.

Tables 1, 2 and 3 following.

Thank you,

Ben C. Hartig

Table 1. Percent of golden tilefish landings, by state, during 1999-2003. Source: Council document 4-12

AREA	PERCENT
Monroe County	4.5
East Florida	68.4
Georgia	0.1
South Carolina	24.9
North Carolina	2.0

Table 2. Average cumulative landings for golden tilefish (1999-2003) Comparing calendar year to Sept 1 start of fishing year. Corresponds to council document 4-46.

CALENDAR YEAR | SEPTEMBER 1 START

	MONTH	Cumulative Landings		MONTH	Cumulative Landings
1	January	18,314		September	47,206
2	February	43,279		October	95,085
3	March	79,022		November	133,423
4	April	123,745		December	152,503
5	May	173,230		January	170,817
6	June	218,408		February	195,782
7	July	237,488		March	231,525
8	August	283,837		April	276,248
9	September	323,879		May	325,733
10	October	371,085		June	370,912
11	November	418,964		July	417,261
12	December	457,302		August	457,302

Table 3. Cumulative percent revenues from golden tilefish, by month for South Carolina and Florida, comparing calendar year to Sept.1 start date. Source: Tables 3-17b, 3-17d council document.

SOUTH CAROLINA					FLORIDA				
MONTH	CUM. %		MONTH	CUM. %	MONTH	CUM. %		MONTH	CUM. %
Jan	5.21		Sept	7.11	Jan	4.52		Sept	9.03
Feb	11.52		Oct	17.48	Feb	9.26		Oct	19.23
Mar	21.99		Nov	27.9	Mar	17.76		Nov	27.4
April	32.36		Dec	33.45	April	29.65		Dec	35.98
May	40.81		Jan	38.66	May	40.83		Jan	40.5
June	49.45		Feb	44.97	June	49.48		Feb	45.24
July	54.83		Mar	55.44	July	54.12		Mar	53.74
Aug	66.55		Apr	65.8	Aug	64.01		Apr	65.63
Sept	73.66		May	74.26	Sept	73.04		May	76.81
Oct	84.03		June	82.9	Oct	83.24		June	85.46
Nov	94.45		July	88.28	Nov	91.41		July	90.1
Dec	100		Aug	100	Dec	100		Aug	100

Amendment 18

My name is Dave Heil and I have been fishing the waters off East Central Florida for approximately 40 years. I have watched the fish populations decline in the 70's and I have seen them rebound to the record levels they are at now. We are catching more fish than ever before at the present time.

I encourage the SAFMC to adopt management options that will ensure the continued availability of the resource as required by the National Standards. The SAFMC's continued ignoring of the destructive fishing techniques of the commercial fishing industry must be stopped and these issues must be addressed. Ignoring these issues prevents effective management of the resources. I encourage the following measures be adopted prior to any additional limitations on the recreational landings.

1. Ban all longline fishing for any purpose. There is no logic for continuing this unsustainable method of fishing. The State of Florida through the efforts of CCA banned gill nets in 1994; fishing stocks have rebounded to historical levels. The banning of all longlines in Federal and State waters would have a similar effect on the fish stocks of managed fish. This is further mandated by National Standard 9.

2. Prohibit all shrimping inside of 60 fathoms. The statistics and options as set forth in the scoping documents ignore the fact that the major cause of juvenile fish mortality is shrimping. The rebuilding of the stock must begin with the elimination of shrimping. Juvenile fish must be allowed to mature and not end up as bycatch floating on the surface behind a shrimp boat. This is mandated by National Standard 9. The destruction of the habitat by the shrimp trawls being drug repeatedly across the coral further damages the habitat for the fish to mature.

3. That there are no reductions in the present bag limit until such time as there has been reliable data collected of the recreational catch. This is required by National Standard 2.

4. Current economic conditions and spiraling gas prices have caused a substantial reduction of the recreational catch in the snapper/grouper fishery, and that trend is continuing. The numbers of recreational trips is declining rapidly with the rise in gas prices. Any more restrictions are not needed and are only punishing a category of angler that is already under pressure. The recreational anglers are under more pressure than the fish. This is as set forth in National Standard 8.

Ted Forsgren of CCA Florida has recently wrote

"If any fishery is in such poor condition that the recreational take must be reduced by means of months long closures, and/or continually smaller & smaller bag limits, then the Fisheries managers should not continue commercial exploitation of that fishery"

"We mus t act now to get the longline gear removed from all offshore waters once and for all" (exhibit A)

CCA has recently published a study by Brad Gentner regarding Grouper fishing in the Gulf of Mexico in regard to the relative values of recreational versus commercial fishing. The economics would be the same for the Atlantic fishery.

"grou per fishing generates $35.2 million in value added, $20 million in income and supports 501 jobs. Commercial gag grouper fishing generates $16 million in valued added, $7.7 million in income and supports 322 jobs while red grouper fishing generate $49 million in valued added, $23.7 million in income and supports 988 jobs. The majority of the economic impacts in the commercial sector in both fisheries occur in the retail and restaurant sectors, and Gentner concludes that those sectors would experience very few losses with a 100 percent recreational allocation." (exhibit B)

Further, it is clear that there has not been sufficient research done or even attempted in regard to the recreational landings to support any changes to the current regulations. The council has no reliable data upon which to make any changes to the recreational limits. If there are any changes that must be made at this time, the only changes that are supportable are changes to the commercial landings. The council continues to make changes to the recreational limits without limiting the commercial landings. These are actions are clearly in violation of the Magnusson Stevens Act. Given the current state of the MRFSS data and system, any findings regarding recreational fishing by MRFSS can only be considered anecdotal and all other measures of fishing pressure from the recreational and for hire sector show a 30-50% drop in trips. This comes from Charter Capt Associations, Marinas, FWC, major network news sources, fishing clubs, gas docks, and a host of other sources that all point to the same trend, downward 30-50% and those that go out are targeting species closer to shore.

Commercial Golden Tilefish and Black Sea Bass Participation and Effort Shifts
Golden Tilefish

I oppose both of the proposed alternatives in that both the endorsement and the LAP systems continue to exclude of a practical basis the public' s participation in the fishery. The alternatives continue the allocation of 95% commercial and 5% recreational allocations.

I object to this unfair allocation, there is no scientific basis for the commercial landings to be this disproportionate with the recreational landings. This is in violation of National Standard 4 (a) which requires "If it become s necessary to allocate or assign fishing privileges among various United States publics, such allocation shall be (A) fair and equitable to all such public's;"

I agree with the position of Ted Forsgren of CCA Florida when recently wrote

"If any fishery is in such poor condition that the recreational take must be reduced by means of months long closures, and/or continually smaller & smaller bag limits, then the Fisheries managers should not continue commercial exploitation of that fishery"

Black Sea Bass
• **Limit the black sea bass pot tags distributed to each permit holder annually with a possible decrease in the number of traps held. For example, one option discussed by the Council was to limit the black sea bass pot tags annually to 100 per holder of Federal Snapper Grouper vessel permits in year 1, 50 in year 2, and 25 in year 3 and onwards until modified. Consider historical harvest in the number of pots distributed to each individual;**

I oppose the use of pots for fishing. These pots are indiscriminate in the fish that are caught and killed and the ghost pots continue to kill fish beyond the fishing limits.

• Require pots to be brought back to shore at the conclusion of each trip; and
I oppose all use of Black Sea Bass Pots, however if they are allowed to be used, pots must be brought back to shore. I also believe that lost pot tags should not be replaced and be forfeited.

• Implement a Limited Access Privilege (LAP) type program whereby each individual is allocated a certain percentage of the Total Allowable Catch (TAC) or a certain number of pots to fish.

I oppose all LAPs as they produce a right to take fish while forcing the public out of the fishery.

Separate Snowy Grouper into Regions/States

I agree with the regionalization of the Snowy Grouper regulations. However, the quotas must be set to allow for the public' s recreational fishery to become viable again. The present regulations have squeezed the recreational angler out of the fishery. The present regulations give 95% of the fishery to the commercial interests. I object to this unfair allocation, there is no scientific basis for the commercial landings to be this disproportionate with the recreational landings. This is in violation of National Standard 4 (a) which requires "If it becomes nece ssary to allocate or assign fishing privileges among various United States publics, such allocation shall be (A) fair and equitable to all such public' s"

I agree with the position of Ted Forsgren of CCA Florida when recently wrote

"If any fishery is in such poor condition that the recreational take must be reduced by means of months long closures, and/or continually smaller & smaller bag limits, then the Fisheries managers should not continue commercial exploitation of that fishery"

Separate the Gag Recreational Annual Catch Limit (ACL) into Region or State Annual Catch Targets (ACTs)

I agree with this proposal.

Changes to the Golden Tilefish Fishing Year
• Change the start of the golden tilefish fishing year from Jan. 1st to Sept. 1st.
• Change the start of the golden tilefish fishing year from Jan. 1st to Aug. 1st.
• Change the start of the golden tilefish fishing year from Jan. 1st to May 1st.
• Remove the 300 lb. trip limit when 75% of the quota has been met

I oppose all of the above proposed alternatives. The present regulations and the new proposed have squeezed the recreational angler out of the fishery. The present regulations give over 97% of the fishery to the commercial interests. I object to this unfair allocation, there is no scientific basis for the commercial landings to be this disproportionate with the recreational landings. This unfair allocation of the fishery must be corrected before any additional regulations are enacted in the Golden Tile Fishery.

This is in violation of National Standard 4 (a) which requires "If it beco mes necessary to allocate or assign fishing privileges among various United States publics, such allocation shall be (A) fair and equitable to all such public's"

I agree with the position of Ted Forsgren of CCA Florida when recently wrote

"If any fishery is in such poor condition that the recreational take must be reduced by means of months long closures, and/or continually smaller & smaller bag limits, then the Fisheries managers should not continue commercial exploitation of that fishery"

Data Reporting

I oppose the implementation of the Marine Recreation Information Program, the program is simply a Band-Aid placed on the failed MRFSS program. MRIP does nothing more than attempt to patch a MRFSS data collection program that has been unable to provide any data on the recreational landings. There are no significant changes in the new system and the expansion of the population of fishing public from which data may be collected will not fix the underlying problems with the program.

Wreckfish Individual Transferable Quota (ITQ) Program

I oppose all ITQ's, as th ey create a private property right for a private entity in the public' s resource. The ITQ becomes a valuable commodity to the quota holder to which the public has no rights. This council should not sell a public resource to a private concern and allow the private concern to reap the windfall from not only from the exploitation of the resource, but also the appreciation of the value of the right to exploit the public resource. If there are any quotas to be issued, they must be nontransferable.

Designate Essential Fish Habitat (EFH) in new areas in the Mid-Atlantic and New England

I am opposed to any new MPA's that re strict the public's ability to fish in any area.

Dave Heil, Winter Park, Florida

COASTAL CONSERVATION ASSOCIATION FLORIDA

DEDICATED TO CONSERVING AND PROTECTING FLORIDA'S MARINE RESOURCES

Dear

As our thoughts turn toward the holidays, friends and family, it is important to remember that the challenges to our marine resources do not take a holiday and many serious issues continue to face the average citizen angler.

Unfair and Inequitable Resource Allocations
While the general public sees ever smaller bag limits with longer & longer closures, the commercial industry is allocated an inequitable percentage of the fish. If any fishery is in such poor condition that the recreational take must be reduced by means of months long closures, and/or continually smaller & smaller bag limits, then the Fisheries Managers should not continue commercial exploitation of that fishery.

Federal law states that allocation of fisheries must be "fair and equitable" to all individuals. Commercial takes of thousands of pounds of fish at a time is completely unfair and inequitable under such circumstances.

Wholesale Fishery Giveaways - IFQs
While the average citizen is left wondering what the next bag limit reduction will be the Federal Councils are moving toward guaranteeing commercial takes with Individual Fishing Quotas (IFQ). The Federal Gulf of Mexico Fisheries Management Council and the National Marine Fisheries Service (NMFS) are expediting the implementation of an IFQ program for exclusive access privileges to Gulf grouper for commercial fishermen. The Gulf Council's Grouper IFQ program will allocate and grant exclusive right to a limited number of commercial interests to more than 65 percent of all the Gulf red and gag grouper.

The NMFS says that an IFQ does not convey title, or ownership of the resource, to the commercial fishers, but, commercial interests will be allowed to take, sell, lease, broker, and even bequeath these grouper quota shares.

Longline Fishing Impacting Fisheries and Endangered Species
For many years CCA Florida has sought to prohibit industrial scale exploitation and bykill caused by commercial longline gear. In 2005, data indicated that just 25 longline boats took more Gulf red grouper than the combined catch of all the recreational fishermen in the Gulf. Recent testimony showed that longlines are discarding huge quantities of Gulf red snapper bykill. New federal observer information revealed that Gulf longliners are catching and discarding, dead, hundreds of endangered loggerhead sea turtles. We must act now to get the longline gear removed from all offshore waters once and for all.

All of these issues, and more, are going on today and we need your help to continue fighting for your resources. We know that conservation matters to you and CCA Florida needs your support.

I personally thank you for considering your part in CCA Florida's mission. Our success car grow each year because of the support of dedicated members like you.

Sincerely,

Ted

Ted Forsgren
Executive Director
Coastal Conservation Association Florida

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Allocation Analysis of the Gulf of Mexico Gag

and Red Grouper Fisheries

Prepared for:

Coastal Conservation Association

By:

Brad Gentner

Principal

Gentner Consulting Group

Table of Contents

Executive Summary

Grouper stocks are harvested by competing user groups and competition is increasing due to coastal population increases, falling total allowable catches (TAC) and changes in management regimes.

• TACs have been decreasing over the last few years due to stock concerns

• Coastal populations have been increasing

• Recreational effort has been increasing slightly

• Increasing use of rights based fishery management increases the need for allocation analysis before initial allocations are made

• Current management allows the allocation to creep between fisheries based on which sector catches the fish first

This report uses economics to analyze grouper allocations in the Gulf of Mexico. Economic value is the appropriate metric for examining allocations. Economic value includes those values accruing to commercial fishermen, for-hire recreational businesses, consumers, and recreational anglers. While total economic value is important, examining marginal willingness to pay (MWTP) using the equimarginal principle is the most appropriate way to estimate the allocation that maximizes value for all of society. The National Marine Fisheries Service uses the site choice random utility model as its standard model for estimating recreational marginal values. This paper estimates a site choice random utility model for grouper and compares the marginal willingness to pay estimates from this analysis to other analyses available in the literature.

• This study establishes the MWTP for gag grouper at $13.58/pound and red grouper at $13.51/pound.

• Haab et al (2008) find MWTP for grouper to fall between $5.15 and $58.78 per pound

• Gentner (2004) find gag grouper MWTP to be $19.37/pound and $19.27/pound for red grouper.

• Carter et al (2008) find current commercial MWTP for red grouper to be $1.25/pound with a range of $3.72/pound for a 0% allocation to $0.53/pound for a 100% allocation.

• Using the equimarginal principle, all recreational estimates of MWTP, with the exception of Carter et al (2008), are higher than commercial MWTP.

• The equimarginal principle indicates that societal value for gag grouper and red grouper is maximized with a 100% allocation to the recreational sector.

• Using Gentner (2004), quality increases for increase in allocation would exceed effort increases. This important result suggests that for a given change in an allocation there would be an increase in angling quality.

Economic impacts, while not appropriate for deciding allocations alone, provide important context on the distributional impacts of an allocation policy. The current total economic impacts for the commercial and recreational sectors are estimated below.

• Recreational gag grouper fishing generates $107 million in value added, $60.8 million in income and supports 1,523 jobs.

• Commercial gag grouper fishing generates $16 million in value added, $7.7 in income, and supports 322 jobs.

• Recreational red grouper fishing generates $35.2 million in value added, $20 million in income, and supports 501 jobs.

• Commercial red grouper fishing generates $49 million in value added, $23.7 million in income, and supports 988 jobs.

• The majority of the economic impacts in the commercial sector in both fisheries occur in the retail and restaurant sectors generating 51% of the jobs, 55% of the value added, and 30% of the income.

• It is likely that retail and restaurant sectors would experience very few losses with a 100% recreational allocation as consumers will readily substitute imported product or other fish species.

This report concludes that a 100% allocation to the recreational sector would maximize economic value to society. This report does not examine social impacts beyond the distributional information provided by the limited economic impact analysis. This analysis, like many, does not include an analysis of values accruing to the consumer sector nor the for-hire sector. Because consumers readily substitute for imports or other species, it is likely that including consumer values would do little to change this conclusion. If for-hire values were included, they would bolster the 100% allocation conclusion.

Introduction

Grouper stocks are harvested by competing user groups and the competition between those groups is intensifying as total allowable catches (TAC) are reduced for stock rebuilding. Additionally, in the Gulf of Mexico (GoM), the commercial red snapper fishery is under a rights based management regime and rights based management is currently being proposed for the grouper fishery. Historically in the United States (US), rights based systems have barred noncommercial

interest from acquiring quota. If this prohibition continues, denying recreational anglers the ability to change allocation using market forces, changing allocations after a commercial rights based system has been imposed will likely become more difficult as the commercial fishery becomes rationalized. Therefore, it is very important to set the allocation correctly when implementing the initial allocation of the commercial rights.

As a result of this increasing pressure, the Gulf of Mexico Fishery Management Council (GMFMC) is developing guidelines for examining allocations between sectors. The reauthorization of Magnuson/Stevens includes language regarding the use of economic value in allocating stocks between sectors, and economic theory dictates the use of economic value when making allocation decisions.

The purpose of this report is to examine reallocation of the red and gag grouper fisheries using economic value as a metric. The report includes a brief discussion about the use of economics in the allocation of resources followed by a discussion of history of the allocations in these two fisheries along with recreational effort and catch trends. Next, estimates for recreational values for gag and red grouper in the GoM are estimated using a site choice random utility model, specified using the 2006 Marine Recreational Fisheries Statistical Survey (MRFSS) economic add-on survey data. Additionally, these estimates are compared to other recreational and commercial value estimates of gag and red grouper from the existing literature. Commercial value estimates were not generated in this analysis as the data needed to estimate commercial values is not publicly available. Instead, commercial value estimates have been taken from the literature. The analysis conducted herein suggests that allocation should be moved to the recreational sector, and a 100% recreational allocation maximizes benefits to society across both gag and red grouper fisheries.

A reallocation to the recreational sector of the entire total allowable catch may potentially create significant social impacts. While this analysis does not include a complete examination of social impacts, commercial and recreational economic impacts are estimated and used to discuss the potential distributional effects of a reallocation policy.

Economics of Allocation

Broadly defined, economists use two different metrics to examine the implications of policy decisions on society: economic value and economic impacts. The first, economic value, also known as economic benefit or welfare, monetizes the value society places on resources or activities. Economic value should be the metric used to decide between one course of action and another (Freeman 1993, Edwards 1990, and others).

The second, economic impacts, examines the flow of expenditures on fishery resource activities and products as that spending moves through a community. While economic impact measures should not be used to choose a course of action, they can be used to examine what particular sectors in the economy are hurt or helped by a particular policy and to what degree. Economic impact analysis examines the distribution of value changes identified when comparing benefits, making both types of analysis complementary.

Very few allocation studies have been conducted for saltwater recreational fishing. Kirkley, et al. (2000) conducted a study for striped bass allocation in Virginia. Carter, Agar, and Waters, 2008, conducted an allocation analysis for the red grouper fishery in the GoM. Their analysis will be discussed at greater length below. Edwards (1990) developed a guide for the allocation of fishery resources and this discussion follows his framework.

For both the recreational and commercial sectors, total value is the sum of consumer and producer surplus. Producer surplus is measured by examining the supply curves for commercial producers of seafood, including harvesters, processors, wholesalers, and distributors, as well as the supply curves for for-hire recreational service providers. Essentially, producer surplus is the difference between the cost of producing the good and the dollar value generated by the sale of the good. Consumer surplus is measured by examining the demand for goods at the consumer level including the demand for fish at markets and restaurants and the demand for recreational fishing trips. Consumer surplus is the difference between the amount society would be willing to pay for the good in question and what consumers actually paid for the good in the marketplace. For the recreational sector, total value or net benefits is the sum of the consumer surplus from recreational fishing participants and producer surplus from for-hire charter and head boat operators. For the commercial sector, total value is the sum of consumer surplus from the purchase of seafood products in markets and restaurants and the producer surplus from harvesters, processors, wholesalers, and distributors of those fishery products.

Value is not static across all allocations, and, as any consumer obtains more of a good, the marginal value of obtaining the next unit of that good falls. That is, there are diminishing returns to additional consumption of any good and this is a fundamental tenet of consumer demand, which has important implications for allocation decisions. A similar tenet exists for producers, but does not always hold depending on the character of the industry. As a result, it is important to examine the schedule of these marginal values in each sector. Societal benefits are maximized at the allocation where commercial sector marginal value is equal to the marginal value from the recreational sector. This is known in economics as the equimarginal principle.

Estimating consumer surplus entails estimating demand curves for both the angling experience and for consumer purchases of seafood. On the recreational side of the equation, estimating consumer surplus involves specialized surveys of anglers. The National Marine Fisheries Service (NMFS) periodically collects the data necessary to estimate site choice recreational demand models. NMFS has spent considerable time and effort developing site choice models[1]

[1] A partial list of the research in recreational site choice models conducted or sponsored by NMFS or using Marine Recreational Fisheries Statistical Survey data include: Gautam and Steinback (1998); Gentner (2007); Gentner and Lowther (2002); Gillig, Woodward, Ozuna, T., and Griffin (2000); Haab, Hicks, Schnier, and Whitehead (2008);

and, currently, site choice models are the agency's preferred recreational valuation technique.[2] On the seafood consumer side, data on the prices and quantities of seafood purchased in markets and restaurants is needed. Unfortunately this type of data rarely exists.

Estimating producer surplus requires data on the costs and earnings of all the various businesses involved in the production and sale of seafood or recreational services. Very little of this type of information exists, making the calculation of producer surplus difficult at best and impossible at worst.

In summary, the equimarginal principle is the preferred method to examine allocations. Often, it is difficult to develop a complete schedule of marginal values across all possible allocations. In this case, it is appropriate to examine total value, recognizing, however, that total value may not take diminishing marginal returns into account.

Trends in the Recreational Fishery

Groupers are a popular recreational target species for both private anglers and for-hire vessel patrons. The majority of all grouper trips, for both gag and red grouper occur in Florida, with a small number of trips occurring in Alabama and other states. As a result, the analysis of the value of gag and red grouper harvest is confined to trips taken in Florida as there is insufficient data on trips occurring in other states for the modeling technique employed in this paper (GMFMC 2008). Directed effort estimates are very important for this analysis as they are used in the expansion of marginal value estimates to total value estimates and the expansion and prediction of economic impact estimates later in this analysis.

Table 1 details the history of the allocation of both gag and red grouper in the Gulf of Mexico since 1986. In 2006, the total gag grouper total allowable catch (TAC) was 3.27 million pounds split with 59% allocated to the recreational sector and 41% allocated to the commercial sector.

In the gag grouper fishery, the allocation has crept towards the commercial sector since 1986, but has been relatively stable in the last few years. For red grouper, the TAC in 2006 was 6.15 million pounds split 16% recreational and 84% commercial. In the red grouper fishery, there has been significant creep towards the commercial fisher since 1986, with a significant recreational loss of allocation over the last few years leading up to 2006.

Directed effort is an important part of this analysis and can be defined by either target trips, catch trips, or a combination of the two measures. Target trips include those trips where the angler indicated a targeting decision for gag grouper, but did not harvest any grouper. Catch trips are all trips, regardless of target, where gag grouper were caught. For the purposes of this report, total directed effort is the sum of target trips and catch trips, following the conventions of the American Fisheries Society. It is important to note, however, that these directed effort estimates are not additive across species as anglers on a targeted trip for one species may indicated multiple target species in the intercept survey or may have caught another species during their

Haab, Whitehead, and McConnell (2003); Haab and Hicks (1999); Haab and Whitehead (1999); Hicks, Gautam, Steinback, and Thunberg (1999); and Hindsley, Landry, and Gentner (2008).

2 See the Center for Independent Experts evaluation of NMFS' recreational economic program. Center for Independent Experts. (CIE 2006).

trip. An example for this analysis includes an angler that listed gag grouper as her primary target while only catching red grouper. This angler's effort then becomes part of the target effort for gag grouper and the catch effort for only red grouper. It is impossible to eliminate this potential double counting.

Table 1. Annual Allocations of Gag and Red Grouper, 1986-2006 (GMFMC, 2008).

	Gag Grouper		**Red Grouper**	
Year	**Percent Recreational**	**Percent Commercial**	**Percent Recreational**	**Percent Commercial**
1986	68%	32%	28%	72%
1987	61%	39%	18%	82%
1988	75%	25%	35%	65%
1989	58%	42%	28%	72%
1990	41%	59%	20%	80%
1991	64%	36%	26%	74%
1992	57%	43%	37%	63%
1993	60%	40%	25%	75%
1994	55%	45%	28%	72%
1995	62%	38%	28%	72%
1996	60%	40%	17%	83%

1997	62%	38%	12%	88%
1998	58%	42%	16%	84%
1999	64%	36%	18%	82%
2000	69%	31%	27%	73%
2001	56%	44%	19%	81%
2002	60%	40%	22%	78%
2003	59%	41%	22%	78%
2004	63%	37%	34%	66%
2005	59%	41%	23%	77%
2006	59%	41%	16%	84%

Because of this double counting problem, all aggregated values in this report are calculated by converting marginal value estimates denominated by numbers of fish and converting them to weight by dividing by the current average harvest weight per fish. This issue again points to the need to use the equimarginal principle as it does not require arbitrary decisions regarding aggregating values to total value estimates.

Figure 1 details the trends in directed effort in the gag grouper fishery. All directed effort data has been taken from the final Amendment 30b (GMFMC 2008). Target trips for gag have been on the rise since 2002, but dropped between 2005 and 2006 to 469,625 target trips, a drop of more than 75,000 trips. Catch trips rose until 2004, but then fell precipitously from 2004 until 2006 to 821,487 trips. Since 2004, catch trips have fallen by 466,000 trips. In total in 2006, gag grouper anglers took 1.3 million trips targeting and/or catching gag grouper, a drop from the previous year of 387,000 trips. While not detailed in Figure 1, the majority (80%) of the 2006 trips were in the private/rental boat mode and 10% where in the for-hire mode. The remaining 10% were in the shore mode.

Figure 1. Gag Grouper Directed Effort, 2002 – 2006.

276,644 311,864 378,398

545,491

469,625

939,298

1,168,782

1,297,609

821,487

1,215,942

1,480,646

1,676,007 1,678,090

1,132,599

1,291,112

0

200,000

400,000

600,000

800,000

1,000,000

1,200,000

1,400,000

1,600,000

1,800,000

2,000,000

2002 2003 2004 2005 2006

Trips

Target Trips Catch Trips Total Trips

Figure 2. Red Grouper Directed Effort, 2002 – 2006.

155,688 184,311

141,860

466,325

557,209

297,903

573,292

620,067

985,179

725,329

439,763

106,967 62,858

829,491

541,018

0

200,000

400,000

600,000

800,000

1,000,000

1,200,000

2002 2003 2004 2005 2006

Trips

Target Trips Catch Trips Total Trips

Figure 2 displays the directed effort in the red grouper fishery over the same time period. Target trips for red grouper have been fairly flat over this time period with a moderate increasing trend. In 2006, target effort was 141,860 trips, a drop of more than 40,000 trips since 2005. Catch effort, on the other hand, has declined considerably in recent years. In 2006, catch effort was 297,903 trips, a drop of more than 240,000 trips. Total effort in 2006 was 439,763 trips dominated by the private rental mode with 81% of those trips. The for-hire mode was responsible for 15% of the 2006 trips with the balance (4%) made up of catch effort trips in the shore mode.

To use the equimarginal principle, angler harvest needs to be denominated in pounds. For reasons to be discussed below, it is difficult to estimated site choice models using harvested pounds directly, so the following estimates will be used to convert numbers of fish to pounds of fish after model estimation. Figure 3 displays the trends in weight per harvested fish from the MRFSS data (NMFS 2008). During the 2002 to 2006 period, gag grouper weight per fish has been falling to just over 7 pounds per fish in 2006. Over the same period, the red grouper weight per harvested fish has slightly increased since 2002 to just over 7 pounds per fish.

Figure 3. Average Weight per Grouper, 2002 – 2006.

Recreational Valuation Methodology

Site choice random utility models (RUM) rely on observed data on recreational site choices. The observed data for this study comes from the 2006 MRFSS intercept survey. In this section, the RUM model is specified and the data manipulation process necessary to run a RUM for groupers using the MRFSS angler data is presented.

This report relies on data from the National Marine Fisheries Service's MRFSS. Since 1994, NMFS has used the MRFSS to gather the travel cost data necessary to estimate the value of access and the value of changes in catch rates. NMFS has invested significant time and money developing the site choice methodology and has deemed it the most appropriate method for estimating recreational values (Center for Independent Experts 2006)

The MRFSS consists of two independent and complementary surveys: a field intercept survey and a random digit dial (RDD) survey of coastal households. The intercept survey is a creel survey used to estimate mean catch-per-trip by species across several strata including fishing wave (2-month period), fishing mode (shore, private or rental boat, or for-hire fishing vessel), and state. Data elements collected during the base part of the intercept survey include state, county, zip code of residence, hours fished, primary area fished, target species, gear used, and days fished in the last two and 12 months. The creel portion of the survey collects length and weight of all fish species retained by the angler and the species and disposition of all catch not retained by the angler.

Because the MRFSS constitutes the best nationwide sample frame for marine recreational angling and offers considerable savings over implementing a new program, economic data collection is added-on to the MRFSS effort. During January through December of 2006, an intercept add-on survey was conducted to obtain data on angler trip expenditures. Upon completion of the base MRFSS survey in 2006, anglers were asked to complete a short add-on questionnaire. The intercept add-on survey was designed to collect the minimum data necessary to estimate RUM's of anglers' site choice decisions.

Nested Logit

RUMs use all of the substitute recreational sites facing an angler to value attributes of the site chosen by an angler. In this case, grouper harvest rates will be valued. NMFS has sponsored a good deal of research into RUMs of recreational site choice to value site closures and angling quality (see footnote 1). The majority of this work has involved specifying nested logit models of recreational site choice using expected catch or harvest rates as the measure of angling quality. The following analysis is patterned after previous NMFS RUM specifications as closely as possible given the data limitations described below. The nested structure was chosen because failing to account for substitution between modes has potentially large impacts on marginal willingness to pay (MWTP) estimates for harvest. In particular, selecting the conditional logit over the nested logit typically induces an upward bias in MWTP (Haab et al 2008). The appropriateness of the nested specification was also tested, and, with this particular data set, it was deemed more appropriate (see Table 4).

The specification of the nested logit model for recreational choices has been adapted from Haab and McConnell (2003). Angler utility is specified as:

$$_{jkjkjk}u = v + \varepsilon$$

where v_{jk} is an angler's indirect utility and ε_{jk} is a random error term for site j in mode k. For this report, it is assumed that the decision to fish for grouper is made outside of the model. Due to data limitations, it was impossible to estimate models for either gag or red grouper independently, so the model was specified using all grouper species. Subsequent to the choice to participate in grouper fishing, the angler is assumed to make a fishing mode choice, between either the private/rental boat or for-hire mode, and then a site choice conditioned on the mode choice. The upper level nesting structure includes the choice of fishing mode across for-hire fishing and fishing from the private/rental boat mode. There were only a handful of shore fishing observations in the data, which is too few to include as a separate nest. In this case, the global site list includes only the 30 Florida sites used in Haab et al (2000) due to data limitations. An angler chooses a fishing site from the set of all alternative sites and fishing mode combinations, if the utility of visiting that site in that mode is greater than the utility of visiting any other site in any other mode in the global choice set.

$$u_{jk} \geq u_{j'k'} \quad \forall j', k'$$

Furthermore, grouper angler indirect utility is specified by:

$$v_{jk}\left(y - c_{jk}, q_{jk}, s_k\right) = -\beta_y c_{jk} + \beta q_{jk} + \gamma s_k$$

where y is income, c_{jk} is the cost of traveling to the site, q_{jk} is a vector of quality attributes that vary by site and mode choice, and s_k is a set of attributes that vary only by mode choice. Since income is an additive constant across all sites combinations in the choice set, it falls out of the nested logit probability. Following Haab et al (2000), the vector q contains travel cost, the log of the number of MRFSS intercept sites aggregated into the sites used in this model, and the expected keep rate. The keep rate was used to model mortality and not total catch. The keep rate includes observed catch, as well as self reported mortality not seen by a MRFSS interviewer. It does not include any mortality of released fish unless the fish was dead before release. This measure most closely approximates commercial mortality. The vector, s, contains one variable which takes the value of one if the angler was fishing in the for-hire mode during wave 3.

The nested logit probability is:

where K is the total number of upper level nests, J_k is number of lower level sites for upper level k, m = (1,….,J), l = (1,….,K), α_k is the location parameter, and θ_k is the inclusive value parameter. This study is concerned with estimating the marginal net benefits of grouper harvest. The appropriate benefit metric in this case is compensating variation (CV) (Haab and McConnell, 2003). Within the nested logit model, indirect utility is specified as:

CV is calculated by differencing the indirect utility before an allocation change to the indirect utility after an allocation change and is represented by:

$$V(c, q, s, y) = V(c^*, q^*, s^*, y - WTP)$$

where the star (*) denotes the changed indirect utility attributes. If V(*) >V(original) then CV is greater than zero. For quality changes that are the same for all sites, such as an allocation change, the CV calculation collapses to:

the change in the expected keep rate times the parameter estimate for expected keep rate divided by the parameter estimate for travel cost. Please see Haab and McConnell (2003) for further details of this specification and the mechanics of the CV calculation. For the remainder of this report CV will be referred to as marginal willingness to pay (MWTP).

Data Manipulation

During the 2006 MRFSS intercept add-on survey, 424 anglers caught grouper, were on single day trips primarily for fishing, finished the intercept add-on containing the necessary variables, and gave the interviewer a home zip code necessary for travel cost calculation. Table 2 contains the descriptive statistics for the variables used in this analysis. By wave, 14.4% of all anglers were intercepted in wave 1, 15.3% were intercepted in wave 2, 16.0% were intercepted in wave 3, 10.6% were intercepted in wave 4, 15.3% were intercepted in wave 5, and 28.3% were intercepted in wave 6, the most popular fishing wave in the data. By fishing mode, 15% were in the for-hire mode and 85% were intercepted in the private rental mode.

Travel cost is simply the round trip travel distance multiplied by the current federal government travel reimbursement rate of $0.585/mile. The opportunity cost of time was calculated by taking the travel time (calculated miles/40 mph average travel speed) and multiplying it by one-third the wage rate. Wage rates were calculated by taking median household income by zip code and dividing it by 2,000 work hours per year (U.S. Census Bureau, 2002). MWTP based on the opportunity cost of time calculated using U.S. Census income estimates likely represent an upper bound when compared to the typical opportunity cost of time calculation from Hicks et al (1999), Haab et al (2000), and Haab et al (2008). The variable used to describe mode choice in the upper level nest was created by crossing participation in the for-hire mode with a wave 3 participation dummy.

Following Hicks et al (1999), a keep rate matrix for all sites by mode was developed by taking the five year average keep at each site by mode. These matrices contain many zero values that may indicate the site is not used as a grouper site or that may indicate that grouper has never been encountered by MRFSS interviewers at the site. Zeros were replaced using the nearest neighboring site in the same mode, if replacement was deemed appropriate based on examination of the harvest data and the site's location. Table 2 contains the descriptive statistics for all variables used in the modeling.

Table 2. Descriptive Statistics for All Variables.

Variable

Name Description Mean Standard

Error

Lower

Confidence

Limit

Upper

Confidence

Limit

pr Private/Rental Mode Dummy 0.85 0.02 0.81 0.88

charter Charter Mode Dummy 0.15 0.02 0.12 0.19

ffdays2 Two Month Avidity 5.00 0.31 4.39 5.61

travel_opp Calculated Travel Cost $48.48 $6.52 $35.67 $61.30

lnm Log of # of Aggregated Sites 3.12 0.04 3.04 3.19

ekarate Expected Harvest 0.81 0.00 0.80 0.82

charter3 Charter Crossed with Wave3 2.12% 0.01 0.75% 3.50%

wave2 Intercepted in Wave 2 15.33% 0.02 11.89% 18.77%

wave3 Intercepted in Wave 3 16.04% 0.02 12.53% 19.54%

wave4 Intercepted in Wave 4 10.61% 0.01 7.67% 13.56%

wave5 Intercepted in Wave 5 15.33% 0.02 11.89% 18.77%

wave6 Intercepted in Wave 6 28.30% 0.02 24.00% 32.61%

Expected Keep Rates

To conform to current theories on the calculation of welfare effects stemming from quality changes, expected keep rates, (rather than historic keep rates), were used as the quality variable in the nested logit model. Typically, a poisson regression is used to estimate expected keep rates. However, if over-dispersion is found in the data the zero alter poission (ZAP) or the negative binomial models are more appropriate. Initial runs using a poisson indicated overdispersion

in the data so both ZAP models and negative binomial models were estimated. The negative binomial model performed far better than the ZAP and was used here for expected keep rates. The specification of the negative binomial is:

where$\lambda \left(\beta \right)_{ii} = \exp z$, x_i equals harvest of individual i on the intercepted trip, and z_i contains variables describing the site and the individual including a constant term, five year average harvest rate in numbers of fish, two month fishing avidity (the number of trips taken in the previous two months), for-hire mode participation dummy, and a wave 5 participation dummy. In previous studies (Hicks et al 1999, and Haab et al 2000), years of fishing experience was used to describe angler experience. This variable was not collected in the 2006 add-on, so two month fishing avidity was used as a proxy for fishing experience.

Table 3 contains the parameter estimates from the negative binomial expected keep model. All variables were significant at the 90% level except hours fished. All parameter estimates are significantly different from zero. The value of tau, the over-dispersion parameter is 3.84 and significant indicating that over-dispersion was indeed a problem in this data set that was corrected using the negative binomial specification. All parameters had a positive and significant impact on the expected keep rate except for wave5, which had a negative impact on expected keep. The parameters from this model were used construct the expected keep rates for all potential site choices in the model.

Table 3. Negative Binomial Expected Keep Rate Model Results.

Variable	**Parameter Estimate**	**Standard Error**	**T-ratio**	**P-value**
constant	-3.4201	0.3609	-9.4760	0.0000
karate	3.2079	0.7133	4.4970	0.0000
ffdays2	0.0462	0.0231	2.0028	0.0452

charter 1.3107 0.7772 1.6865 0.0917

wave5 -1.2965 0.6713 -1.9313 0.0535

Tau 3.8429 1.4470 2.6558 0.0079

For the purposes of this analysis, it would have been ideal to use weight of grouper harvested instead of numbers of grouper harvested. However, harvest in this analysis is defined as harvest measured and weighed by a MRFSS interviewer plus harvest consumed or disposed of at sea. While several methods were explored to assign weights to the unobserved catch, none proved satisfactory. Instead MWTP estimates for keep rates in numbers of grouper were converted to weight based measures using the average weight of grouper from Figure 3.

Results

Table 4 includes the results of the nested RUM estimation. Full information maximum likelihood estimation was conducted using SAS PROC MDC (SAS 2003). Overall, all parameters were significant at the 95% level with the exception of the upper level nest variable indicating for-hire anglers fishing in wave 3, and it was significant at the 90% level. The model performed well with a McFadden's R of 0.6271 and a Cragg-Uhler statistic of 0.9950. The travel cost parameter was negative, as expected, suggesting that anglers prefer sites with lower travel cost. The site aggregation parameter was positive suggesting that anglers prefer aggregated sites containing a larger number of individual MRFSS sites. The parameter on expected harvest was also positive suggesting that anglers prefer more catch to less. Finally, a test of the appropriateness of the nested model over the conditional logit model suggests that the nested model is indeed appropriate.

Estimates of Marginal Values of Grouper

Table 5 contains the MWTP for this study and several other NMFS sponsored studies for comparison. The MWTP estimates from this model are displayed in the first three rows. Using the analysis presented above, the MWTP for one grouper was $95.59 in 2006. Using the average weights from Figure 3, this translates into a MWTP per pound of $13.58 for gag and $13.51 for red grouper. Expanding these marginal values to the total economic value of grouper harvest in 2006 yields $26.4 million for the gag grouper fishery and $13.6 million for the red grouper fishery.

Table 4. Nested Model Parameter Estimates

Parameter	**Estimate**	**Standard Error**	**P-Value**
Lower Level Nest			
travel_opp	-0.0384	0.0020	<.0001
lnm	0.5608	0.0855	<.0001
ekarate	3.6735	0.5194	<.0001
Upper Level Nest			
charter3	-0.7002	0.3811	0.0662
Inclusive Value Parameters			
Charter Mode	0.0100	*	
Private/Rental Mode	0.3190	0.0384	
Model Fit			
Log Likelihood	-662.4747		
McFadden's R	0.6271		
Cragg-Uhler	0.9950		

IIA Test 89.7469 <.0001

*Restricted parameter. Likelihood ratio test fails to reject

restriction

Table 5. Mean Willingness to Pay for Grouper, 2006.

Model Compensating Variation,

2006 Dollars Mean Total Value

One Grouper $95.59 ---

One Pound Gag Grouper $13.58 $26,439,769

Model in This

Report: Grouper

Nested Logit One Pound Red Grouper $13.51 $13,642,039

One Grouper $122.96 ---

Haab et al, 2008 One Pound Gag Grouper $17.27 $33,616,777

One Pound Red Grouper $18.34 $18,527,896

One Grouper $136.36 ---

Gentner, 2004 One Pound Gag Grouper $19.37 $37,713,831

One Pound Red Grouper $19.27 $19,459,079

One Grouper --- ---

Carter et al, 2008 One Pound Gag Grouper ---

One Pound Red Grouper* $1.33 $1,698,129.73

NMFS has invested considerable time and funds estimating MWTP for various species using a variety of methodologies. The vast majority of this work has focused on RUMs of recreational choice using either revealed preference data or stated preference data. Most recently, the Marine Fisheries Initiative (MARFIN) funded Haab, Hicks, Schnier, and Whitehead to explore the impacts of angler heterogeneity on MWTP estimates derived from site choice RUMs (Haab et al

2008). They focused on single species models for popular Gulf and South Atlantic species including grouper. For each species they specified the typical conditional and nested logits as well as expanding their analysis to a new class of models including random parameters logit and finite mixture models, both still based on the RUM framework, in an attempt to incorporate angler heterogeneity.

The Haab et al (2008) models used data from the 2000 MRFSS intercept add-on survey. They calculated travel cost to include the opportunity cost of time for those unable to take time off work with pay to participate and they used \$0.30/mile for their calculations. In addition, they also added the average charter fee from Gentner et al (2001). Otherwise, they followed the standard data creation steps outlined in this paper.

MWTP estimates for grouper ranged from \$34.50 to \$393.98 per fish across all the various specifications used in their analysis. All values have been converted to 2006 dollars using the consumer price index. Using weight conversion factors from 2000, this represents a range of \$4.85/pound to \$55.33/pound for gag and \$5.15 to \$58.78/pound for red grouper. The MWTP numbers from their report displayed in Table 5 are from the finite mixture model that accounts for angler heterogeneity and was particularly well behaved. Using these estimates, the total economic benefits from the gag grouper fishery are \$33.6 million and \$18.5 million from the red grouper fishery.

Several results are worth noting beyond the MWTP estimates. Haab et al's (2008) primary goal was to explore new methods and not directed policy application. As a result, it produced a wide range of values. However, the results derived support the values found in this analysis. Also, they found that aggregating across differing species, as in Carter et al (2008), adds biases when trying to examine single species policies such as allocation.

In 2003, NMFS explored a new methodology, the stated preference choice experiment, to examine angler choices of recreational fishing trips. This method presents anglers with a series of hypothetical fishing trips that vary in trip attributes through a mail survey. The data are analyzed using a RUM in much the same way that the revealed preference data was analyzed above.

Gentner (2004) details the analysis of this data, and, while not calculated in the paper, it is possible to calculate the MWTP for grouper harvest using the parameters in the paper. Using the policy outcome model, the MWTP for on grouper is $136.36 in 2006 dollars. This translates into a MWTP for gag harvest of $19.37/pound and $19.27/pound for red grouper. When looking at total economic benefits, these estimates generate $37.7 million in gag benefits and $19.5 million in red grouper benefits.

An added advantage of stated preference choice experiments is the ability to predict effort changes stemming from changes in fishing trip attributes. The model generates an elasticity measure for grouper harvest of 0.114 which means that if harvest goes up one unit, effort will rise by 11.4%. This information will be used below to discuss possible economic impact consequences of various allocation scenarios. Both valuation and effort predictions from this model were used in the red snapper fishery management plan amendment 27 (GMFMC 2007).

Finally, Carter, Agar, and Waters (2008) estimated both commercial and recreational MWTP estimates in the red grouper fishery in their examination of red grouper allocation. They used commercial and recreational data from 2003 for data availability reasons and because there were major regulatory changes for both commercial and recreational anglers after 2003.

On the commercial side, Carter et al (2008), estimated profit functions for multi-product firms in a mixed species fishery. Their commercial analysis resulted in a MWTP for red grouper in the commercial sector of $1.25/pound in 2006 dollars. In the multi-species reef fishery many trips do not harvest grouper. In order to include these zero grouper trips Carter et al (2008) used a harvest of 0.1 pounds to replace the zero grouper harvest levels. This substitution likely introduces an upward bias in the commercial MWTP estimate. Their paper also used a simulation approach to estimate the MWTP for red grouper across a range of allocation scenarios. From this simulation the maximum amount the commercial sector is willing to pay for additional allocation was $3.72 in 2006 dollars.

Carter et al (2008) attempted to estimate a consumer demand model for red grouper and met with little success. As a result, red grouper consumer MWTP was not included in their analysis. This is a common problem for consumer demand models as adequate data at the consumer level does not exist. It is, however, possible to estimate consumer surplus measures using landings data as in Park et al (2004). No attempt was made by Carter et al to estimate consumer surplus values using landings data.

Carter et al (2008) also estimated a recreational demand model. They did not estimate a recreational site choice model, but instead selected a hedonic price model, a first for NMFS. Hedonic models use the price of a good traded in the market and in this case they used charter trip prices. Hedonic modeling assumes that the good in question is composed of many attributes and in this case those attributes include the harvest of fish. As such, the value of harvest is reflected in the charter price and econometric methods can be used to extract the portion of the total price attributable to harvest. Due to data limitations, the model was estimated using all species of fish harvested by recreational anglers on charter trips. The point estimate for MWTP for all species of fish was found to be $1.33 in 2006 dollars. This estimate was then applied to red grouper. As with the RUM's discussed in this paper, they were unable to trace out the benefit function for recreational fishing. No attempt was made in Carter et al (2008) to estimate the MWTP for grouper from the for-hire sector.

Economic Impacts

While allocation decisions should be made by using the equimarginal principle or total economic value as the primary factor, there are other factors that can be examined such as economic impacts. Economic impacts help to examine distributional issues that may arise with any reallocation (Kirkley et al 2000; Edwards 1990). Table 6 and Table 7 detail the current economic impacts generated by trip expenditures in the recreational sector. These estimates were generated using the 2006 MRFSS economic add-on following Gentner and Steinback (2008). This data was used to calculate grouper specific trip expenditures of $64.51 per person per trip. Using the gag grouper total directed effort, gag grouper fishing generates $83.3 million in total trip expenditures. The gag grouper fishery generates 1,513 jobs, $107 million in value added (or contribution to gross domestic product), and $60.8 million in personal income. Because there is less directed effort in the red grouper fishery, total trip expenditures are lower at $27.6 million dollars which supports 501 jobs, $35.2 million in value added and $20 million in person income.

Table 6. Recreational Gag Grouper Trip Expenditures and Economic Impacts.

Expenditure	**Expenditures**	**Impacts**			
Category	**Mean**	**Total Value**	**Added**	**Income**	**Jobs**
Private Transportation	$6.83	$8,822,574	$9,945,171	$5,433,043	112
Groceries	$6.91	$8,927,613	$12,350,674	$7,129,302	165
Restaurant	$1.75	$2,257,595	$2,217,091	$1,320,858	32
Lodging	$0.24	$313,754	$460,412	$283,495	10
Public Transportation	$0.02	$19,520	$28,668	$16,424	0

Boat Fuel	$20.80 $26,855,719	$30,272,881	$16,538,085	341
Boat Rental	$0.04 $52,755	$77,446	$44,770	1
Charter Fees	$19.54 $25,229,902	$37,037,688	$21,411,177	627
Crew Tips	$0.27 $342,445	$502,706	$290,624	9
Bait	$3.86 $4,986,667	$7,305,711	$4,285,077	116
Ice	$1.01 $1,299,443	$1,023,558	$683,218	20
Fishing Tackle	$2.70 $3,488,977	$4,799,861	$2,827,366	62
Parking	$0.48 $620,049	$910,265	$526,225	15
Souvenirs	$0.06 $78,249	$51,536	$33,197	1
TOTAL	**$64.51 $83,295,263**	**$106,983,668**	**$60,822,860**	**1,513**

Table 7. Recreational Red Grouper Trip Expenditures and Economic Impacts.

Expenditure Expenditures Impacts

Category Mean Total Value

Added Income Jobs

Private Transportation $6.83 $3,005,039 $3,387,404 $1,850,538 38

Groceries $6.91 $3,040,816 $4,206,738 $2,428,297 56

Restaurant $1.75 $768,955 $755,159 $449,895 11

Lodging $0.24 $106,867 $156,820 $96,561 3

Public Transportation $0.02 $6,649 $9,765 $5,594 0

Boat Fuel $20.80 $9,147,271 $10,311,184 $5,633,003 116

Boat Rental $0.04 $17,969 $26,379 $15,249 0

Charter Fees $19.54 $8,593,505 $12,615,331 $7,292,817 214

Crew Tips $0.27 $116,640 $171,226 $98,989 3

Bait $3.86 $1,698,498 $2,488,383 $1,459,531 40

Ice $1.01 $442,601 $348,632 $232,710 7

Fishing Tackle $2.70 $211,194 $310,043 $179,237 5

Parking $0.48 $442,601 $348,632 $232,710 7

Souvenirs $0.06 $26,652 $17,553 $11,307 0

TOTAL $64.51 $27,625,256 $35,153,248 $19,986,436 501

For the recreational sector, durable good purchases, such as fishing rods, tackle, boats, homes, and vehicles were not included in the analysis. Durable good purchases were left out of the estimation because recreational anglers buy gear that could be used in multiple fisheries. It is impossible to apportion durable good expenditures attributable only to grouper fishing. Durable good expenditures were also left out of the analysis because very little can be said about what will happen when allocations change. While it is possible that some anglers only fish for grouper and would no longer fish if recreational allocation fell, it is more likely that they would continue to fish in other fisheries. While increasing recreational allocations might induce non-anglers to take up the sport and purchase durable goods, it is beyond the scope of this analysis to examine the participation decision. If changes in durable good purchases could be estimated, they would increase the economic impact of recreational grouper fishing.

On the commercial side, price per pound for each species was taken from FUS (2006) and used to establish total landed value. To capture the impact of this harvest on the harvester, dealer, processor, and wholesale sectors, the NMFS Fisheries Input/Output Model was used to estimate the economic impacts generated by harvesting, processing, and wholesaling sectors (Kirkley et al 2004). To capture the retail trade in these two grouper species, the value added table from the 2006 Fisheries of the United States was used to calculate the amount of each species purchased at restaurants and retail markets and the markup percentages within that model were used to estimate total consumer expenditures on gag and red grouper. An IMPLAN model was then constructed to estimate the economic impact those expenditures were run through IMPLAN software to estimate the impacts from the retail sector (IMPLAN 2000). Table 8 contains the commercial economic impact estimates.

Commercial fishing for gag grouper generates $16 million in value added, $7.7 million in income and supports 322 jobs, far fewer than the recreational gag grouper fishery. Commercial fishing for red grouper generates $49 million in value added, $23.7 million in income, and supports 988 jobs, which is more than the recreational fishery. Both commercial fisheries generate $64.9 million in value added, $31.4 million in income, and support 1,310 jobs. The majority of these impacts however are generated by the retail and restaurants sectors. The retail trade from grocery stores and other retail outlets generate $2.2 million in value added, $316,000 in income and support 22 jobs. The restaurant sector, however, is larger than all the harvesting and processing sectors combined generating $33.7 million in value added, $9.1 million in income, and supporting 642 jobs.

It is unlikely that the economic impacts of retail and restaurant trade would fall with falling commercial allocations of gag grouper or red grouper. Asche et al (2005) summarizes the results of many research projects looking at seafood demand and the majority of this work indicates that consumers readily substitute other species in the face of price changes. Changes in allocation away from the commercial sector would be met with higher consumer prices unless the demand could be met by imports. If prices rose, consumers would switch to imports or other species. Additionally, Park et al (2004) used commercial landings to estimate consumer demand for grouper in the U.S. and found consumers would substitute other species or imports readily. As a result, restaurants and retail outlets would still provide the same amount of fish, albeit different kinds of fish, in the face of reduced commercial allocations. When looking at only the harvester, processors, and dealers, gag grouper supports only $6.7 million in value added, $5.8 million in income, and supports only 159 jobs while red grouper generates $20.9 million in value added, $17.9 million in income and supports only 487 jobs. In contrast, recreational gag grouper fishing generates $107 million in value added, $60.8 million in personal income, and supports 1,513 jobs while red grouper fishing generates $35.2 million in value added, $20 million in person income, and supports 501 jobs.

Table 8. Economic Impacts of Commercial Red and Gag Grouper Harvest.

Sector	**Gag Grouper**	**Red Grouper**	**Total Gag and Red Grouper**
Harvesters			
Employment impacts (FTE jobs)	74	226	300
Income Impacts (000 of 2006$)	$2,299	$7,056	$9,355
Value Added (000 of 2006 $)	$3,062	$9,401	$12,462
Primary dealers/processors			
Employment impacts (FTE jobs)	41	125	165
Income Impacts (000 of 2003$)	$1,759	$5,402	$7,162
Value Added (000 of 2006 $)	$2,187	$6,714	$8,901
Secondary wholesalers/distributors			
Employment impacts (FTE jobs)	44	136	181
Income Impacts (000 of 2003$)	$1,341	$4,116	$5,457
Value Added (000 of 2006 $)	$1,900	$5,834	$7,734
Retail			
Employment impacts (FTE jobs)	5	17	22
Income Impacts (000 of 2003$)	$77.78	$238.22	$316.00
Value Added (000 of 2006 $)	$533.88	$1,638.68	$2,172.56

Restaurants

Employment impacts (FTE jobs) 158 484 642

Income Impacts (000 of 2003$) $2,241.53 $6,874.41 $9,115.95

Value Added (000 of 2006 $) $8,270.25 $25,384.54 $33,654.79

Harvesters and seafood industry

Employment impacts (FTE jobs) 322 988 1,310

Income Impacts (000 of 2003$) $7,719 $23,687 $31,406

Value Added (000 of 2006 $) $15,953 $48,972 $64,925

Similar arguments could also be made for recreational fishing. Economic theory suggests that consumers spend a fixed proportion of their income on leisure activities and if one recreational activity were to no longer be available, they would continue to spend that same proportion of their income on another recreational activity. Recreational anglers are also capable of fishing for many different species or even participating in other recreational activities. While some anglers might quit fishing altogether if allocations were changed in favor of the commercial sector, many would continue to fish for another species. To a large degree, this is why value should be used instead of economic impacts to make allocation decisions.

Using the elasticity estimate from Gentner (2004), changes in recreational effort were estimated for a variety of allocation scenarios. Table 9 and Table 10 display the results of this analysis for gag and red grouper respectively. Since the elasticity is small, the increases in effort are relatively moderate. Caution is warranted in interpreting theses estimates as allocations move farther away from the status quo. This analysis also assumes that recreational expenditures would not change as allocations change, which is probably a safe assumption for relatively small changes in allocations.

Table 9. Recreational Economic Impacts Across Various Gag Grouper Allocation Scenarios.

Allocation Scenario			Recreational Impacts	
Change	Recreational Share	Commercial Share	Value Added (1000's of $'s)	Employment
2006 Status Quo	59%	41%	$106,984	1,513
Recreational +5%	64%	36%	$109,137	1,535
Recreational +25%	84%	16%	$109,586	1,555
Recreational +35%	94%	6%	$109,743	1,565
Recreational 100%	100%	0%	$109,946	1,571
Commercial +5%	54%	46%	$104,830	1,490
Commercial +25%	34%	66%	$104,381	1,470
Commercial +40%	19%	81%	$104,044	1,455
Commercial 100%	0%	100%	$0	0

Because gag grouper allocations are currently closer to 100% relative to red grouper, the changes in effort implied in Table 9 are relatively small. If the recreational sector received 100% of the gag grouper TAC, Gentner (2004) predicts only 4.42% more trips for a 41% increase in the quota. This suggests that harvest rates would likely increase as the available harvest is increasing faster than effort.

Table 10. Recreational Economic Impacts Across Various Red Grouper Allocation Scenarios.

Allocation Scenario Recreational Impacts

Change Recreational

Share

Commercial

Share

Value Added

(1000's of $'s) Employment

2006 Status Quo 16% 84% $36,439 515

Recreational +5% 21% 79% $37,345 537

Recreational +25% 41% 59% $38,184 558

Recreational +50% 66% 34% $39,233 583

Recreational 100% 100% 0% $40,660 618

Commercial +5% 11% 89% $35,534 493

Commercial 100% 0% 100% $0 0

Conversely, since the red grouper allocations are farther from 100% than gag grouper, the changes in effort implied in Table 10 are higher relative to gag grouper. Overall, a move to a 100% allocation in the red grouper fishery would only increase effort 22.7% for an 84% increase in allocation. Again, this result still leaves room for a quality improvement in red grouper harvest.

It is beyond the scope of this analysis to examine changes in commercial sector economic impacts. To perform such an analysis, estimates of gag grouper and red grouper dockside prices would be needed for various levels of landings. As allocations fall, dockside prices would increase partially ameliorating the impact of the fall in allocation. Conversely, as allocations increased dockside prices would likely fall, dampening an increase in commercial economic impacts.

Discussion

It is very difficult to establish MWTP functions for recreational fisheries and no attempt was made in this analysis to generate those. However if one assumes the angler benefit function has a horizontal slope, as in Carter et al (2008), all point estimates of MWTP, outside of the Carter et al (2008) estimate, are higher than the highest MWTP estimated in Carter et al (2008) for the commercial fishery. For instance, the lowest per pound MWTP for red grouper from Haab et al (2008) is \$5.15, a full \$1.43 higher than the commercial MWTP of \$3.72 which coincides with a 100% recreational allocation. This result suggests that total societal value would be maximized with a 100% allocation to the recreational sector. While Carter et al (2008) did not estimate a gag grouper MWTP for either the commercial or recreational sectors, it is likely that the commercial gag MWTP would be similar. If the gag grouper commercial MWTP schedule were similar, it would also recommend a 100% allocation to the recreational sector.

Using the MWTP estimated in this paper of \$13.51, current red grouper angler total economic value is \$13.6 million and would be \$83 million dollars under a 100% allocation to the recreational sector. Current commercial value in the red grouper fishery is \$6.4 million and under a 100% allocation to the commercial sector, that value rises to \$10.2 million dollars using estimates from Carter et al (2008).

There are several caveats to the analysis presented here. First, consumer MTWP values were not calculated in this study or in any of the other studies presented here. It is likely that these values would be low given the highly price elastic nature of consumer demand for seafood (Asche et al 2005; Park et al 2004). Balancing the lack of consumer MWTP is the lack of MWTP estimates from the for-hire sector. None of the analyses examined here estimated for-hire values for the commercial providers of recreational services as adequate data on this industry does not exist. It is likely that the MWTP estimates from the for-hire sector would be at least as high as the consumer MWTP suggesting that the omission of these two values would not change the conclusions presented here. If anything, the inclusion of for-hire MWTP estimates would further bolster the 100% recreational allocation conclusion.

Finally, because of the diminishing marginal returns principle, the recreational MWTP should decrease as the amount of harvest increases. Because effort in both of these fisheries is quite high, the marginal increase in harvest, even for a large increase in quota, is relatively small. For example, in the red grouper fishery a 100% allocation would increase harvest per trip by 11.75 pounds or, using the current average weight per red grouper, only 1.7 red grouper. In the case of red grouper, 1.7 fish increase is a slight increase suggesting that the MWTP for that next 0.7 fish would be only slight lower. For gag grouper the increase is even smaller. At a 100% allocation, the average harvest weight increase per trip would be slightly more than one pound and less than a single fish increase. In the case of gag grouper, MWTP at a 100% recreational allocation would not be lower than the estimates presented here.

There are other factors to consider when changing allocations including distributional concerns, equity, and other social factors (Kirkley et al, 2000; Edwards, 1990). With a 100% allocation to the recreational sector across either of these two grouper species, there would be negative impacts on the commercial sector, more for red grouper than for gag grouper. From the economic impact analysis, it is clear both the recreational and commercial sectors generate significant economic impact. It is difficult, however, to draw conclusions from limited economic impact analysis conducted here. Instead, this information is useful in providing context about potential distributional effects of any reallocation policy. On the commercial side, it is very unlikely that all the economic impacts supported by commercial activity would be lost with a 100% allocation to the recreational sector. Additionally, with a 100% allocation to the recreational sector, more value added, income, and jobs would be supported in industries that support recreational fishing. It is not possible from this analysis to know if the recreational economic impact gains would outweigh any commercial losses. The converse is equally true for a 100% allocation to the commercial sector.

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Amendment 18

My name is Dave Heil and I have been fishing the waters off East Central Florida for approximately 40 years. I have watched the fish populations decline in the 70's and I have seen them rebound to the record levels they are at now. We are catching more fish than ever before at the present time.

I encourage the SAFMC to adopt management options that will ensure the continued availability of the resource as required by the National Standards. The SAFMC's continued ignoring of the destructive fishing techniques of the commercial fishing industry must be stopped and these issues must be addressed. Ignoring these issues prevents effective management of the resources. I encourage the following measures be adopted prior to any additional limitations on the recreational landings.

1. Ban all longline fishing for any purpose. There is no logic for continuing this unsustainable method of fishing. The State of Florida through the efforts of CCA banned gill nets in 1994; fishing stocks have rebounded to historical levels. The banning of all longlines in Federal and State waters would have a similar effect on the fish stocks of managed fish. This is further mandated by National Standard 9.

2. Prohibit all shrimping inside of 60 fathoms. The statistics and options as set forth in the scoping documents ignore the fact that the major cause of juvenile fish mortality is shrimping. The rebuilding of the stock must begin with the elimination of shrimping. Juvenile fish must be allowed to mature and not end up as bycatch floating on the surface behind a shrimp boat. This is mandated by National Standard 9. The destruction of the habitat by the shrimp trawls being drug repeatedly across the coral further damages the habitat for the fish to mature.

3. That there are no reductions in the present bag limit until such time as there has been reliable data collected of the recreational catch. This is required by National Standard 2.

4. Current economic conditions and spiraling gas prices have caused a substantial reduction of the recreational catch in the snapper/grouper fishery, and that trend is continuing. The numbers of recreational trips is declining rapidly with the rise in gas prices. Any more restrictions are not needed and are only punishing a category of angler that is already under pressure. The recreational anglers are under more pressure than the fish. This is as set forth in National Standard 8.

Ted Forsgren of CCA Florida has recently wrote

"If any fishery is in such poor condition that the recreational take must be reduced by means of months long closures, and/or continually smaller & smaller bag limits, then the Fisheries managers should not continue commercial exploitation of that fishery"

"We mus t act now to get the longline gear removed from all offshore waters once and for all" (exhibit A)

CCA has recently published a study by Brad Gentner regarding Grouper fishing in the Gulf of Mexico in regard to the relative values of recreational versus commercial fishing. The economics would be the same for the Atlantic fishery.

"grou per fishing generates $35.2 million in value added, $20 million in income and supports 501 jobs. Commercial gag grouper fishing generates $16 million in valued added, $7.7 million in income and supports 322 jobs while red grouper fishing generate $49 million in valued added, $23.7 million in income and supports 988 jobs. The majority of the economic impacts in the commercial sector in both fisheries occur in the retail and restaurant sectors, and Gentner concludes that those sectors would experience very few losses with a 100 percent recreational allocation." (exhibit B)

Further, it is clear that there has not been sufficient research done or even attempted in regard to the recreational landings to support any changes to the current regulations. The council has no reliable data upon which to make any changes to the recreational limits. If there are any changes that must be made at this time, the only changes that are supportable are changes to the commercial landings. The council continues to make changes to the recreational limits without limiting the commercial landings. These are actions are clearly in violation of the Magnusson Stevens Act. Given the current state of the MRFSS data and system, any findings regarding recreational fishing by MRFSS can only be considered anecdotal and all other measures of fishing pressure from the recreational and for hire sector show a 30-50% drop in trips. This comes from Charter Capt Associations, Marinas, FWC, major network news sources, fishing clubs, gas docks, and a host of other sources that all point to the same trend, downward 30-50% and those that go out are targeting species closer to shore.

Commercial Golden Tilefish and Black Sea Bass Participation and Effort Shifts Golden Tilefish

I oppose both of the proposed alternatives in that both the endorsement and the LAP systems continue to exclude of a practical basis the public' s participation in the fishery. The alternatives continue the allocation of 95% commercial and 5% recreational allocations.

I object to this unfair allocation, there is no scientific basis for the commercial landings to be this disproportionate with the recreational landings. This is in violation of National Standard 4 (a) which requires "If it become s necessary to allocate or assign fishing privileges among various United States publics, such allocation shall be (A) fair and equitable to all such public's;"

I agree with the position of Ted Forsgren of CCA Florida when recently wrote

"If any fishery is in such poor condition that the recreational take must be reduced by means of months long closures, and/or continually smaller & smaller bag limits, then the Fisheries managers should not continue commercial exploitation of that fishery"

Black Sea Bass

- **Limit the black sea bass pot tags distributed to each permit holder annually with a possible decrease in the number of traps held. For example, one option discussed by the Council was to limit the black sea bass pot tags annually to 100 per holder of Federal Snapper Grouper vessel permits in year 1, 50 in year 2, and 25 in year 3 and onwards until modified. Consider historical harvest in the number of pots distributed to each individual;**

I oppose the use of pots for fishing. These pots are indiscriminate in the fish that are caught and killed and the ghost pots continue to kill fish beyond the fishing limits.

• Require pots to be brought back to shore at the conclusion of each trip; and
I oppose all use of Black Sea Bass Pots, however if they are allowed to be used, pots must be brought back to shore. I also believe that lost pot tags should not be replaced and be forfeited.

• Implement a Limited Access Privilege (LAP) type program whereby each individual is allocated a certain percentage of the Total Allowable Catch (TAC) or a certain number of pots to fish.

I oppose all LAPs as they produce a right to take fish while forcing the public out of the fishery.

Separate Snowy Grouper into Regions/States

I agree with the regionalization of the Snowy Grouper regulations. However, the quotas must be set to allow for the public' s recreational fishery to become viable again. The present regulations have squeezed the recreational angler out of the fishery. The present regulations give 95% of the fishery to the commercial interests. I object to this unfair allocation, there is no scientific basis for the commercial landings to be this disproportionate with the recreational landings. This is in violation of National Standard 4 (a) which requires "If it becomes nece ssary to allocate or assign fishing privileges among various United States publics, such allocation shall be (A) fair and equitable to all such public' s"

I agree with the position of Ted Forsgren of CCA Florida when recently wrote

"If any fishery is in such poor condition that the recreational take must be reduced by means of months long closures, and/or continually smaller & smaller bag limits, then the Fisheries managers should not continue commercial exploitation of that fishery"

Separate the Gag Recreational Annual Catch Limit (ACL) into Region or State Annual Catch Targets (ACTs)

I agree with this proposal.

Changes to the Golden Tilefish Fishing Year
• Change the start of the golden tilefish fishing year from Jan. 1st to Sept. 1st.
• Change the start of the golden tilefish fishing year from Jan. 1st to Aug. 1st.
• Change the start of the golden tilefish fishing year from Jan. 1st to May 1st.
• Remove the 300 lb. trip limit when 75% of the quota has been met

I oppose all of the above proposed alternatives. The present regulations and the new proposed have squeezed the recreational angler out of the fishery. The present regulations give over 97% of the fishery to the commercial interests. I object to this unfair allocation, there is no scientific basis for the commercial landings to be this disproportionate with the recreational landings. This unfair allocation of the fishery must be corrected before any additional regulations are enacted in the Golden Tile Fishery.

This is in violation of National Standard 4 (a) which requires "If it beco mes necessary to allocate or assign fishing privileges among various United States publics, such allocation shall be (A) fair and equitable to all such public's"

I agree with the position of Ted Forsgren of CCA Florida when recently wrote

"If any fishery is in such poor condition that the recreational take must be reduced by means of months long closures, and/or continually smaller & smaller bag limits, then the Fisheries managers should not continue commercial exploitation of that fishery"

Data Reporting

I oppose the implementation of the Marine Recreation Information Program, the program is simply a Band-Aid placed on the failed MRFSS program. MRIP does nothing more than attempt to patch a MRFSS data collection program that has been unable to provide any data on the recreational landings. There are no significant changes in the new system and the expansion of the population of fishing public from which data may be collected will not fix the underlying problems with the program.

Wreckfish Individual Transferable Quota (ITQ) Program

I oppose all ITQ's, as th ey create a private property right for a private entity in the public' s resource. The ITQ becomes a valuable commodity to the quota holder to which the public has no rights. This council should not sell a public resource to a private concern and allow the private concern to reap the windfall from not only from the exploitation of the resource, but also the appreciation of the value of the right to exploit the public resource. If there are any quotas to be issued, they must be nontransferable.

Designate Essential Fish Habitat (EFH) in new areas in the Mid-Atlantic and New England

I am opposed to any new MPA's that re strict the public's ability to fish in any area.

Dave Heil, Winter Park, Florida

COASTAL CONSERVATION ASSOCIATION FLORIDA

Dedicated to Conserving and Protecting Florida's Marine Resources

Dear

As our thoughts turn toward the holidays, friends and family, it is important to remember that the challenges to our marine resources do not take a holiday and many serious issues continue to face the average citizen angler.

Unfair and Inequitable Resource Allocations

While the general public sees ever smaller bag limits with longer & longer closures, the commercial industry is allocated an inequitable percentage of the fish. If any fishery is in such poor condition that the recreational take must be reduced by means of months long closures, and/or continually smaller & smaller bag limits, then the Fisheries Managers should not continue commercial exploitation of that fishery.

Federal law states that allocation of fisheries must be "fair and equitable" to all individuals. Commercial takes of thousands of pounds of fish at a time is completely unfair and inequitable under such circumstances.

Wholesale Fishery Giveaways - IFQs

While the average citizen is left wondering what the next bag limit reduction will be the Federal Councils are moving toward guaranteeing commercial takes with Individual Fishing Quotas (IFQ). The Federal Gulf of Mexico Fisheries Management Council and the National Marine Fisheries Service (NMFS) are expediting the implementation of an IFQ program for exclusive access privileges to Gulf grouper for commercial fishermen. The Gulf Council's Grouper IFQ program will allocate and grant exclusive right to a limited number of commercial interests to more than 65 percent of all the Gulf red and gag grouper.

The NMFS says that an IFQ does not convey title, or ownership of the resource, to the commercial fishers, but, commercial interests will be allowed to take, sell, lease, broker, and even bequeath these grouper quota shares.

Longline Fishing Impacting Fisheries and Endangered Species

For many years CCA Florida has sought to prohibit industrial scale exploitation and bykill caused by commercial longline gear. In 2005, data indicated that just 25 longline boats took more Gulf red grouper than the combined catch of all the recreational fishermen in the Gulf. Recent testimony showed that longlines are discarding huge quantities of Gulf red snapper bykill. New federal observer information revealed that Gulf longliners are catching and discarding, dead, hundreds of endangered loggerhead sea turtles. We must act now to get the longline gear removed from all offshore waters once and for all.

All of these issues, and more, are going on today and we need your help to continue fighting for your resources. We know that conservation matters to you and CCA Florida needs your support.

I personally thank you for considering your part in CCA Florida's mission. Our success car grow each year because of the support of dedicated members like you.

Sincerely,

Ted

Ted Forsgren
Executive Director
Coastal Conservation Association Florida

P.O. Box 568886, Orlando, FL 32856 Phone: (407) 854-7002 Fax: (407) 854-1766

Allocation Analysis of the Gulf of Mexico Gag

and Red Grouper Fisheries

Prepared for:

Coastal Conservation Association

By:

Brad Gentner

Principal

Gentner Consulting Group

Table of Contents

Executive Summary

Grouper stocks are harvested by competing user groups and competition is increasing due to coastal population increases, falling total allowable catches (TAC) and changes in management regimes.

• TACs have been decreasing over the last few years due to stock concerns

• Coastal populations have been increasing

• Recreational effort has been increasing slightly

• Increasing use of rights based fishery management increases the need for allocation analysis before initial allocations are made

• Current management allows the allocation to creep between fisheries based on which sector catches the fish first

This report uses economics to analyze grouper allocations in the Gulf of Mexico. Economic value is the appropriate metric for examining allocations. Economic value includes those values accruing to commercial fishermen, for-hire recreational businesses, consumers, and recreational anglers. While total economic value is important, examining marginal willingness to pay (MWTP) using the equimarginal principle is the most appropriate way to estimate the allocation that maximizes value for all of society. The National Marine Fisheries Service uses the site choice random utility model as its standard model for estimating recreational marginal values. This paper estimates a site choice random utility model for grouper and compares the marginal willingness to pay estimates from this analysis to other analyses available in the literature.

• This study establishes the MWTP for gag grouper at $13.58/pound and red grouper at $13.51/pound.

• Haab et al (2008) find MWTP for grouper to fall between $5.15 and $58.78 per pound

• Gentner (2004) find gag grouper MWTP to be $19.37/pound and $19.27/pound for red grouper.

• Carter et al (2008) find current commercial MWTP for red grouper to be $1.25/pound with a range of $3.72/pound for a 0% allocation to $0.53/pound for a 100% allocation.

• Using the equimarginal principle, all recreational estimates of MWTP, with the exception of Carter et al (2008), are higher than commercial MWTP.

• The equimarginal principle indicates that societal value for gag grouper and red grouper is maximized with a 100% allocation to the recreational sector.

• Using Gentner (2004), quality increases for increase in allocation would exceed effort increases. This important result suggests that for a given change in an allocation there would be an increase in angling quality.

Economic impacts, while not appropriate for deciding allocations alone, provide important context on the distributional impacts of an allocation policy. The current total economic impacts for the commercial and recreational sectors are estimated below.

• Recreational gag grouper fishing generates $107 million in value added, $60.8 million in income and supports 1,523 jobs.

• Commercial gag grouper fishing generates $16 million in value added, $7.7 in income, and supports 322 jobs.

• Recreational red grouper fishing generates $35.2 million in value added, $20 million in income, and supports 501 jobs.

• Commercial red grouper fishing generates $49 million in value added, $23.7 million in income, and supports 988 jobs.

• The majority of the economic impacts in the commercial sector in both fisheries occur in the retail and restaurant sectors generating 51% of the jobs, 55% of the value added, and 30% of the income.

• It is likely that retail and restaurant sectors would experience very few losses with a 100% recreational allocation as consumers will readily substitute imported product or other fish species.

This report concludes that a 100% allocation to the recreational sector would maximize economic value to society. This report does not examine social impacts beyond the distributional information provided by the limited economic impact analysis. This analysis, like many, does not include an analysis of values accruing to the consumer sector nor the for-hire sector. Because consumers readily substitute for imports or other species, it is likely that including consumer values would do little to change this conclusion. If for-hire values were included, they would bolster the 100% allocation conclusion.

Introduction

Grouper stocks are harvested by competing user groups and the competition between those groups is intensifying as total allowable catches (TAC) are reduced for stock rebuilding. Additionally, in the Gulf of Mexico (GoM), the commercial red snapper fishery is under a rights based management regime and rights based management is currently being proposed for the grouper fishery. Historically in the United States (US), rights based systems have barred noncommercial

interest from acquiring quota. If this prohibition continues, denying recreational anglers the ability to change allocation using market forces, changing allocations after a commercial rights based system has been imposed will likely become more difficult as the commercial fishery becomes rationalized. Therefore, it is very important to set the allocation correctly when implementing the initial allocation of the commercial rights.

As a result of this increasing pressure, the Gulf of Mexico Fishery Management Council (GMFMC) is developing guidelines for examining allocations between sectors. The reauthorization of Magnuson/Stevens includes language regarding the use of economic value in allocating stocks between sectors, and economic theory dictates the use of economic value when making allocation decisions.

The purpose of this report is to examine reallocation of the red and gag grouper fisheries using economic value as a metric. The report includes a brief discussion about the use of economics in the allocation of resources followed by a discussion of history of the allocations in these two fisheries along with recreational effort and catch trends. Next, estimates for recreational values for gag and red grouper in the GoM are estimated using a site choice random utility model, specified using the 2006 Marine Recreational Fisheries Statistical Survey (MRFSS) economic add-on survey data. Additionally, these estimates are compared to other recreational and commercial value estimates of gag and red grouper from the existing literature. Commercial value estimates were not generated in this analysis as the data needed to estimate commercial values is not publicly available. Instead, commercial value estimates have been taken from the literature. The analysis conducted herein suggests that allocation should be moved to the recreational sector, and a 100% recreational allocation maximizes benefits to society across both gag and red grouper fisheries.

A reallocation to the recreational sector of the entire total allowable catch may potentially create significant social impacts. While this analysis does not include a complete examination of social impacts, commercial and recreational economic impacts are estimated and used to discuss the potential distributional effects of a reallocation policy.

Economics of Allocation

Broadly defined, economists use two different metrics to examine the implications of policy decisions on society: economic value and economic impacts. The first, economic value, also known as economic benefit or welfare, monetizes the value society places on resources or activities. Economic value should be the metric used to decide between one course of action and another (Freeman 1993, Edwards 1990, and others).

The second, economic impacts, examines the flow of expenditures on fishery resource activities and products as that spending moves through a community. While economic impact measures should not be used to choose a course of action, they can be used to examine what particular sectors in the economy are hurt or helped by a particular policy and to what degree. Economic impact analysis examines the distribution of value changes identified when comparing benefits, making both types of analysis complementary.

Very few allocation studies have been conducted for saltwater recreational fishing. Kirkley, et al. (2000) conducted a study for striped bass allocation in Virginia. Carter, Agar, and Waters, 2008, conducted an allocation analysis for the red grouper fishery in the GoM. Their analysis will be discussed at greater length below. Edwards (1990) developed a guide for the allocation of fishery resources and this discussion follows his framework.

For both the recreational and commercial sectors, total value is the sum of consumer and producer surplus. Producer surplus is measured by examining the supply curves for commercial producers of seafood, including harvesters, processors, wholesalers, and distributors, as well as the supply curves for for-hire recreational service providers. Essentially, producer surplus is the difference between the cost of producing the good and the dollar value generated by the sale of the good. Consumer surplus is measured by examining the demand for goods at the consumer level including the demand for fish at markets and restaurants and the demand for recreational fishing trips. Consumer surplus is the difference between the amount society would be willing to pay for the good in question and what consumers actually paid for the good in the marketplace. For the recreational sector, total value or net benefits is the sum of the consumer surplus from recreational fishing participants and producer surplus from for-hire charter and head boat operators. For the commercial sector, total value is the sum of consumer surplus from the purchase of seafood products in markets and restaurants and the producer surplus from harvesters, processors, wholesalers, and distributors of those fishery products.

Value is not static across all allocations, and, as any consumer obtains more of a good, the marginal value of obtaining the next unit of that good falls. That is, there are diminishing returns to additional consumption of any good and this is a fundamental tenet of consumer demand, which has important implications for allocation decisions. A similar tenet exists for producers, but does not always hold depending on the character of the industry. As a result, it is important to examine the schedule of these marginal values in each sector. Societal benefits are maximized at the allocation where commercial sector marginal value is equal to the marginal value from the recreational sector. This is known in economics as the equimarginal principle.

Estimating consumer surplus entails estimating demand curves for both the angling experience and for consumer purchases of seafood. On the recreational side of the equation, estimating consumer surplus involves specialized surveys of anglers. The National Marine Fisheries Service (NMFS) periodically collects the data necessary to estimate site choice recreational demand models. NMFS has spent considerable time and effort developing site choice models[1]

[1] A partial list of the research in recreational site choice models conducted or sponsored by NMFS or using Marine Recreational Fisheries Statistical Survey data include: Gautam and Steinback (1998); Gentner (2007); Gentner and Lowther (2002); Gillig, Woodward, Ozuna, T., and Griffin (2000); Haab, Hicks, Schnier, and Whitehead (2008);

and, currently, site choice models are the agency's preferred recreational valuation technique.[2] On the seafood consumer side, data on the prices and quantities of seafood purchased in markets and restaurants is needed. Unfortunately this type of data rarely exists.

Estimating producer surplus requires data on the costs and earnings of all the various businesses involved in the production and sale of seafood or recreational services. Very little of this type of information exists, making the calculation of producer surplus difficult at best and impossible at worst.

In summary, the equimarginal principle is the preferred method to examine allocations. Often, it is difficult to develop a complete schedule of marginal values across all possible allocations. In this case, it is appropriate to examine total value, recognizing, however, that total value may not take diminishing marginal returns into account.

Trends in the Recreational Fishery

Groupers are a popular recreational target species for both private anglers and for-hire vessel patrons. The majority of all grouper trips, for both gag and red grouper occur in Florida, with a small number of trips occurring in Alabama and other states. As a result, the analysis of the value of gag and red grouper harvest is confined to trips taken in Florida as there is insufficient data on trips occurring in other states for the modeling technique employed in this paper (GMFMC 2008). Directed effort estimates are very important for this analysis as they are used in the expansion of marginal value estimates to total value estimates and the expansion and prediction of economic impact estimates later in this analysis.

Table 1 details the history of the allocation of both gag and red grouper in the Gulf of Mexico since 1986. In 2006, the total gag grouper total allowable catch (TAC) was 3.27 million pounds split with 59% allocated to the recreational sector and 41% allocated to the commercial sector.

In the gag grouper fishery, the allocation has crept towards the commercial sector since 1986, but has been relatively stable in the last few years. For red grouper, the TAC in 2006 was 6.15 million pounds split 16% recreational and 84% commercial. In the red grouper fishery, there has been significant creep towards the commercial fisher since 1986, with a significant recreational loss of allocation over the last few years leading up to 2006.

Directed effort is an important part of this analysis and can be defined by either target trips, catch trips, or a combination of the two measures. Target trips include those trips where the angler indicated a targeting decision for gag grouper, but did not harvest any grouper. Catch trips are all trips, regardless of target, where gag grouper were caught. For the purposes of this report, total directed effort is the sum of target trips and catch trips, following the conventions of the American Fisheries Society. It is important to note, however, that these directed effort estimates are not additive across species as anglers on a targeted trip for one species may indicated multiple target species in the intercept survey or may have caught another species during their

Haab, Whitehead, and McConnell (2003); Haab and Hicks (1999); Haab and Whitehead (1999); Hicks, Gautam, Steinback, and Thunberg (1999); and Hindsley, Landry, and Gentner (2008).

2 See the Center for Independent Experts evaluation of NMFS' recreational economic program. Center for Independent Experts. (CIE 2006).

trip. An example for this analysis includes an angler that listed gag grouper as her primary target while only catching red grouper. This angler's effort then becomes part of the target effort for gag grouper and the catch effort for only red grouper. It is impossible to eliminate this potential double counting.

Table 1. Annual Allocations of Gag and Red Grouper, 1986-2006 (GMFMC, 2008).

	Gag Grouper		**Red Grouper**	
Year	**Percent Recreational**	**Percent Commercial**	**Percent Recreational**	**Percent Commercial**
1986	68%	32%	28%	72%
1987	61%	39%	18%	82%
1988	75%	25%	35%	65%
1989	58%	42%	28%	72%
1990	41%	59%	20%	80%
1991	64%	36%	26%	74%
1992	57%	43%	37%	63%
1993	60%	40%	25%	75%
1994	55%	45%	28%	72%
1995	62%	38%	28%	72%
1996	60%	40%	17%	83%

1997	62%	38%	12%	88%
1998	58%	42%	16%	84%
1999	64%	36%	18%	82%
2000	69%	31%	27%	73%
2001	56%	44%	19%	81%
2002	60%	40%	22%	78%
2003	59%	41%	22%	78%
2004	63%	37%	34%	66%
2005	59%	41%	23%	77%
2006	59%	41%	16%	84%

Because of this double counting problem, all aggregated values in this report are calculated by converting marginal value estimates denominated by numbers of fish and converting them to weight by dividing by the current average harvest weight per fish. This issue again points to the need to use the equimarginal principle as it does not require arbitrary decisions regarding aggregating values to total value estimates.

Figure 1 details the trends in directed effort in the gag grouper fishery. All directed effort data has been taken from the final Amendment 30b (GMFMC 2008). Target trips for gag have been on the rise since 2002, but dropped between 2005 and 2006 to 469,625 target trips, a drop of more than 75,000 trips. Catch trips rose until 2004, but then fell precipitously from 2004 until 2006 to 821,487 trips. Since 2004, catch trips have fallen by 466,000 trips. In total in 2006, gag grouper anglers took 1.3 million trips targeting and/or catching gag grouper, a drop from the previous year of 387,000 trips. While not detailed in Figure 1, the majority (80%) of the 2006 trips were in the private/rental boat mode and 10% where in the for-hire mode. The remaining 10% were in the shore mode.

Figure 1. Gag Grouper Directed Effort, 2002 – 2006.

276,644 311,864 378,398

545,491

469,625

939,298

1,168,782

1,297,609

821,487

1,215,942

1,480,646

1,676,007 1,678,090

1,132,599

1,291,112

0

200,000

400,000

600,000

800,000

1,000,000

1,200,000

1,400,000

1,600,000

1,800,000

2,000,000

2002 2003 2004 2005 2006

Trips

Target Trips Catch Trips Total Trips

Figure 2. Red Grouper Directed Effort, 2002 – 2006.

155,688 184,311

141,860

466,325

557,209

297,903

573,292

620,067

985,179

725,329

439,763

106,967 62,858

829,491

541,018

0

200,000

400,000

600,000

800,000

1,000,000

1,200,000

2002 2003 2004 2005 2006

Trips

Target Trips Catch Trips Total Trips

Figure 2 displays the directed effort in the red grouper fishery over the same time period. Target trips for red grouper have been fairly flat over this time period with a moderate increasing trend. In 2006, target effort was 141,860 trips, a drop of more than 40,000 trips since 2005. Catch effort, on the other hand, has declined considerably in recent years. In 2006, catch effort was 297,903 trips, a drop of more than 240,000 trips. Total effort in 2006 was 439,763 trips dominated by the private rental mode with 81% of those trips. The for-hire mode was responsible for 15% of the 2006 trips with the balance (4%) made up of catch effort trips in the shore mode.

To use the equimarginal principle, angler harvest needs to be denominated in pounds. For reasons to be discussed below, it is difficult to estimated site choice models using harvested pounds directly, so the following estimates will be used to convert numbers of fish to pounds of fish after model estimation. Figure 3 displays the trends in weight per harvested fish from the MRFSS data (NMFS 2008). During the 2002 to 2006 period, gag grouper weight per fish has been falling to just over 7 pounds per fish in 2006. Over the same period, the red grouper weight per harvested fish has slightly increased since 2002 to just over 7 pounds per fish.

Figure 3. Average Weight per Grouper, 2002 – 2006.

Recreational Valuation Methodology

Site choice random utility models (RUM) rely on observed data on recreational site choices. The observed data for this study comes from the 2006 MRFSS intercept survey. In this section, the RUM model is specified and the data manipulation process necessary to run a RUM for groupers using the MRFSS angler data is presented.

This report relies on data from the National Marine Fisheries Service's MRFSS. Since 1994, NMFS has used the MRFSS to gather the travel cost data necessary to estimate the value of access and the value of changes in catch rates. NMFS has invested significant time and money developing the site choice methodology and has deemed it the most appropriate method for estimating recreational values (Center for Independent Experts 2006)

The MRFSS consists of two independent and complementary surveys: a field intercept survey and a random digit dial (RDD) survey of coastal households. The intercept survey is a creel survey used to estimate mean catch-per-trip by species across several strata including fishing wave (2-month period), fishing mode (shore, private or rental boat, or for-hire fishing vessel), and state. Data elements collected during the base part of the intercept survey include state, county, zip code of residence, hours fished, primary area fished, target species, gear used, and days fished in the last two and 12 months. The creel portion of the survey collects length and weight of all fish species retained by the angler and the species and disposition of all catch not retained by the angler.

Because the MRFSS constitutes the best nationwide sample frame for marine recreational angling and offers considerable savings over implementing a new program, economic data collection is added-on to the MRFSS effort. During January through December of 2006, an intercept add-on survey was conducted to obtain data on angler trip expenditures. Upon completion of the base MRFSS survey in 2006, anglers were asked to complete a short add-on questionnaire. The intercept add-on survey was designed to collect the minimum data necessary to estimate RUM's of anglers' site choice decisions.

Nested Logit

RUMs use all of the substitute recreational sites facing an angler to value attributes of the site chosen by an angler. In this case, grouper harvest rates will be valued. NMFS has sponsored a good deal of research into RUMs of recreational site choice to value site closures and angling quality (see footnote 1). The majority of this work has involved specifying nested logit models of recreational site choice using expected catch or harvest rates as the measure of angling quality. The following analysis is patterned after previous NMFS RUM specifications as closely as possible given the data limitations described below. The nested structure was chosen because failing to account for substitution between modes has potentially large impacts on marginal willingness to pay (MWTP) estimates for harvest. In particular, selecting the conditional logit over the nested logit typically induces an upward bias in MWTP (Haab et al 2008). The appropriateness of the nested specification was also tested, and, with this particular data set, it was deemed more appropriate (see Table 4).

The specification of the nested logit model for recreational choices has been adapted from Haab and McConnell (2003). Angler utility is specified as:

$$u_{jk} = v_{jk} + \varepsilon_{jk}$$

where v_{jk} is an angler's indirect utility and ε_{jk} is a random error term for site j in mode k. For this report, it is assumed that the decision to fish for grouper is made outside of the model. Due to data limitations, it was impossible to estimate models for either gag or red grouper independently, so the model was specified using all grouper species. Subsequent to the choice to participate in grouper fishing, the angler is assumed to make a fishing mode choice, between either the private/rental boat or for-hire mode, and then a site choice conditioned on the mode choice. The upper level nesting structure includes the choice of fishing mode across for-hire fishing and fishing from the private/rental boat mode. There were only a handful of shore fishing observations in the data, which is too few to include as a separate nest. In this case, the global site list includes only the 30 Florida sites used in Haab et al (2000) due to data limitations. An angler chooses a fishing site from the set of all alternative sites and fishing mode combinations, if the utility of visiting that site in that mode is greater than the utility of visiting any other site in any other mode in the global choice set.

$$u_{jk} \geq u_{j'k'} \quad \forall j', k'$$

Furthermore, grouper angler indirect utility is specified by:

$$v_{jk}\left(y - c_{jk}, q_{jk}, s_k\right) = -\beta_y c_{jk} + \beta q_{jk} + \gamma s_k$$

where y is income, c_{jk} is the cost of traveling to the site, q_{jk} is a vector of quality attributes that vary by site and mode choice, and s_k is a set of attributes that vary only by mode choice. Since income is an additive constant across all sites combinations in the choice set, it falls out of the nested logit probability. Following Haab et al (2000), the vector q contains travel cost, the log of the number of MRFSS intercept sites aggregated into the sites used in this model, and the expected keep rate. The keep rate was used to model mortality and not total catch. The keep rate includes observed catch, as well as self reported mortality not seen by a MRFSS interviewer. It does not include any mortality of released fish unless the fish was dead before release. This measure most closely approximates commercial mortality. The vector, s, contains one variable which takes the value of one if the angler was fishing in the for-hire mode during wave 3.

The nested logit probability is:

where K is the total number of upper level nests, J_k is number of lower level sites for upper level k, m = (1,….,J), l = (1,….,K), α_k is the location parameter, and θ_k is the inclusive value parameter. This study is concerned with estimating the marginal net benefits of grouper harvest. The appropriate benefit metric in this case is compensating variation (CV) (Haab and McConnell, 2003). Within the nested logit model, indirect utility is specified as:

CV is calculated by differencing the indirect utility before an allocation change to the indirect utility after an allocation change and is represented by:

$$V(c, q, s, y) = V(c^*, q^*, s^*, y - WTP)$$

where the star (*) denotes the changed indirect utility attributes. If V(*) >V(original) then CV is greater than zero. For quality changes that are the same for all sites, such as an allocation change, the CV calculation collapses to:

the change in the expected keep rate times the parameter estimate for expected keep rate divided by the parameter estimate for travel cost. Please see Haab and McConnell (2003) for further details of this specification and the mechanics of the CV calculation. For the remainder of this report CV will be referred to as marginal willingness to pay (MWTP).

Data Manipulation

During the 2006 MRFSS intercept add-on survey, 424 anglers caught grouper, were on single day trips primarily for fishing, finished the intercept add-on containing the necessary variables, and gave the interviewer a home zip code necessary for travel cost calculation. Table 2 contains the descriptive statistics for the variables used in this analysis. By wave, 14.4% of all anglers were intercepted in wave 1, 15.3% were intercepted in wave 2, 16.0% were intercepted in wave 3, 10.6% were intercepted in wave 4, 15.3% were intercepted in wave 5, and 28.3% were intercepted in wave 6, the most popular fishing wave in the data. By fishing mode, 15% were in the for-hire mode and 85% were intercepted in the private rental mode.

Travel cost is simply the round trip travel distance multiplied by the current federal government travel reimbursement rate of $0.585/mile. The opportunity cost of time was calculated by taking the travel time (calculated miles/40 mph average travel speed) and multiplying it by one-third the wage rate. Wage rates were calculated by taking median household income by zip code and dividing it by 2,000 work hours per year (U.S. Census Bureau, 2002). MWTP based on the opportunity cost of time calculated using U.S. Census income estimates likely represent an upper bound when compared to the typical opportunity cost of time calculation from Hicks et al (1999), Haab et al (2000), and Haab et al (2008). The variable used to describe mode choice in the upper level nest was created by crossing participation in the for-hire mode with a wave 3 participation dummy.

Following Hicks et al (1999), a keep rate matrix for all sites by mode was developed by taking the five year average keep at each site by mode. These matrices contain many zero values that may indicate the site is not used as a grouper site or that may indicate that grouper has never been encountered by MRFSS interviewers at the site. Zeros were replaced using the nearest neighboring site in the same mode, if replacement was deemed appropriate based on examination of the harvest data and the site's location. Table 2 contains the descriptive statistics for all variables used in the modeling.

Table 2. Descriptive Statistics for All Variables.

Variable

Name Description Mean Standard

Error

Lower

Confidence

Limit

Upper

Confidence

Limit

pr Private/Rental Mode Dummy 0.85 0.02 0.81 0.88

charter Charter Mode Dummy 0.15 0.02 0.12 0.19

ffdays2 Two Month Avidity 5.00 0.31 4.39 5.61

travel_opp Calculated Travel Cost $48.48 $6.52 $35.67 $61.30

lnm Log of # of Aggregated Sites 3.12 0.04 3.04 3.19

ekarate Expected Harvest 0.81 0.00 0.80 0.82

charter3 Charter Crossed with Wave3 2.12% 0.01 0.75% 3.50%

wave2 Intercepted in Wave 2 15.33% 0.02 11.89% 18.77%

wave3 Intercepted in Wave 3 16.04% 0.02 12.53% 19.54%

wave4 Intercepted in Wave 4 10.61% 0.01 7.67% 13.56%

wave5 Intercepted in Wave 5 15.33% 0.02 11.89% 18.77%

wave6 Intercepted in Wave 6 28.30% 0.02 24.00% 32.61%

Expected Keep Rates

To conform to current theories on the calculation of welfare effects stemming from quality changes, expected keep rates, (rather than historic keep rates), were used as the quality variable in the nested logit model. Typically, a poisson regression is used to estimate expected keep rates. However, if over-dispersion is found in the data the zero alter poission (ZAP) or the negative binomial models are more appropriate. Initial runs using a poisson indicated overdispersion

in the data so both ZAP models and negative binomial models were estimated. The negative binomial model performed far better than the ZAP and was used here for expected keep rates. The specification of the negative binomial is:

where $\lambda(\beta)_{ii} = \exp z$, x_i equals harvest of individual i on the intercepted trip, and z_i contains variables describing the site and the individual including a constant term, five year average harvest rate in numbers of fish, two month fishing avidity (the number of trips taken in the previous two months), for-hire mode participation dummy, and a wave 5 participation dummy. In previous studies (Hicks et al 1999, and Haab et al 2000), years of fishing experience was used to describe angler experience. This variable was not collected in the 2006 add-on, so two month fishing avidity was used as a proxy for fishing experience.

Table 3 contains the parameter estimates from the negative binomial expected keep model. All variables were significant at the 90% level except hours fished. All parameter estimates are significantly different from zero. The value of tau, the over-dispersion parameter is 3.84 and significant indicating that over-dispersion was indeed a problem in this data set that was corrected using the negative binomial specification. All parameters had a positive and significant impact on the expected keep rate except for wave5, which had a negative impact on expected keep. The parameters from this model were used construct the expected keep rates for all potential site choices in the model.

Table 3. Negative Binomial Expected Keep Rate Model Results.

Variable	**Parameter Estimate**	**Standard Error**	**T-ratio**	**P-value**
constant	-3.4201	0.3609	-9.4760	0.0000
karate	3.2079	0.7133	4.4970	0.0000
ffdays2	0.0462	0.0231	2.0028	0.0452

charter 1.3107 0.7772 1.6865 0.0917

wave5 -1.2965 0.6713 -1.9313 0.0535

Tau 3.8429 1.4470 2.6558 0.0079

For the purposes of this analysis, it would have been ideal to use weight of grouper harvested instead of numbers of grouper harvested. However, harvest in this analysis is defined as harvest measured and weighed by a MRFSS interviewer plus harvest consumed or disposed of at sea. While several methods were explored to assign weights to the unobserved catch, none proved satisfactory. Instead MWTP estimates for keep rates in numbers of grouper were converted to weight based measures using the average weight of grouper from Figure 3.

Results

Table 4 includes the results of the nested RUM estimation. Full information maximum likelihood estimation was conducted using SAS PROC MDC (SAS 2003). Overall, all parameters were significant at the 95% level with the exception of the upper level nest variable indicating for-hire anglers fishing in wave 3, and it was significant at the 90% level. The model performed well with a McFadden's R of 0.6271 and a Cragg-Uhler statistic of 0.9950. The travel cost parameter was negative, as expected, suggesting that anglers prefer sites with lower travel cost. The site aggregation parameter was positive suggesting that anglers prefer aggregated sites containing a larger number of individual MRFSS sites. The parameter on expected harvest was also positive suggesting that anglers prefer more catch to less. Finally, a test of the appropriateness of the nested model over the conditional logit model suggests that the nested model is indeed appropriate.

Estimates of Marginal Values of Grouper

Table 5 contains the MWTP for this study and several other NMFS sponsored studies for comparison. The MWTP estimates from this model are displayed in the first three rows. Using the analysis presented above, the MWTP for one grouper was $95.59 in 2006. Using the average weights from Figure 3, this translates into a MWTP per pound of $13.58 for gag and $13.51 for red grouper. Expanding these marginal values to the total economic value of grouper harvest in 2006 yields $26.4 million for the gag grouper fishery and $13.6 million for the red grouper fishery.

Table 4. Nested Model Parameter Estimates

Parameter	**Estimate**	**Standard Error**	**P-Value**
Lower Level Nest			
travel_opp	-0.0384	0.0020	<.0001
lnm	0.5608	0.0855	<.0001
ekarate	3.6735	0.5194	<.0001
Upper Level Nest			
charter3	-0.7002	0.3811	0.0662
Inclusive Value Parameters			
Charter Mode	0.0100	*	
Private/Rental Mode	0.3190	0.0384	
Model Fit			
Log Likelihood	-662.4747		
McFadden's R	0.6271		
Cragg-Uhler	0.9950		

IIA Test 89.7469 <.0001

*Restricted parameter. Likelihood ratio test fails to reject

restriction

Table 5. Mean Willingness to Pay for Grouper, 2006.

Model Compensating Variation,

2006 Dollars Mean Total Value

One Grouper $95.59 ---

One Pound Gag Grouper $13.58 $26,439,769

Model in This

Report: Grouper

Nested Logit One Pound Red Grouper $13.51 $13,642,039

One Grouper $122.96 ---

Haab et al, 2008 One Pound Gag Grouper $17.27 $33,616,777

One Pound Red Grouper $18.34 $18,527,896

One Grouper $136.36 ---

Gentner, 2004 One Pound Gag Grouper $19.37 $37,713,831

One Pound Red Grouper $19.27 $19,459,079

One Grouper --- ---

Carter et al, 2008 One Pound Gag Grouper ---

One Pound Red Grouper* $1.33 $1,698,129.73

NMFS has invested considerable time and funds estimating MWTP for various species using a variety of methodologies. The vast majority of this work has focused on RUMs of recreational choice using either revealed preference data or stated preference data. Most recently, the Marine Fisheries Initiative (MARFIN) funded Haab, Hicks, Schnier, and Whitehead to explore the impacts of angler heterogeneity on MWTP estimates derived from site choice RUMs (Haab et al

2008). They focused on single species models for popular Gulf and South Atlantic species including grouper. For each species they specified the typical conditional and nested logits as well as expanding their analysis to a new class of models including random parameters logit and finite mixture models, both still based on the RUM framework, in an attempt to incorporate angler heterogeneity.

The Haab et al (2008) models used data from the 2000 MRFSS intercept add-on survey. They calculated travel cost to include the opportunity cost of time for those unable to take time off work with pay to participate and they used $0.30/mile for their calculations. In addition, they also added the average charter fee from Gentner et al (2001). Otherwise, they followed the standard data creation steps outlined in this paper.

MWTP estimates for grouper ranged from $34.50 to $393.98 per fish across all the various specifications used in their analysis. All values have been converted to 2006 dollars using the consumer price index. Using weight conversion factors from 2000, this represents a range of $4.85/pound to $55.33/pound for gag and $5.15 to $58.78/pound for red grouper. The MWTP numbers from their report displayed in Table 5 are from the finite mixture model that accounts for angler heterogeneity and was particularly well behaved. Using these estimates, the total economic benefits from the gag grouper fishery are $33.6 million and $18.5 million from the red grouper fishery.

Several results are worth noting beyond the MWTP estimates. Haab et al's (2008) primary goal was to explore new methods and not directed policy application. As a result, it produced a wide range of values. However, the results derived support the values found in this analysis. Also, they found that aggregating across differing species, as in Carter et al (2008), adds biases when trying to examine single species policies such as allocation.

In 2003, NMFS explored a new methodology, the stated preference choice experiment, to examine angler choices of recreational fishing trips. This method presents anglers with a series of hypothetical fishing trips that vary in trip attributes through a mail survey. The data are analyzed using a RUM in much the same way that the revealed preference data was analyzed above.

Gentner (2004) details the analysis of this data, and, while not calculated in the paper, it is possible to calculate the MWTP for grouper harvest using the parameters in the paper. Using the policy outcome model, the MWTP for on grouper is $136.36 in 2006 dollars. This translates into a MWTP for gag harvest of $19.37/pound and $19.27/pound for red grouper. When looking at total economic benefits, these estimates generate $37.7 million in gag benefits and $19.5 million in red grouper benefits.

An added advantage of stated preference choice experiments is the ability to predict effort changes stemming from changes in fishing trip attributes. The model generates an elasticity measure for grouper harvest of 0.114 which means that if harvest goes up one unit, effort will rise by 11.4%. This information will be used below to discuss possible economic impact consequences of various allocation scenarios. Both valuation and effort predictions from this model were used in the red snapper fishery management plan amendment 27 (GMFMC 2007).

Finally, Carter, Agar, and Waters (2008) estimated both commercial and recreational MWTP estimates in the red grouper fishery in their examination of red grouper allocation. They used commercial and recreational data from 2003 for data availability reasons and because there were major regulatory changes for both commercial and recreational anglers after 2003.

On the commercial side, Carter et al (2008), estimated profit functions for multi-product firms in a mixed species fishery. Their commercial analysis resulted in a MWTP for red grouper in the commercial sector of $1.25/pound in 2006 dollars. In the multi-species reef fishery many trips do not harvest grouper. In order to include these zero grouper trips Carter et al (2008) used a harvest of 0.1 pounds to replace the zero grouper harvest levels. This substitution likely introduces an upward bias in the commercial MWTP estimate. Their paper also used a simulation approach to estimate the MWTP for red grouper across a range of allocation scenarios. From this simulation the maximum amount the commercial sector is willing to pay for additional allocation was $3.72 in 2006 dollars.

Carter et al (2008) attempted to estimate a consumer demand model for red grouper and met with little success. As a result, red grouper consumer MWTP was not included in their analysis. This is a common problem for consumer demand models as adequate data at the consumer level does not exist. It is, however, possible to estimate consumer surplus measures using landings data as in Park et al (2004). No attempt was made by Carter et al to estimate consumer surplus values using landings data.

Carter et al (2008) also estimated a recreational demand model. They did not estimate a recreational site choice model, but instead selected a hedonic price model, a first for NMFS. Hedonic models use the price of a good traded in the market and in this case they used charter trip prices. Hedonic modeling assumes that the good in question is composed of many attributes and in this case those attributes include the harvest of fish. As such, the value of harvest is reflected in the charter price and econometric methods can be used to extract the portion of the total price attributable to harvest. Due to data limitations, the model was estimated using all species of fish harvested by recreational anglers on charter trips. The point estimate for MWTP for all species of fish was found to be $1.33 in 2006 dollars. This estimate was then applied to red grouper. As with the RUM's discussed in this paper, they were unable to trace out the benefit function for recreational fishing. No attempt was made in Carter et al (2008) to estimate the MWTP for grouper from the for-hire sector.

Economic Impacts

While allocation decisions should be made by using the equimarginal principle or total economic value as the primary factor, there are other factors that can be examined such as economic impacts. Economic impacts help to examine distributional issues that may arise with any reallocation (Kirkley et al 2000; Edwards 1990). Table 6 and Table 7 detail the current economic impacts generated by trip expenditures in the recreational sector. These estimates were generated using the 2006 MRFSS economic add-on following Gentner and Steinback (2008). This data was used to calculate grouper specific trip expenditures of $64.51 per person per trip. Using the gag grouper total directed effort, gag grouper fishing generates $83.3 million in total trip expenditures. The gag grouper fishery generates 1,513 jobs, $107 million in value added (or contribution to gross domestic product), and $60.8 million in personal income. Because there is less directed effort in the red grouper fishery, total trip expenditures are lower at $27.6 million dollars which supports 501 jobs, $35.2 million in value added and $20 million in person income.

Table 6. Recreational Gag Grouper Trip Expenditures and Economic Impacts.

Expenditure	**Expenditures**	**Impacts**			
Category	**Mean**	**Total Value**	**Added**	**Income**	**Jobs**
Private Transportation	$6.83	$8,822,574	$9,945,171	$5,433,043	112
Groceries	$6.91	$8,927,613	$12,350,674	$7,129,302	165
Restaurant	$1.75	$2,257,595	$2,217,091	$1,320,858	32
Lodging	$0.24	$313,754	$460,412	$283,495	10
Public Transportation	$0.02	$19,520	$28,668	$16,424	0

Boat Fuel	$20.80	$26,855,719	$30,272,881	$16,538,085	341
Boat Rental	$0.04	$52,755	$77,446	$44,770	1
Charter Fees	$19.54	$25,229,902	$37,037,688	$21,411,177	627
Crew Tips	$0.27	$342,445	$502,706	$290,624	9
Bait	$3.86	$4,986,667	$7,305,711	$4,285,077	116
Ice	$1.01	$1,299,443	$1,023,558	$683,218	20
Fishing Tackle	$2.70	$3,488,977	$4,799,861	$2,827,366	62
Parking	$0.48	$620,049	$910,265	$526,225	15
Souvenirs	$0.06	$78,249	$51,536	$33,197	1
TOTAL	**$64.51**	**$83,295,263**	**$106,983,668**	**$60,822,860**	**1,513**

Table 7. Recreational Red Grouper Trip Expenditures and Economic Impacts.

Expenditure Expenditures Impacts

Category Mean Total Value

Added Income Jobs

Private Transportation $6.83 $3,005,039 $3,387,404 $1,850,538 38

Groceries $6.91 $3,040,816 $4,206,738 $2,428,297 56

Restaurant $1.75 $768,955 $755,159 $449,895 11

Lodging $0.24 $106,867 $156,820 $96,561 3

Public Transportation $0.02 $6,649 $9,765 $5,594 0

Boat Fuel $20.80 $9,147,271 $10,311,184 $5,633,003 116

Boat Rental $0.04 $17,969 $26,379 $15,249 0

Charter Fees $19.54 $8,593,505 $12,615,331 $7,292,817 214

Crew Tips $0.27 $116,640 $171,226 $98,989 3

Bait $3.86 $1,698,498 $2,488,383 $1,459,531 40

Ice $1.01 $442,601 $348,632 $232,710 7

Fishing Tackle	$2.70	$211,194	$310,043	$179,237	5
Parking	$0.48	$442,601	$348,632	$232,710	7
Souvenirs	$0.06	$26,652	$17,553	$11,307	0
TOTAL	**$64.51**	**$27,625,256**	**$35,153,248**	**$19,986,436**	**501**

For the recreational sector, durable good purchases, such as fishing rods, tackle, boats, homes, and vehicles were not included in the analysis. Durable good purchases were left out of the estimation because recreational anglers buy gear that could be used in multiple fisheries. It is impossible to apportion durable good expenditures attributable only to grouper fishing. Durable good expenditures were also left out of the analysis because very little can be said about what will happen when allocations change. While it is possible that some anglers only fish for grouper and would no longer fish if recreational allocation fell, it is more likely that they would continue to fish in other fisheries. While increasing recreational allocations might induce non-anglers to take up the sport and purchase durable goods, it is beyond the scope of this analysis to examine the participation decision. If changes in durable good purchases could be estimated, they would increase the economic impact of recreational grouper fishing.

On the commercial side, price per pound for each species was taken from FUS (2006) and used to establish total landed value. To capture the impact of this harvest on the harvester, dealer, processor, and wholesale sectors, the NMFS Fisheries Input/Output Model was used to estimate the economic impacts generated by harvesting, processing, and wholesaling sectors (Kirkley et al 2004). To capture the retail trade in these two grouper species, the value added table from the 2006 Fisheries of the United States was used to calculate the amount of each species purchased at restaurants and retail markets and the markup percentages within that model were used to estimate total consumer expenditures on gag and red grouper. An IMPLAN model was then constructed to estimate the economic impact those expenditures were run through IMPLAN software to estimate the impacts from the retail sector (IMPLAN 2000). Table 8 contains the commercial economic impact estimates.

Commercial fishing for gag grouper generates $16 million in value added, $7.7 million in income and supports 322 jobs, far fewer than the recreational gag grouper fishery. Commercial fishing for red grouper generates $49 million in value added, $23.7 million in income, and supports 988 jobs, which is more than the recreational fishery. Both commercial fisheries generate $64.9 million in value added, $31.4 million in income, and support 1,310 jobs. The majority of these impacts however are generated by the retail and restaurants sectors. The retail trade from grocery stores and other retail outlets generate $2.2 million in value added, $316,000 in income and support 22 jobs. The restaurant sector, however, is larger than all the harvesting and processing sectors combined generating $33.7 million in value added, $9.1 million in income, and supporting 642 jobs.

It is unlikely that the economic impacts of retail and restaurant trade would fall with falling commercial allocations of gag grouper or red grouper. Asche et al (2005) summarizes the results of many research projects looking at seafood demand and the majority of this work indicates that consumers readily substitute other species in the face of price changes. Changes in allocation away from the commercial sector would be met with higher consumer prices unless the demand could be met by imports. If prices rose, consumers would switch to imports or other species. Additionally, Park et al (2004) used commercial landings to estimate consumer demand for grouper in the U.S. and found consumers would substitute other species or imports readily. As a result, restaurants and retail outlets would still provide the same amount of fish, albeit different kinds of fish, in the face of reduced commercial allocations. When looking at only the harvester, processors, and dealers, gag grouper supports only $6.7 million in value added, $5.8 million in income, and supports only 159 jobs while red grouper generates \$20.9 million in value added, \$17.9 million in income and supports only 487 jobs. In contrast, recreational gag grouper fishing generates \$107 million in value added, \$60.8 million in personal income, and supports 1,513 jobs while red grouper fishing generates \$35.2 million in value added, \$20 million in person income, and supports 501 jobs.

Table 8. Economic Impacts of Commercial Red and Gag Grouper Harvest.

Sector	**Gag Grouper**	**Red Grouper**	**Total Gag and Red Grouper**
Harvesters			
Employment impacts (FTE jobs)	74	226	300
Income Impacts (000 of 2006\$)	\$2,299	\$7,056	\$9,355
Value Added (000 of 2006 \$)	\$3,062	\$9,401	\$12,462
Primary dealers/processors			
Employment impacts (FTE jobs)	41	125	165
Income Impacts (000 of 2003\$)	\$1,759	\$5,402	\$7,162
Value Added (000 of 2006 \$)	\$2,187	\$6,714	\$8,901
Secondary wholesalers/distributors			
Employment impacts (FTE jobs)	44	136	181
Income Impacts (000 of 2003\$)	\$1,341	\$4,116	\$5,457
Value Added (000 of 2006 \$)	\$1,900	\$5,834	\$7,734
Retail			
Employment impacts (FTE jobs)	5	17	22
Income Impacts (000 of 2003\$)	\$77.78	\$238.22	\$316.00
Value Added (000 of 2006 \$)	\$533.88	\$1,638.68	\$2,172.56

Restaurants

Employment impacts (FTE jobs) 158 484 642

Income Impacts (000 of 2003$) $2,241.53 $6,874.41 $9,115.95

Value Added (000 of 2006 $) $8,270.25 $25,384.54 $33,654.79

Harvesters and seafood industry

Employment impacts (FTE jobs) 322 988 1,310

Income Impacts (000 of 2003$) $7,719 $23,687 $31,406

Value Added (000 of 2006 $) $15,953 $48,972 $64,925

Similar arguments could also be made for recreational fishing. Economic theory suggests that consumers spend a fixed proportion of their income on leisure activities and if one recreational activity were to no longer be available, they would continue to spend that same proportion of their income on another recreational activity. Recreational anglers are also capable of fishing for many different species or even participating in other recreational activities. While some anglers might quit fishing altogether if allocations were changed in favor of the commercial sector, many would continue to fish for another species. To a large degree, this is why value should be used instead of economic impacts to make allocation decisions.

Using the elasticity estimate from Gentner (2004), changes in recreational effort were estimated for a variety of allocation scenarios. Table 9 and Table 10 display the results of this analysis for gag and red grouper respectively. Since the elasticity is small, the increases in effort are relatively moderate. Caution is warranted in interpreting theses estimates as allocations move farther away from the status quo. This analysis also assumes that recreational expenditures would not change as allocations change, which is probably a safe assumption for relatively small changes in allocations.

Table 9. Recreational Economic Impacts Across Various Gag Grouper Allocation Scenarios.

Allocation Scenario Recreational Impacts

Change Recreational

Share

Commercial

Share

Value Added

(1000's of $'s) Employment

2006 Status Quo 59% 41% $106,984 1,513

Recreational +5% 64% 36% $109,137 1,535

Recreational +25% 84% 16% $109,586 1,555

Recreational +35% 94% 6% $109,743 1,565

Recreational 100% 100% 0% $109,946 1,571

Commercial +5% 54% 46% $104,830 1,490

Commercial +25% 34% 66% $104,381 1,470

Commercial +40% 19% 81% $104,044 1,455

Commercial 100% 0% 100% $0 0

Because gag grouper allocations are currently closer to 100% relative to red grouper, the changes in effort implied in Table 9 are relatively small. If the recreational sector received 100% of the gag grouper TAC, Gentner (2004) predicts only 4.42% more trips for a 41% increase in the quota. This suggests that harvest rates would likely increase as the available harvest is increasing faster than effort.

Table 10. Recreational Economic Impacts Across Various Red Grouper Allocation Scenarios.

Allocation Scenario Recreational Impacts

Change Recreational

Share

Commercial

Share

Value Added

(1000's of $'s) Employment

2006 Status Quo 16% 84% $36,439 515

Recreational +5% 21% 79% $37,345 537

Recreational +25% 41% 59% $38,184 558

Recreational +50% 66% 34% $39,233 583

Recreational 100% 100% 0% $40,660 618

Commercial +5% 11% 89% $35,534 493

Commercial 100% 0% 100% $0 0

Conversely, since the red grouper allocations are farther from 100% than gag grouper, the changes in effort implied in Table 10 are higher relative to gag grouper. Overall, a move to a 100% allocation in the red grouper fishery would only increase effort 22.7% for an 84% increase in allocation. Again, this result still leaves room for a quality improvement in red grouper harvest.

It is beyond the scope of this analysis to examine changes in commercial sector economic impacts. To perform such an analysis, estimates of gag grouper and red grouper dockside prices would be needed for various levels of landings. As allocations fall, dockside prices would increase partially ameliorating the impact of the fall in allocation. Conversely, as allocations increased dockside prices would likely fall, dampening an increase in commercial economic impacts.

Discussion

It is very difficult to establish MWTP functions for recreational fisheries and no attempt was made in this analysis to generate those. However if one assumes the angler benefit function has a horizontal slope, as in Carter et al (2008), all point estimates of MWTP, outside of the Carter et al (2008) estimate, are higher than the highest MWTP estimated in Carter et al (2008) for the commercial fishery. For instance, the lowest per pound MWTP for red grouper from Haab et al (2008) is $5.15, a full $1.43 higher than the commercial MWTP of $3.72 which coincides with a 100% recreational allocation. This result suggests that total societal value would be maximized with a 100% allocation to the recreational sector. While Carter et al (2008) did not estimate a gag grouper MWTP for either the commercial or recreational sectors, it is likely that the commercial gag MWTP would be similar. If the gag grouper commercial MWTP schedule were similar, it would also recommend a 100% allocation to the recreational sector.

Using the MWTP estimated in this paper of $13.51, current red grouper angler total economic value is $13.6 million and would be $83 million dollars under a 100% allocation to the recreational sector. Current commercial value in the red grouper fishery is $6.4 million and under a 100% allocation to the commercial sector, that value rises to $10.2 million dollars using estimates from Carter et al (2008).

There are several caveats to the analysis presented here. First, consumer MTWP values were not calculated in this study or in any of the other studies presented here. It is likely that these values would be low given the highly price elastic nature of consumer demand for seafood (Asche et al 2005; Park et al 2004). Balancing the lack of consumer MWTP is the lack of MWTP estimates from the for-hire sector. None of the analyses examined here estimated for-hire values for the commercial providers of recreational services as adequate data on this industry does not exist. It is likely that the MWTP estimates from the for-hire sector would be at least as high as the consumer MWTP suggesting that the omission of these two values would not change the conclusions presented here. If anything, the inclusion of for-hire MWTP estimates would further bolster the 100% recreational allocation conclusion.

Finally, because of the diminishing marginal returns principle, the recreational MWTP should decrease as the amount of harvest increases. Because effort in both of these fisheries is quite high, the marginal increase in harvest, even for a large increase in quota, is relatively small. For example, in the red grouper fishery a 100% allocation would increase harvest per trip by 11.75 pounds or, using the current average weight per red grouper, only 1.7 red grouper. In the case of red grouper, 1.7 fish increase is a slight increase suggesting that the MWTP for that next 0.7 fish would be only slight lower. For gag grouper the increase is even smaller. At a 100% allocation, the average harvest weight increase per trip would be slightly more than one pound and less than a single fish increase. In the case of gag grouper, MWTP at a 100% recreational allocation would not be lower than the estimates presented here.

There are other factors to consider when changing allocations including distributional concerns, equity, and other social factors (Kirkley et al, 2000; Edwards, 1990). With a 100% allocation to the recreational sector across either of these two grouper species, there would be negative impacts on the commercial sector, more for red grouper than for gag grouper. From the economic impact analysis, it is clear both the recreational and commercial sectors generate significant economic impact. It is difficult, however, to draw conclusions from limited economic impact analysis conducted here. Instead, this information is useful in providing context about potential distributional effects of any reallocation policy. On the commercial side, it is very unlikely that all the economic impacts supported by commercial activity would be lost with a 100% allocation to the recreational sector. Additionally, with a 100% allocation to the recreational sector, more value added, income, and jobs would be supported in industries that support recreational fishing. It is not possible from this analysis to know if the recreational economic impact gains would outweigh any commercial losses. The converse is equally true for a 100% allocation to the commercial sector.

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South Carolina Sea Grant Consortium ***PROJECT REPORT***

Date:	June 23, 2008

Please complete this form and submit it both in hard copy and electronically by July 1, 2008 to:
coopfish@scseagrant.org

If this is your Final Report, please fill out ALL SECTIONS LISTED BELOW. Specifically, please use this form to provide four-pages of narrative about your project under the following sections of the form:
Project Objectives,
Project Results (link the results by objective),
Benefits,
Interactions

Please also include information and/or comments about future work that is needed with relation to this project under the Follow Up and Future Options sections.

Check One:	☒ Final Report ☐ Annual Progress Report ☐ "Seed" Project Report

Initiation Date:	5/15/07	Reporting Period From:	6/1/07	To	6/5/08

Project Number:	R70G	Date of Report:	6/23/08
Project Title:			

Principal Investigator:	Donald Lombardi – **Home Phone (843) 525-0861, Cell (843) 368-2603**
Affiliation(s):	Active USCG Captain, 33 Years, License #1130727, Issue #7

Co-Principal Investigator:	Len Conapinski
Affiliation(s):	Helper, Mate

Associate Investigator:	
Affiliation(s):	

Associate Investigator:	
Affiliation(s):	

Objectives: Please refer to your original project summary form. Note any significant changes in objectives below. Otherwise, leave blank.

To investigate and document legal and undersized fish (Black Sea Bass) and injuries to released fish.

Project Results (Results to Date, if Annual Report): Summarize results of your Sea Grant project. Structure your response by Project Objective. Be complete. Also, note any unanticipated problems in meeting project objectives.

In June 2007, the South Atlantic Fisheries Council has increased the minimum size requirement of Black Sea Bass from 11" to 12" total length. In May of 2006, the minimum size was 10" total length.

During the June to November period many people anchor over reefs and fish for Black Sea Bass while they live/line for King Mackerel and Cobia. Others, like me, target only Black Sea Bass year-round. I felt there would be a problem with the very high amount of caught and released fish when people try to catch the limit of 15 12" fish per person. If fisherman injure or kill a large amount of released fish it would go against the South Carolina Cooperative Fisheries goals.

This investigation took place over a 12 month period fishing offshore 30 trips to five Beaufort area artificial reefs, not natural live bottom. The names of these reefs are: (1) PA-4 Hunting Island (6H1), (2) PA-44 Betsy Ross, (3) PA-48 Eagles Nest, (4) PA-49 Hilton Head, and (5) PA-42 Beaufort 45.

The water depths were from 45 feet to 90 feet and, I made six (6) trips to each reef during the four (4) seasons.

After locating good structure I either anchored or drifted depending on current or wind.

Two fishermen used identical rod and reels and bait on double hook bottom rigs, one with #2 circle hooks and one with #2 "J" hooks.

Using waterproof paper, the daily results were documented as follows:

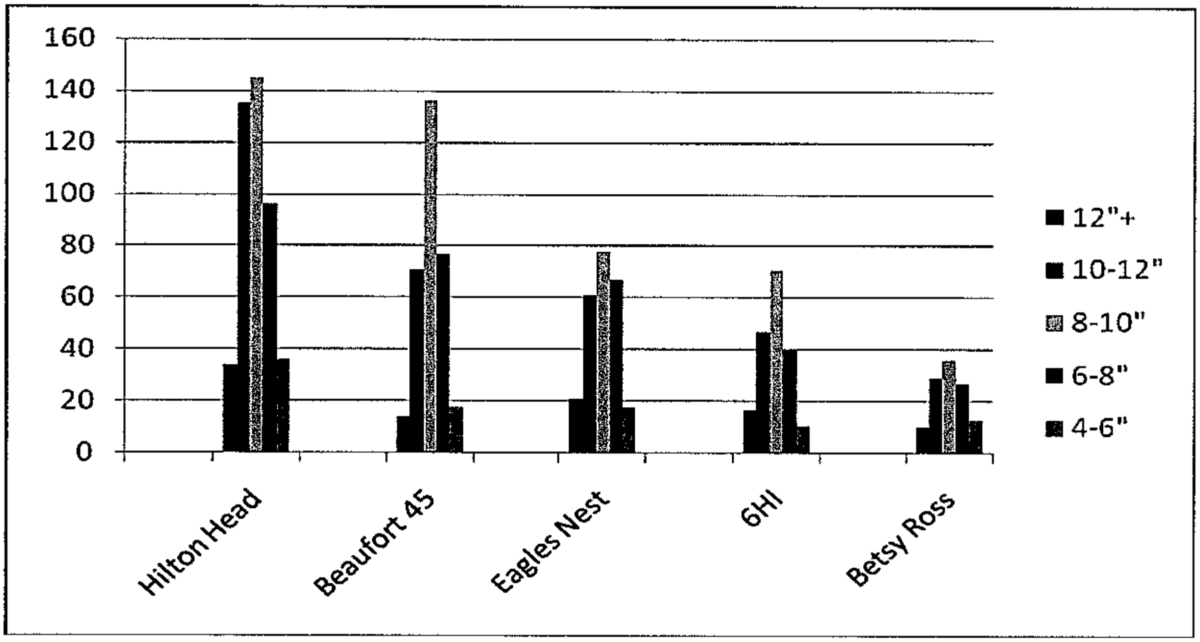
- The amount of 12" TL or longer.
- Undersized released fish were measured by size category.
- The amount gill/gut hooked on circle and "J" hooks.

An observation of released fish was included.

All the day's information was put on a trip report that was used to compile the following info.

Individual Reef Results and Totals

Reefs	12"+	10-12"	8-10"	6-8"	4-6"	Total	Ratio	"J" Gut/Gil	"C" Gut/Gil
Hilton Head	34	135	145	96	36	446	13/1	12	3
Beaufort 45	14	71	136	77	18	306	21.8/1	5	2
Eagles Nest	21	61	78	67	18	245	11.7/1	12	0
6HI	17	47	71	40	11	196	11.5/1	6	0
Betsy Ross	10	29	36	27	13	115	11.5/1	3	1
Totals	**96**	**343**	**466**	**307**	**96**	**1308**	**13.6/1**	**38**	**6**



Reef Name	Water Depth
Hilton Head	50 feet
Beaufort 45	45 feet
Eagles Nest	70 feet
6HI	50 feet
Betsy Ross	90 feet

1,308 Black Sea Bass were caught and of that total 96 were 12" or longer. That is a ratio of 13.6 to 1 or **7.3%**. If the size limit was still 10", the ratio would be 3 to 1. The Hilton Head (PA-49) was the best producer with a total of 446 fish.

A total of 38 fish caught on "J" hooks were gut or gill hooked. Six (6) fish caught on circle hooks were gut or gill hooked. When released all 44 of these fish were visibly injured and probably did not survive. This total of 44 was much lower than I had anticipated and I believe the use of power pro braided line was the reason. There is no stretch and you felt every bite and reacted quicker than with monofilament. Still, circle hooks are best to reduce injury, approximately six (6) times better.

Release Details

	10"/12"	**8"/10"**	**6"/8"**	**4"/6"**
Drifted Away	2	4	2	0
Float than Swim	9	17	10	0
Swam Away	332	445	295	96
Total	**343**	**466**	**307**	**96**

Benefits: List any documented, quantifiable economic effects of this project to date. Cite companies, agencies, or other groups applying project results. Indicate anticipated uses outside the research community.

I have always believed that commercial landings of Black Sea Bass are very accurate but recreationally caught landings are mostly a speculation. Used on an average, this research might give a more accurate daily result of a fishing trip.

Also, the commercial minimum size for Black Sea Bass is 10". To increase the size of the fish mass this size must be increased.

Circle hooks have again been proven to cause less damage and injury to the fish that are released.

Interactions: List and describe significant interactions with other universities, state/federal agencies, business, industry, and the general public throughout the duration of the project.

	Name of Entity:		Name of Interaction:
1	South Carolina Department of Natural Resources	1	Pat Harris, Ph.D., Associate Marine Scientist
2	South Carolina Sea Grant Consortium	2	Amber Von Harten
3		3	
4		4	
5		5	

Publications: Cite those publications published during the project year specified. You are required to send ten (10) copies of each to the Consortium office.

Journal Articles – Include author(s), title, year, journal name, volume number, and page numbers.

N/A

Other Articles – Include articles published in proceedings volumes and as book chapters.

N/A

Technical Reports – Include title, author(s), date, and publisher.

N/A

Outreach/Education Publications – Include Web site, curricula, manuals, etc.

N/A

Presentations – Include title of talk, name of meeting or conference, date, and location.

N/A

Planned Publications – Include title, author(s), expected publication date, and publisher.

N/A

Patents and Copyrights: List any patents or copyrights (awarded or pending) resulting from this project.

N/A

Other Products: Describe any unanticipated products or benefits that have resulted from this project.

A pleasant surprise was the amount of keeper red snappers (4) and (20) shorts plus 15 to 18 small grouper. I do not believe in venting due to slime introduction and careless needle placement. Some of the short snapper and most of the grouper had their stomach blown out. I used my own design of release system with good results. I also have an idea for a commercial application.

Follow-up: Describe any follow-up activities that should be undertaken to ensure that results of this project are applied to their fullest extent.

Black sea bass fishing in South Carolina during June, July, August, September and October was not very productive for 12"+ fish. Non-stop junk fish and small sea bass were caught. November, December, January, February, March, April & May were much better for quantity and size, but good weather opportunities were less. Visual observations of released fish showed mortality rates of 20% or more due to Barracuda around the boat. Nothing I did seemed to help. During cold weather loons showed up on most reefs. 1 or 2 were not a problem because you could throw fish back away from them. When loons were thick they got most every released fish, so I devised a release method of using a 5 gallon bucket of water for small sea bass. After 8 to 10 fish were in the bucket I would dump them. The loons were afraid of the bucket and moved away and all the bubbles concealed the fish. After that I never saw a loon capture a released fish. I would be willing to work with Amber Von Harten to produce a summary of results for publication to other fishermen.

Future Efforts (optional): List or describe future research or education efforts that would address questions or needs that surfaced during the conduct of this project.

Comments (optional): How helpful were the S.C. Sea Grant Consortium, S.C. Sea Grant Extension Program and S.C. Department of Natural Resources staff during the project? Suggestions on improving any aspect of agency interactions are welcome.

This last year was enjoyable because I fished a lot, caught many fish and learned some new techniques. My research was made easier due to information from Amber Von Harten and Elaine L. Knight at the South Carolina Sea Grant Consortium. Dr. Pat Harris from the South Carolina Department of Natural Resources was also very helpful in sharing his previous research on snapper/grouper. Original instructions were clear and concise and the few questions I had later were answered promptly.

(Principal Investigator's Signature)

Print Name:
Donald Lombardi

*** AMENDMENT 18 *** COMMENTS

I encourage the SAFMC to adopt management options that will ensure the continued availability of the resource as required by the National Standards. The SAFMC?s continued ignoring of the destructive fishing techniques of the commercial fishing industry must be stopped and these issues must be addressed. Ignoring these issues prevents effective management of the resources. I encourage the following measures be adopted prior to any additional limitations on the recreational landings.

1. Ban all longline fishing for any purpose. There is no logic for continuing this unsustainable method of fishing. The State of Florida through the efforts of CCA banned gill nets in 1994; fishing stocks have rebounded to historical levels. The banning of all longlines in Federal and State waters would have a similar effect on the fish stocks of managed fish. This is further mandated by National Standard 9.

2. Prohibit all shrimping inside of 60 fathoms. The statistics and options as set forth in the scoping documents ignore the fact that the major cause of juvenile fish mortality is shrimping. The rebuilding of the stock must begin with the elimination of shrimping. Juvenile fish must be allowed to mature and not end up as bycatch floating on the surface behind a shrimp boat. This is mandated by National Standard 9. The destruction of the habitat by the shrimp trawls being drug repeatedly across the coral further damages the habitat for the fish to mature.

3. That there are no reductions in the present bag limit until such time as there has been reliable data collected of the recreational catch. This is required by National Standard 2.

4. Current economic conditions and spiraling gas prices have caused a substantial reduction of the recreational catch in the snapper/grouper fishery, and that trend is continuing. The numbers of recreational trips is declining rapidly with the rise in gas prices. Any more restrictions are not needed and are only punishing a category of angler that is already under pressure. The recreational anglers are under more pressure than the fish. This is as set forth in National Standard 8.

Ted Forsgren of CCA Florida has recently wrote <If any fishery is in such poor condition that the recreational take must be reduced by means of months long closures, and/or continually smaller & smaller bag limits, then the Fisheries managers should not continue commercial exploitation of that fishery> <We must act now to get the longline gear removed from all offshore waters once and for all>

In addition, CCA has recently published a study by Brad Gentner regarding Grouper fishing in the Gulf of Mexico in regard to the relative values of recreational versus commercial fishing. The economics would be the same for the Atlantic fishery.
His study found that grouper fishing generates $35.2 million in value added, $20 million in income and supports 501 jobs. Commercial gag grouper fishing generates $16 million in valued added, $7.7 million in income and supports 322 jobs while red grouper fishing

generate $49 million in valued added, $23.7 million in income and supports 988 jobs. The majority of the economic impacts in the commercial sector in both fisheries occur in the retail and restaurant sectors, and Gentner concludes that those sectors would experience very few losses with a 100 percent recreational allocation.>

Further, it is clear that there has not been sufficient research done or even attempted in regard to the recreational landings to support any changes to the current regulations. The council has no reliable data upon which to make any changes to the recreational limits. If there are any changes that must be made at this time, the only changes that are supportable are changes to the commercial landings. The council continues to make changes to the recreational limits without limiting the commercial landings. These are actions are clearly in violation of the Magnusson Stevens Act. Given the current state of the MRFSS data and system, any findings regarding recreational fishing by MRFSS can only be considered anecdotal and all other measures of fishing pressure from the recreational and for hire sector show a 30-50% drop in trips.
This comes from Charter Capt Associations, Marinas, FWC, major network news sources, fishing clubs, gas docks, and a host of other sources that all point to the same tren;d, downward 30-50% and those that go out are targeting species closer to shore.

AMENDMENT 18

Commercial Golden Tilefish and Black Sea Bass Participation and Effort Shifts Golden Tilefish I oppose both of the proposed alternatives in that both the endorsement and the LAP systems continue to exclude of a practical basis the public?s participation in the fishery. The alternatives continue the allocation of 95% commercial and 5% recreational allocations.
I object to this unfair allocation, there is no scientific basis for the commercial landings to be this disproportionate with the recreational landings. This is in violation of National Standard 4 (a) which requires <If it becomes necessary to allocate or assign fishing privileges among various United States publics, such allocation shall be (A) fair and equitable to all such public?s;>

Black Sea Bass
Limit the black sea bass pot tags distributed to each permit holder annually with a possible decrease in the number of traps held. For example, one option discussed by the Council was to limit the black sea bass pot tags annually to 100 per holder of Federal Snapper Grouper vessel permits in year 1, 50 in year 2, and 25 in year 3 and onwards until modified. Consider historical harvest in the number of pots distributed to each individual; I oppose the use of pots for fishing. These pots are indiscriminate in the fish that are caught and killed and the ghost pots continue to kill fish beyond the fishing limits.

Require pots to be brought back to shore at the conclusion of each trip; and I oppose all use of Black Sea Bass Pots, however if they are allowed to be used, pots must be brought back to shore. I also believe that lost pot tags should not be replaced and be forfeited.

Implement a Limited Access Privilege (LAP) type program whereby each individual is allocated a certain percentage of the Total Allowable Catch (TAC) or a certain number of pots to fish.
I oppose all LAPs as they produce a right to take fish while forcing the public out of the fishery.

Separate Snowy Grouper into Regions/States I agree with the regionalization of the Snowy Grouper regulations. However, the quotas must be set to allow for the public?s recreational fishery to become viable again. The present regulations have squeezed the recreational angler out of the fishery. The present regulations give 95% of the fishery to the commercial interests. I object to this unfair allocation, there is no scientific basis for the commercial landings to be this disproportionate with the recreational landings. This is in violation of National Standard 4 (a) which requires ?If it becomes necessary to allocate or assign fishing privileges among various United States publics, such allocation shall be (A) fair and equitable to all such public?s

Separate the Gag Recreational Annual Catch Limit (ACL) into Region or State Annual Catch Targets (ACTs) I agree with this proposal.

Changes to the Golden Tilefish Fishing Year
  Change the start of the golden tilefish fishing year from Jan. 1st to Sept. 1st.
  Change the start of the golden tilefish fishing year from Jan. 1st to Aug. 1st.
  Change the start of the golden tilefish fishing year from Jan. 1st to May 1st.
  Remove the 300 lb. trip limit when 75% of the quota has been met I oppose all of the above proposed alternatives. The present regulations and the new proposed have squeezed the recreational angler out of the fishery. The present regulations give over 97% of the fishery to the commercial interests. I object to this unfair allocation, there is no scientific basis for the commercial landings to be this disproportionate with the recreational landings. This unfair allocation of the fishery must be corrected before any additional regulations are enacted in the Golden Tile Fishery.
This is in violation of National Standard 4 (a) which requires <If it becomes necessary to allocate or assign fishing privileges among various United States publics, such allocation shall be (A) fair and equitable to all such publics>

Data Reporting
I oppose the implementation of the Marine Recreation Information Program, the program is simply a Band-Aid placed on the failed MRFSS program. MRIP does nothing more than attempt to patch a MRFSS data collection program that has been unable to provide any data on the recreational landings. There are no significant changes in the new system and the expansion of the population of fishing public from which data may be collected will not fix the underlying problems with the program.

Wreckfish Individual Transferable Quota (ITQ) Program I oppose all ITQs, as they create a private property right for a private entity in the publics resource. The ITQ becomes a valuable commodity to the quota holder to which the public has no rights. This council should not sell a public resource to a private concern and allow the private concern to reap the windfall from not only from the exploitation of the resource, but also the appreciation of the value of the right to exploit the public resource. If there are any quotas to be issued, they must be nontransferable.

Designate Essential Fish Habitat (EFH) in new areas in the Mid-Atlantic and New England I am opposed to any new MPAs that restrict the public?s ability to fish in any area.

To Whom It May Concern:

While I don't like to see pot limits, it may be necessary to keep a viable fishery for current participants. A pot limit of 100 for all fishermen holding tags as of the control date, or capping the number of tags held as of the date, could be options. In any case, I would prefer pot or fish allocations to be transferable.

Thank You

Joan Berko