The Economics of Recreational and Commercial Striped Bass Fishing in The State of New York

December, 2006

Prepared by Southwick Associates, Inc.
Fernandina Beach, Florida

For:

The Fishermen's Conservation Association

and Stripers Forever

Table of Contents

Acknowledgements

This report was adapted from a study on the same topic covering the entire Atlantic Coast -- *The Economics of Recreational and Commercial Striped Bass Fishing*, March, 2005 -- prepared on behalf of Stripers Forever by Rob Southwick of Southwick Associates, Inc. Valuable assistance was provided by Dave Anderson of Kleinschmidt Associates, Inc. Thanks also go to Brad Burns, Phil Goodyear, Bruce Freeman, George P. Howard, Andy Loftus, Russell Nelson, Ph.D. of Nelson Resources Consulting, Inc., and Dr. Bob Shipp, PhD, Chair of the Marine Sciences Department, University of South Alabama and former Chairman of the Gulf of Mexico Fishery Management Council. Their inclusion as reviewers does not necessarily represent their endorsement of this report. It was the responsibility of the authors to combine all comments into a single, final product; the authors remain responsible for the contents herein.

Executive Summary

Economic Impacts:

This report assesses the economic contributions of commercial and recreational striped bass fishing in the estuarine and marine waters of New York and the potential of fish raised through aquaculture as a substitute for wild fish. The contents were adapted from a study on the same topic covering the entire Atlantic Coast from Maine to North Carolina -- *The Economics of Recreational and Commercial Striped Bass Fishing*, March, 2005.

The Fisherman's Conservation Association and Stripers Forever agree to the following:
"We advocate eliminating all commercial fishing for wild striped bass, setting aside as much of the commercial quota as necessary to create and maintain healthier fish stocks, and allocating the rest to improve personal-use fishing for recreational anglers."
If the striped bass fishery were so managed, any future harvest levels would produce greater returns for coastal economies and the national economy, because as this report explains, striped bass captured by the recreational sector are far more valuable on a per pound basis than those harvested commercially.

The purpose of this report is to help readers understand the greater economic returns from recreational fishing compared to commercial harvests, even when overall harvests are reduced. This report is based on data from existing sources and includes details regarding methods, limitations and results.

Currently, given state-specific allocations of striped bass between the commercial and recreational sectors, anglers harvest 4.3 times more fish, yet produce nearly 14 times more economic activity as a result (Table E-1). The commercial impacts in Table E-1 considered the value-added and additional impacts created as raw striped bass move through processors and distributors on the way to the final restaurant or retail consumer. Detailed, state-specific impacts for the recreational and commercial fisheries are presented later in this report.

Table E-1: Impacts of Recreationally Harvested Striped Bass Compared to Commercially Harvested Striped Bass in New York

	Commercial	Recreational	Recreational Impacts Are:
Total:			
Pounds Harvested	785,765	3,409,572	4.3 times greater
Retail Sales (angler expenditures, seafood retail and restaurants)	$6,666,547	$209,246,206	31.4 times greater
Total Multiplier Effect (or new economic activity)	$26,251,085	$364,518,115	13.9 times greater
Jobs	568	2,753	4.8 times greater
Per Pound:			
Retail Sales (angler expenditures, seafood retail and restaurants)	$8.48	$61.37	7.2 times greater
Total Multiplier Effect (or new economic activity)	$33.41	$106.91	3.2 times greater
Jobs	0.000723	0.000807	1.1 times greater

The state economy will benefit by maximizing the percentage of fish caught by the recreational sector (harvested fish plus catch-and-release fishing). This is demonstrated in Table E-2, which presents the actual economic impacts from all striped bass activity in 2003, plus a hypothetical scenario based on all harvests occurring in the recreational sector.

Table E-2: Actual & Hypothetical Economic Impacts of NY Striped Bass Harvests

I. Current 2003 Scenario:	Commercial	Recreational	Total
Pounds Harvested	785,765	3,409,572	4,195,337
Retail Sales	$6,666,547	$209,246,206	$215,912,753
State Fuel & Sales Tax Revenues	n/a	$7,542,405	$7,542,405
State Income Tax Revenues	n/a	$2,510,282	$2,510,282
Total Multiplier Effect	$26,251,085	$364,518,115	$390,769,200
Jobs	568	2,753	3,321
II. If Stripers Fully Allocated to Recreation:			
Pounds Harvested	0	4,195,337	4,195,337
Retail Sales	$0	$273,484,791	$273,484,791
State Fuel & Sales Tax Revenues	n/a	$9,857,923	$9,857,923
State Income Tax Revenues	n/a	$3,280,939	$3,280,939
Total Multiplier Effect	$0	$476,425,176	$476,425,176
Jobs	0	3,598	3,598
III. Net Increase in Impacts (I – II):			
Pounds Harvested	-785,765	785,765	**0**
Retail Sales	-$6,666,547	$64,238,585	**$57,572,038**
State Fuel & Sales Tax Revenues	n/a	$2,315,518	**$2,315,518**
State Income Tax Revenues	n/a	$770,657	**$770,657**
Total Multiplier Effect	-$26,251,085	$111,907,061	**$85,655,976**
Jobs	-568	845	**277**

Economic Values:

A full economic examination of a fishery should include economic values when possible. Economic values examine economic efficiency and look at changes in consumer surplus and producer surplus. Consumer surplus is the value of a good or service beyond what the customer actually paid, and can be viewed as the satisfaction received after using a specific good or service. In the case of recreational fishing, consumer surplus is a dollar measure of the benefit an angler receives from the enjoyment of going fishing. Producer surplus is defined as the difference between what producers actually receive when selling a product and the minimum amount they would be willing to accept for that product. For a seafood processor, producer surplus would be equal to the value of the price of a pound of fish minus the opportunity cost, or the amount they could have received in their next most productive activity. These concepts are explained in greater detail within the report.

New York-specific valuation information could not be estimated. However, by adapting results from an existing study produced at the Virginia Institute of Marine Sciences (Kirkley et al. 2000), rough estimates of the economic value of the striped bass fishery to the Atlantic Coast were achieved. A 100 percent allocation to the recreational fishery produces the greatest societal benefit among various management scenarios. However, without a detailed analysis of economic value, which was beyond the scope of this study, results should be interpreted cautiously. Nevertheless, based on these best available data, a hypothetical 100 percent allocation to the recreational sector would produce nearly 11.5 times as much value compared to a complete allocation to the commercial sector, and about 1.3 times as much value compared to current harvest allocations (or approximately $50 million). With 24.8 percent of marine recreational fishing trips in New York targeting striped bass, compared to 20 percent in Virginia, it is reasonable to expect that any economic valuation procedures applied in New York will show maximum value is derived from recreational fisheries.

Aquaculture as a Substitute:

Estimating the economics of substituting striped bass raised through aquaculture for wild stripers harvested commercially in New York was not possible, but the in-state economic effects are not expected to be substantially different from those at the national level. In 2003, 11.447 million pounds of striped bass were produced through aquaculture, which is 61.6 percent greater than the 7.085 million pounds harvested in the same year by the commercial sector. These fish currently enter the commercial market at the distribution level, such as the Fulton Fish Market and other similar points. The per-pound prices in 2003 for striped bass raised through aquaculture and wild striped bass were basically the same, averaging $2.78 for farmed fish and $2.75 for wild fish. The price similarity reflects the market's lack of distinction between the two products. If wild fish were superior, a higher price would reflect its extra desirability.

Once farmed striped bass enter the seafood processing and distribution chain, their economic impacts are expected to be similar to wild striped bass. Starting with the major fish auctions and distributors, many of the same businesses that currently handle farmed striped bass or could do so in the future are likely also handling wild striped bass. Therefore, any dislocation in the overall U.S. economy would be very minimal if wild fish were replaced by farm-raised fish. The economic impacts at these levels need not be considered when looking at trade-offs between wild harvests and aquaculture. However, economic changes will occur in the production sector, with dollars and economic impacts lost to commercial fishermen offset by gains in striped bass raised through aquaculture. The estimated trade-offs between the economic impacts of producing striped bass are presented in Table E-3.

Table E-3: Comparing the Economics of Obtaining Striped Bass for Human Consumption from Aquaculture Sources and Wild Sources in the U.S., 2003

	Dockside Value	Total Multiplier Effect	Salaries and Wages	Jobs
Aquaculture (farm activities only; does not include processing, wholesale, retail, restaurants, etc.)	$12,741,553	$48,458,674.37	$9,021,019.52	349
Commercial Fisheries (wild harvest only; does not include processing, wholesale, retail, restaurants, etc.)	$12,741,553	$34,288,983.96	$11,674,958.15	342
Difference:		*41.3%*	*-22.7%*	*1.9%*

The impacts in Table E-3 must be considered estimates, based on the differing data sources used for the analyses of aquaculture and commercial fisheries. However, Table E-3 is the best approximation possible of the economic impacts created by each source of raw product, and expresses the point that a shift in striped bass production from wild harvests to aquaculture will result in minimal net economic losses. While local disruptions will occur, as they do whenever an industry experiences shifts in manufacturing sources, the net effects on the U.S. economy would be minimal.

U.S. striped bass production on farms already exceeds wild production -- 11.447 million pounds in 2003 versus 7.085 million pounds. Annual production from aquaculture would need to increase an additional 38 percent to produce the 7.085 million pounds of wild striped bass harvested in 2003. However, in the past three years alone, the annual production of striped bass by fish farms has grown 21.9 percent, and over the past 10 years the growth rate has been 222 percent, indicating that the ability to expand production exists.

1.0 Introduction

This report assesses the economic contributions of commercial and recreational marine striped bass fishing in New York and the potential of aquaculture as an alternate source for wild fish. The purpose is to help readers understand the relative difference in economic activity resulting from recreational and commercial striped bass fishing. The information in this report was extracted from a study released by Stripers Forever titled "*The Economics of Recreational and Commercial Striped Bass Fishing*" (March, 2005). The latter report is based on information from existing scientific publications, reports and other data sources. Data limitations encountered are described in this report.

This report reviews the economics of striped bass harvests using two principal measures: economic impacts (jobs, expenditures, tax revenues, etc.) and economic value (quality of life measures and consumer and producer surplus). Both measures are valid and have a role in fisheries management decisions. Many people prefer economic value measures because economic impacts do not reflect the full intrinsic value individuals receive from either catching fish recreationally or consuming fish purchased at a seafood store or restaurant. However, it is important to recognize the value of various fisheries to equipment dealers, seafood processors, coastal communities and others who are personally impacted by fishery management decisions. Recognizing the different ways people measure and debate fishery management issues, this report includes both economic impact and value measures.

2.0 Definitions

Recreational fishing comprises all methods of angling, including catch-and-release fishing. The recreational fishing category includes fishing guides, charter boats and party boats (head boats) that exist for the purpose of taking people fishing as a recreational activity. All measures of recreational fishing in this report include guide and charter boats. **Commercial** fishing includes all harvesting methods used for the primary purpose of selling fish as a means of income.

Economic impacts measure the changes within an economy, and are usually expressed in jobs, income, retail sales (expenditures) and tax revenues. Economic impacts, for the purpose of economic modeling, can be divided into three standard components: direct, indirect and induced impacts. Each of these is considered by most economic models when estimating the overall impacts of any activity on the economy. A **direct impact** is defined as the economic result of the initial purchase made by the consumer based on the dollars that remain within the local economy. For example, when a person buys fishing tackle or a fish to eat for $10, there is a direct impact for the retailer, and the economy, of $10. **Indirect impacts** measure how sales in one industry affect the other industries providing supplies and support. For example, the retailer must purchase additional rods or fish, plus pay costs such as power, rent, etc.; the tackle manufacturer must purchase more plastics production, plastics manufacturers must buy resins, fish retailers must buy more fish, wholesalers must buy more products and supplies, and so on. Therefore, the original expenditure of $10 benefits many other industries. An **induced impact** results from the wages and salaries paid by the directly and indirectly impacted industries. The employees of these industries then spend their incomes. These expenditures are induced impacts which, in turn, create a continual cycle of indirect and induced effects.

The sum of the direct, indirect and induced effects is the **total economic impact**. As the original retail purchase (direct impact) goes through round after round of indirect and induced effects, the economic impact of the original purchase is multiplied, benefiting many industries and individuals. Likewise, the reverse is true. If a particular item or industry is removed, the economic loss is greater than the original retail sale. Once the original retail purchase is made, each successive round of spending is smaller than the previous round. When the economic benefits are no longer measurable, the economic examination ends.

Economic value goes beyond the impacts created by dollars changing hands. Economic value measures the surplus left to the consumer or producer after all sales are complete. Economic value measures the intrinsic well-being people are left with after completing an activity or consuming a product and all dollars or other expenses are spent. Economic value can be considered a quality of life measure. For example, a person who buys a boat for $20,000 expects the value or enjoyment the boat brings back to be worth more than $20,000. Another example: when a consumer buys a fish to eat for $10, but would have paid $15, the consumer is better off by $5. Economic value measures should be considered along with economic impacts and other issues involved with fishery management efforts.

There are different perspectives on how *recreational economic impacts* should be applied in fishery management decisions. Some people focus on the "new" dollars brought into a region by outside visitors or businesses and do not consider the dollars and business associated with purchases made by local residents. Others may argue that equipment and resident expenditures are relevant because, in the absence of striper fishing, the dollars spent on that activity may be taken out of the local community or spent on other industries besides fishing. The proper application of economic impacts depends on the situation. The perspective of this study is the overall economic activity created by striper fishing, for fish landed, eaten or released, regardless of where. Therefore, resident and non-resident distinctions are not considered. Since many businesses impacted by striped bass stock fluctuations sell equipment such as tackle and boats, recreational impacts are presented that include equipment sales as well as estimates that do not.

Many theoretical discussions of fishery economics include both together, with economic value equating to the surpluses earned after impacts are considered. In this report, economic impacts and economic value are considered separately based on available data and literature. If resources allow, future examinations of the trade-offs between recreational and commercial fisheries would benefit from detailed examinations of net economic impacts and surplus issues – for both consumer and producer surpluses.

3.0 Economic Impacts

3.1 Recreational Harvest

The data and information in this report were extracted from a similar report that covered the Atlantic coast from Maine to North Carolina. The methods used in that report are separated in this report into three stages:

1) Listing the number of recreational trips taken in 2003 in New York that primarily targeted striped bass (the year 2003 is the latest for which data were available, and presents the best current picture).
2) Estimating the expenditures made by striped bass anglers per trip and in total.
3) Estimating economic impacts by matching the dollars spent with economic multipliers.

This report measures the economic impact of recreational trips that *targeted* striped bass, versus those trips that were in pursuit of any species or those that caught striped bass incidentally while pursuing other species. The other alternative was to consider the economic impact of trips where at least one striped bass was *caught*, whether or not striped bass were the primary targets for those trips. However, one can assume that many of those trips would have been made even in the absence of striped bass, though the exact percentage is unknown. Anglers who intentionally targeted striped bass and spent dollars pursuing them most accurately reflect the economic effects of the striped bass fishery.

The methodology used here includes expenditures made for travel *and* equipment . Recognizing this study measures the total impacts of trips that targeted stripers, it is correct to include equipment purchases made by striper anglers. Likewise, the effects of resident striped bass angling expenditures should be considered. In the absence of striped bass, anglers may not necessarily spend their dollars in a manner benefiting the state or the same industries at the same level. A disruption in resident striped bass angling may displace many businesses and employees and should be considered in striped bass management plans. Therefore, it can be prudent to use the economic importance measure (resident and non-resident effects) rather than just economic impacts (non-residents only).

Trip Data:

The number of all marine fishing trips for each state, including New York, and the number of trips targeting striped bass were obtained directly from NOAA Fisheries' Marine Recreational Fisheries Statistics Survey (MRFSS).[1] The MRFSS is a combination phone and in-person, on-site survey conducted annually. The MRFSS reports angler trips taken for specific species, the number of anglers, and total fish caught. The MRFSS provided annual trip data. SAS software was used to analyze the MRFSS data to calculate the total number of marine recreational fishing

[1] While subject to criticism about its reliability, better data sources for striped bass-specific trips were not available.

trips taken and the number of trips taken specifically for striped bass. Table 1 presents estimates of trips taken.

Table 1: Number of Trips Targeting Any Species and Trips Specifically for Striped Bass, by Mode and State, 2003

	Mode:[2]	Estimated Total Fishing Trips	Trips Targeting Striped Bass	% of All Trips Targeting Striped Bass
New York	Shore	2,089,522	474,216	*22.7%*
	Party/Charter Boat	405,533	82,507	*20.3%*
	Private/Rental Boat	3,030,068	812,187	*26.8%*
	Total	5,525,123	1,368,910	*24.8%*
Atlantic Coast, Maine to North Carolina (including New York)	Shore	14,766,485	4,460,461	30.2%
	Party/Charter Boat	1,726,271	377,104	21.8%
	Private/Rental Boat	19,462,694	6,295,711	32.3%
	Total	**35,955,450**	**11,133,276**	**30.96%**

Source: Personal communication from NOAA Fisheries, Fisheries Statistics and Economics Division.

Expenditures:

Expenditures made to pursue striped bass in New York were based on the average expenditures made *regionally* for striped bass. This was a necessary step in the larger Atlantic Coast report as the number of people per state in the MRFSS survey who reported fishing for striped bass was often too low to reliably develop state-specific expenditure profiles. Using small samples to develop expenditure profiles would possibly have resulted in wide differences and lower reliability in many state-specific results. Recognizing that the types of expenditures made by striper anglers will vary little from state to state, regional profiles of striped bass anglers were developed. The regions were adopted from previous NOAA Fisheries angler expenditure studies in the northeast (ME to VA) and southeast (NC to FL) regions (Steinback and Gentner, 2001; and Gentner et al, 2001). With this approach, all expenditure items reported have large sample sizes, ranging from a minimum of 67 up to 652, depending on the mode of fishing and region. The regional expenditure profiles are presented in Tables 2a and 2b. New York was one of the few states with large, relatively reliable survey sample sizes. *To ensure the results reported here remain consistent with the national report, the methods used in the national report are carried over without substituting state-specific data for the regional data.*

Angler expenditures were obtained directly from the MRFSS survey. Expenditure data were produced by NOAA Fisheries via several add-on economic components to MRFSS. The analysis only included expenditures made by striped bass anglers. The original data contained responses from 2,025 anglers. "Outliers," or unreasonable responses, were removed, for a total 1,920 useable responses. All analyses were conducted using SAS software. Regional profiles were developed, with the Northeast profile representing all striper anglers from Virginia to Maine.

[2] Shore fishing = fishing from a beach, bank or man-made structure; Party/Charter boat fishing includes guides. Private or rental boat refers to operating a boat without a hired captain or crew. These classifications are the standard method of categorizing anglers in NOAA Fisheries surveys.

Both trip and equipment expenditures are included in the analysis. New York annual trip expenditures were relatively simple to calculate. The average amount reported spent per trip by striped bass anglers, as provided by the regional expenditure profiles and reported in Table 2, was multiplied by the total number of reported trips (Table 3). The equipment expenditures in the regional profiles show the amount spent annually for specific services and durable goods (boats, reels, etc.) that are used for many fishing trips, including those not targeting striped bass. To estimate the percentage consumed by striped bass angling, these services and durable goods expenditures were multiplied by the percent of *all* marine fishing trips targeting striped bass. That procedure suffices in meeting the goal of this project, which is to estimate the economic impacts of striped bass angling, versus projecting the losses to regional economies should striped bass angling cease. The latter would require estimating how much angling activity and dollars would be shifted to other species, a step not required when projecting current economic impacts.

Table 2: Average Costs Per Angler

Table 2a: Average Cost Per Angler/Trip[3,4]

		Mid-Atlantic	
		$ per item:	Sub-total:
Private Transportation	Charter	$8.51	
	Private/Rental	$20.65	$45.60
	Shore	$16.45	
Food	Charter	$24.34	
	Private/Rental	$12.18	$51.10
	Shore	$14.57	
Lodging	Charter	$7.20	
	Private/Rental	$2.64	$11.33
	Shore	$1.49	
Public Transportation	Charter	$1.82	
	Private/Rental	$0.67	$2.93
	Shore	$0.43	
Boat Fuel	Private/Rental	$13.64	$70.56
Charter Fees	Charter	$56.48	$70.18
Access/Boat Launching	Charter	$0.06	
	Private/Rental	$1.59	$3.29
	Shore	$1.64	
Equipment Rental	Charter	$5.03	
	Private/Rental	$0.48	$5.86
	Shore	$0.34	
Bait	Charter	$1.41	
	Private/Rental	$6.83	$15.51
	Shore	$7.28	
Ice	Charter	$0.60	
	Private/Rental	$2.13	$4.94
	Shore	$2.21	
Travel Costs Sub-Total:	Charter	$105.46	
	Private/Rental	$60.81	$210.68
	Shore	$44.41	

[3] Charter fishing includes partyboats (or headboats) and guides. Shore fishing includes beaches, bank fishing, docks, piers and other man-made structures.

[4] The data in this table comes directly from MRFSS, the best source available. As with any survey, there is an element of error that may account for any unusual figures, such as dollars reported for boat purchases by charter customers, and boat expenses reported by shore anglers.

Table 2b: Average Annual Equipment Expense Per Angler Targeting Striped Bass

Equipment Expenditures		Mid-Atlantic
Rods and Reels	Charter	$46.73
	Private/Rental	$61.02
	Shore	$71.32
Other Tackle	Charter	$19.34
	Private/Rental	$26.34
	Shore	$32.31
Camping Equipment	Charter	$0.40
	Private/Rental	$3.35
	Shore	$3.15
Binoculars	Charter	$0.29
	Private/Rental	$4.34
	Shore	$2.11
Clothing	Charter	$5.41
	Private/Rental	$9.28
	Shore	$9.20
Processing/Taxidermy	Charter	$0.00
	Private/Rental	$0.38
	Shore	-
Magazines	Charter	$2.08
	Private/Rental	$2.90
	Shore	$0.89
Club Dues	Charter	$1.23
	Private/Rental	$3.34
	Shore	$7.57
Miscellaneous	Charter	$3.70
	Private/Rental	$4.72
	Shore	$2.97
Boat Expenses	Charter	$162.41
	Private/Rental	$320.96
	Shore	$142.04
Power Boat Purchases	Charter	$294.44
	Private/Rental	$1,537.37
	Shore	$139.18
Non-Power Boat Purchase	Charter	$0.00
	Private/Rental	$7.48
	Shore	$3.56
Electronics	Charter	$9.73
	Private/Rental	$31.80
	Shore	$5.72
Fishing Vehicle	Charter	$1.03
	Private/Rental	$644.57
	Shore	$1,162.34
Vacation Home	Charter	$19.15
	Private/Rental	$0.13
	Shore	$1.81
Equipment Sub-Total:	Charter	$565.93
	Private/Rental	$2,657.98
	Shore	$1,584.17

Table 3: Number of Trips Targeting Any Species and Trips Specifically For Striped Bass, by Mode, 2003

	Mode:[5]	Estimated Total Fishing Trips	Trips Targeting Striped Bass	% of Marine Trips Targeting Striped Bass
New York	Shore	2,089,522	474,216	22.7%
	Party/Charter Boat	405,533	82,507	20.3%
	Private/Rental Boat	3,030,068	812,187	26.8%
	Total	5,525,123	1,368,910	24.8%
Total, Atlantic Coast	Shore	14,766,485	4,460,461	30.2%
(Maine to North Carolina)	Party/Charter Boat	1,726,271	377,104	21.8%
	Private/Rental Boat	19,462,694	6,295,711	32.3%
	Total	***35,955,450***	***11,133,276***	***30.96%***

Source: Personal communication from NOAA Fisheries, Fisheries Statistics and Economics Division.

Corrections were made to the expenditures to update them to 2003 levels. This was done by applying the Consumer Price Index to adjust data from 1998 levels, which was the year used for the Northeast expenditure data. According to the Department of Commerce (U.S. Department of Commerce, 2004), the inflation adjustment factors were 1.13 (+13%) for the Northeast U.S. Table 4 presents the expenditure estimates for New York.

Table 4: Estimated Expenditures for Recreational Striped Bass Fishing in New York

Trip Expenditures:	MODE:	$ Per Mode	$Total Per Item:
Private Transportation	Charter	$701,970	$25,271,519
	Private/Rental	$16,770,118	
	Shore	$7,799,431	
Food	Charter	$2,008,616	$18,812,521
	Private/Rental	$9,893,818	
	Shore	$6,910,086	
Lodging	Charter	$594,422	$3,443,655
	Private/Rental	$2,142,224	
	Shore	$707,009	
Public Transportation	Charter	$150,013	$903,129
	Private/Rental	$547,406	
	Shore	$205,710	
Boat Fuel	Private/Rental	$11,079,936	$11,079,936
Charter Fees	Charter	$4,660,243	$4,660,243
Access/Boat Launching	Charter	$4,584	$2,076,457
	Private/Rental	$1,293,424	
	Shore	$778,449	
Equipment Rental	Charter	$415,285	$968,969
	Private/Rental	$391,279	
	Shore	$162,405	
Bait	Charter	$116,426	$9,111,142
	Private/Rental	$5,543,420	
	Shore	$3,451,297	

[5] Shore fishing = fishing from a beach, bank or man-made structure; Party/Charter boat fishing includes guides. Private or rental boat refers to operating a boat without a hired captain or crew. These classifications are the standard method for categorizing anglers in NOAA Fisheries surveys.

Table 4 Continued

Ice	Charter	$49,504	$2,826,901	
	Private/Rental	$1,731,258		
	Shore	$1,046,139		
Trip Sub-Total:	Charter	8,701,062		
	Private/Rental	49,392,884		
	Shore	21,060,525		
	Total:	*79,154,472*	$79,154,472	
x CPI adjustment to 2003 (13%):		***89,444,553***		
		Resident	Non-resident	*Total:*
Rods and Reels		$68,835,000.00	$277,000.00	*$69,112,000.00*
Other Tackle		$40,720,000.00	$516,000.00	*$41,236,000.00*
Camping Equipment		$3,657,000.00		*$3,657,000.00*
Binoculars		$3,000,000.00		*$3,000,000.00*
Clothing		$7,190,000.00		*$7,190,000.00*
Processing/Taxidermy		$303,000.00		*$303,000.00*
Magazines		$3,967,000.00		*$3,967,000.00*
Club Dues		$2,765,000.00		*$2,765,000.00*
Miscellaneous		$2,917,000.00		*$2,917,000.00*
Boat Expenses		$13,761,000.00		*$13,761,000.00*
Power Boat Purchases		$246,588,000.00		*$246,588,000.00*
Non-Power Boat Purchases		$320,000.00		*$320,000.00*
Electronics		$12,556,000.00		*$12,556,000.00*
Licenses		n/a		n/a
Fishing Vehicle		$20,409,000.00		*$20,409,000.00*
Vacation Home		$128,000.00		*$128,000.00*
Equipment Total, ALL FISHING:				$427,909,000.00
Durable $$ assigned to striped bass:				$106,019,161.78
TOTAL STRIPED BASS EXPENDITURES, 1998				$185,173,633
			x CPI Adjustment to 2003:	+ 13%
TOTAL 2003 EST. STRIPED BASS $$:				**$209,246,206**

Economic Impact Per Dollar Spent by Marine Recreational Anglers

Economic multipliers explaining the total jobs, earnings (salaries and wages), total economic impact (output), and tax revenues for New York were derived from American Sportfishing Association data (ASA 2002). This study calculated the economic impact from marine recreational fishing per state based on data from the 2001 National Survey of Fishing, Hunting and Wildlife-Associated Recreation (U.S. Fish and Wildlife Service 2002) and RIMS-II input-output multipliers (Bureau of Economic Analysis 1997). This source was chosen for use over other sources such as NOAA Fisheries regional economic analyses of sport fishing because it provides a better "apples-to-apples" comparison to the multipliers derived in this report for the commercial fishing analysis. The resources available for this report did not allow for the development of economic models unique to striped bass. Simple multipliers were obtained by dividing the total output, jobs or earnings estimates by total expenditures. The resulting ratios were then used as multipliers and are listed in Table 5. The expenditures were multiplied by the respective multipliers to derive the final economic impact estimates.

Table 5: Recreational Multipliers Used in This Analysis (Impacts Per Dollar Spent)

	Retail Sales	Total Multiplier Effect (output)	Salaries and Wages	Jobs	Sales and Motor Fuel Taxes	State Income Taxes	Federal Income Taxes
New York	1	1.742053641	0.387527359	0.000013157	0.036045598	0.011996787	0.069402712
United States	1	2.746529311	0.71905113	0.000026232	0.043581188	0.007550318	0.119978368

Source: Sportfishing in America, Values of Our Traditional Pastime, American Sportfishing Association, 2003.

The multiplier data were for 2001, not 2003, which is the time frame of this report. However, without updated models showing any increases or decreases in the impact effects between 2001 and 2003, adjustments were not possible. Given the nature of the general economy to evolve slowly over time, economic multipliers would generally experience small changes from year to year. The U.S. Department of Commerce, reflecting the slowly evolving nature of the economy, only updates the data used to produce its RIMS-II economic multipliers every five years. Regardless, the economy does change gradually. Therefore, the multipliers used in this report are considered closely, but not perfectly, representative of 2003. The estimated economic effects of striped bass angler expenditures on travel-related expenses and equipment sales are presented in Table 6. The effects from only travel-related expenses are presented in Table 7 and explain the importance of striped bass angling to coastal-related tourism. Appendix I lists rough estimates of the number of striped bass anglers per state.

Table 6: Estimated Economic Impacts, All Recreational Travel & Equipment Expenditures Combined

	Retail Sales	Total Multiplier Effect (Output)	Salaries and Wages	Jobs	Sales and Motor Fuel Taxes	State Income Taxes	Federal Income Taxes
New York	$209,246,206	$364,518,115	$81,088,629	2,753	$7,542,405	$2,510,282	$14,522,254
Atlantic Coast, Maine to North Carolina (including New York)	$2,412,284,999	$6,625,411,457	$1,734,556,255	63,278	$105,130,245	$18,213,520	$289,422,017
Per lb harvested in New York:	$61.37	$106.91	$23.78	0.00081	$2.21	$0.74	$4.26
Per fish caught and kept in New York:	$666.89	$1,161.77	$258.44	0.00877	$24.04	$8.00	$46.28
Per trip in New York:	$152.86	$266.28	$59.24	0.00201	$5.51	$1.83	$10.61

Table 7: Estimated Economic Impacts from Recreational Travel Expenditures Only

	Retail Sales	Total Multiplier Effect (Output)	Salaries and Wages	Jobs	Sales and Motor Fuel Taxes	State Income Taxes	Federal Income Taxes
New York	$89,444,553	$155,817,209	$34,662,211	1,177	$3,224,082	$1,073,047	$6,207,695
Atlantic Coast, Maine to North Carolina (including New York)	$645,816,927	$1,773,755,120	$464,375,391	16,941	$28,145,469	$4,876,123	$77,484,061
Per lb harvested in New York:	$26.23	$45.70	$10.17	0.00035	$0.95	$0.31	$1.82
Per fish caught and kept in New York:	$285.07	$496.61	$110.47	0.00375	$10.28	$3.42	$19.78
Per trip in New York:	$65.34	$113.83	$25.32	0.00086	$2.36	$0.78	$4.53

3.2 Commercial Harvest

As with the recreational analysis and all other analyses in this report, the methods used to analyze commercial harvests and the results were obtained from a study released by Stripers Forever titled "*The Economics of Recreational and Commercial Striped Bass Fishing*" (March, 2005). The methods used to generate the economic impact estimates of New York and Atlantic Coast commercial striped bass landings are separated into two basic stages:

1) NOAA Fisheries data regarding the value of fish landed in New York and for the coast as a whole, and
2) Combined landings value data, also known as dockside prices, with economic multipliers that describe the economic activity stimulated as the raw product is processed, distributed and ultimately consumed.

Commercial Landings Value Data

Data regarding the 2003 Atlantic striped bass harvest in New York and all states were obtained from NOAA Fisheries. Data were retrieved for pounds harvested and dollars earned by harvesters. New York's commercial fisheries harvest more pounds of wild striped bass than any other state, with 785,765 pounds harvested in 2003. This represented 11 percent of the Atlantic coast striped bass harvest.

Commercial Harvest Multiplier Data

Only a few sources of multiplier data for New York and Atlantic commercial finfish harvest were found. The most recent and directly applicable source of multiplier data was from the Virginia Institute of Marine Science (Kirkley et al, 2000). The multipliers in this report, while detailed and considered very reliable, only reported the economic effects of commercial fishery activities in Virginia. No other source of adequate, more recent multipliers was available for New York or any other states that covered all major commercial fishery sectors (harvesting, processing, distribution, and retail and restaurants/food service) and level of impacts needed (jobs, earnings, output, etc). Therefore, the Virginia multipliers were adapted for use in the other Atlantic Coast states. Recognizing the competitive nature of the seafood industry along the Atlantic Coast, commercial fishery multipliers for New York and Virginia are not expected to have major differences.

The Virginia multipliers consider the expenditures and impacts generated as striped bass move through the processing, distribution and retail/food service levels. The commercial fishery multipliers used in this study, and the adaptations made to these multipliers, are presented in Appendix II. Please note that all adjustments were made so any possible error was skewed towards maximizing estimates of commercial harvest data. The economic results reported herein are considered to be at the high end of their possible range.

Applying the Multipliers

The multipliers explain the relationship between the value of commercial striper landings and their cumulative economic impacts. In this study, for every $1 of fish landed, the multipliers report the level of economic activity created, the number of jobs supported, and income (salaries, wages, and business profits) produced. To determine the economic impacts of striped bass commercial harvests, the total dock-side value of all 2003 landings in New York was applied to their appropriate multipliers. Landings value and the resulting economic impact estimates are reported in Table 8.

Table 8: Estimated Economic Impacts of Commercial Striped Bass Landings, 2003[1]

Region:	Landings	Consumer Level Retail Sales [3]	Total Multiplier Effect (Output)	Income (Salaries, Wages, Business Profits)	Jobs (Full-time equivalent)
New York	$1,970,098	$6,666,547	$26,251,085	$19,323,066	568
U.S.[2]	$12,741,553	$43,115,704	$250,079,578	$188,542,356	5,023
Pounds Harvested, in New York:	785,765				
Per lb harvested, in New York:	$2.51	$8.48	$33.41	$24.59	0.000723

[1] Blank cells ("$ - ") are states that either do not permit commercial striped bass harvests or reported zero harvest.
[2] The sum of the impacts per state will not equal the U.S. estimate because effects from state exports are not included in state-level impacts.

[3] These figures reflect the weighted average amount paid at the seafood retail and restaurant level.

4.0 Economic Impacts from Reallocating Striped Bass

NOTE: The missions of Stripers Forever and the Fisherman's Conservation Association agree as follows: "We advocate eliminating all commercial fishing for wild striped bass, setting aside as much of the commercial quota as necessary to create and maintain healthier fish stocks, and allocating the rest to improve personal-use fishing for recreational anglers." The information presented in this section is *only* intended to demonstrate the greater economic returns produced by recreational fishing, even when fish are released, compared to commercial landings.

This section looks at the differences in retail sales, jobs and overall economic activity stimulated by recreational and commercial harvests. Recognizing that boat, tackle and other equipment dealers have been vocal about striped bass management to their livelihoods, the recreational dollars analyzed here are based on Table 4, which includes travel and equipment expenditures.

Based on NOAA landings data, and matched with the economic impact information presented on the preceding pages, the respective impacts per pound of fish *landed* (versus caught and released) are presented in Table 9. Please note that these numbers do not reflect the fish allocated by the government to the commercial and recreational sectors. Instead, they reflect actual fish caught as reported by NOAA Fisheries. Overall, on a per-pound basis, the recreational sector in New York generates greater impacts for the coastal economy, with over 31 times more in retail sales value per pound landed, nearly 14 times more economic activity across the state economy, and nearly five times more jobs.

Table 9. New York Recreational Landings Compared to Commercial Harvests, 2003:

	Commercial	Recreational	Recreational Impacts Are:
Total:			
Pounds Harvested	785,765	3,409,572	4.3 times greater
Retail Sales (angler expenditures, seafood retail and restaurants)	$6,666,547	$209,246,206	31.4 times greater
Total Multiplier Effect (or new economic activity)	$26,251,085	$364,518,115	13.9 times greater
Jobs	568	2,753	4.8 times greater
Per Pound:			
Retail Sales (angler expenditures, seafood retail and restaurants)	$8.48	$61.37	7.2 times greater
Total Multiplier Effect (or new economic activity)	$33.41	$106.91	3.2 times greater
Jobs	0.000723	0.000807	1.1 times greater

One goal of this study is to demonstrate the greater returns to coastal economies from recreational fishing for striped bass compared to commercial harvests. The greater returns from recreational activities are demonstrated next by comparing current economic impacts of striped bass harvests to a hypothetical scenario where fishing is limited to recreational anglers only.

The first step is to estimate the level of economic impacts that might occur if commercial harvesting ceased. Two different approaches, each differing slightly but based on a similar approach, were tested to estimate the economic returns from such a scenario and are presented here. The first approach is slightly more complex, but both yield the same general results. These approaches were developed and reported in the Stripers Forever report titled "The Economics of Recreational and Commercial Striped Bass Fishing" (March, 2005). Those methods and results are presented here.

4.1 Approach #1:

Total allowable striped bass harvests, as set by the Atlantic States Marine Fisheries Commission, are based on overall mortality on fish stocks. If the 7.1 million fish currently harvested along the Atlantic coast by commercial fishermen were reallocated to the recreational sector, state authorities would be able to adjust seasons, bag and size limits in a way that permits the harvest of the additional fish.[6] Do not mistake this as recognition that anglers would be compelled to harvest all fish they catch. This is not true. The changes in recreational fishing levels brought on by changes to seasons include both fish landed by anglers and catch-and-release activity. Even though this approach is based on the total fish harvested, it automatically includes catch-and-release angling. Not only has catch-and-release angling become increasingly popular; to a degree it sustained a recreational fishery for striped bass during the harvest moratoriums in the late 1980's and early 1990's.

Without being able to accurately predict how New York or any other state would ultimately adjust their regulations, estimates are made here based on the regulations as they existed in 2003, the latest year when data were available. The following process was used:

1) In 2003, according to NOAA Fisheries, 2,503,800 striped bass were landed or discarded by anglers from Maine through the Carolinas, weighing 22,952,673 pounds. Therefore, the average weight of a striper landed in 2003 was 9.17 pounds. Please note this figure only represents fish *landed* or *discarded*, and does not include fish released alive. This figure includes all striped bass -- those caught in inshore waters which are typically populated with smaller fish, and larger, more fully mature fish typically caught in deeper waters.

2) In 2003, a total of 35,955,450 marine recreational fishing trips were made in the same states for all types of fish, in all types of water (inshore, offshore, etc.), and by all modes (boat, shore, etc.), while 11,133,276 trips were made specifically targeting striped bass (see Table 1).

3) Based on the above, in 2003, the average recreational fishing trip landed an average of 0.07 striped bass/trip (2,503,800 fish / 35,955,450 trips = .0696 fish, rounded to 0.07 fish).

[6] Stripers Forever, Inc. emphasizes it is not seeking to reallocate commercial harvests to recreational anglers. Instead, the goal is to create healthier fish stocks, and therefore better catch-and-release fishing and some limited harvests by reducing *overall* landings and mortality.

4) Therefore, the average weight of striped bass harvested per trip was 0.6419 pounds (9.17 pounds per fish x .07 fish = 0.6419 pounds per trip).

5) Hypothetically, if the commercial allocation was assigned to the recreational sector, the 7,085,427 pounds taken commercially in 2003 could be harvested by a maximum of 11,038,210 additional targeted and non-targeted trips (7,085,427 lbs / .6419 = 11,038,210 fishing trips), assuming striped bass populations remained steady at 2003 levels. Increases in striped bass populations could result in more recreational fishing trips, even with increased harvest limits. This is discussed further in the next section. This hypothetical scenario helps to highlight the greater economic returns of recreational striped bass fishing, and is not meant to advocate for such a reallocation. This scenario also assumes demand for fishing would remain static at 2003 levels. Demand for striped bass fishing varies each year based on anglers' expectations of catching fish, weather, economic variables, and other factors not fully understood nor available for use in estimating the effects of harvest shifts between recreational and commercial harvests.

6) Based on Table 1, approximately 30.9 percent of *all* 2003 marine recreational fishing trips targeted striped bass. Therefore, of the 11,038,210 new trips that could be created, an estimated 3,417,881 trips may specifically target striped bass. We estimate *only* targeted trips for striped bass will increase as a result of reallocated fish. We also estimate that the 7,616,365 non-targeted trips would remain at the same level and not grow as a result of the increased striper opportunities. The additional 3,417,881 trips would equate to an approximate 30.9 percent increase in trips targeting striped bass.

Without the means to estimate marginal changes in economic impacts per dollar spent by anglers, we must assume economic impacts from striped bass would also increase approximately 30.9 percent. We acknowledge that for many anglers, equipment expenditures made for fishing at lower harvest levels, such as boats and tackle, would suffice for their additional fishing activities. However, there are additional anglers who may feel compelled to make additional expenditures but would not have done so at lower harvest levels. In addition, increased fishing activity can mean wear on existing equipment, thus increasing anglers' average annual equipment expenditures. However, with no information available on the marginal changes in anglers' expenditures based on changes in expected fishing activity, the assumption that economic impacts will increase linearly with fish populations is made. This assumption is partially supported by Table 15 which shows angling activity increased in near-linear fashion as striped bass stocks grew in the 1980's and 1990's. To an unknown extent, it is reasonable to assume angler expenditures grew as well. Tables 10 and 11 present the additional economic impacts reallocation could produce, and Tables 12 and 13 present the overall impacts that could result.

Table 10: Estimated *Additional* Recreational Economic Impacts from Reallocating Striped Bass, Based on Travel and Equipment Expenditures Combined

	Retail Sales	Total Multiplier Effect (output)	Salaries and Wages	Jobs	Sales and Motor Fuel Taxes	State Income Taxes	Federal Income Taxes
New York	$64,238,585	$111,907,061	$24,894,209	845	$2,315,518	$770,657	$4,458,332
United States	$740,571,495	$2,034,001,317	$532,508,770	19,426	$32,274,985	$5,591,551	$88,852,559
Per lb. harvested in New York:	$18.84	$32.82	$7.30	0.000248	$0.68	$0.23	$1.31
Per fish caught and kept in New York:	$204.74	$356.66	$79.34	0.002693	$7.38	$2.46	$14.21
Per trip in New York:	$46.93	$81.75	$18.19	0.000617	$1.69	$0.56	$3.26

Table 11: Estimated *Additional* Recreational Economic Impacts from Reallocating Striped Bass, Based on Travel Expenditures Only

	Retail Sales	Total Multiplier Effect (output)	Salaries and Wages	Jobs	Sales and Motor Fuel Taxes	State Income Taxes	Federal Income Taxes
New York	$27,459,478	$47,835,883	$10,641,299	361	$989,793	$329,426	$1,905,762
United States	$198,265,797	$544,542,822	$142,563,245	5,201	$8,640,659	$1,496,970	$23,787,607
Per lb. harvested in New York:	$8.05	$14.03	$3.12	0.000106	$0.29	$0.10	$0.56
Per fish caught and kept in New York:	$87.52	$152.46	$33.92	0.001151	$3.15	$1.05	$6.07
Per trip in New York:	$20.06	$34.94	$7.77	0.000264	$0.72	$0.24	$1.39

Table 12: Estimated *Total* Recreational Economic Impacts from Reallocating Striped Bass, Based on Travel and Equipment Expenditures Combined

	Retail Sales	Total Multiplier Effect (output)	Salaries and Wages	Jobs	Sales and Motor Fuel Taxes	State Income Taxes	Federal Income Taxes
New York	$273,484,791	$476,425,176	$105,982,839	3,598	$9,857,923	$3,280,939	$18,980,586
United States	$3,152,856,494	$8,659,412,775	$2,267,065,025	82,705	$137,405,231	$23,805,071	$378,274,577
Per lb. harvested in New York:	$80.21	$139.73	$31.08	0.001055	$2.89	$0.96	$5.57
Per fish caught and kept in New York:	$871.63	$1,518.43	$337.78	0.011467	$31.42	$10.46	$60.49
Per trip in New York:	$199.78	$348.03	$77.42	0.002628	$7.20	$2.40	$13.87

Table 13: Estimated *Total* Recreational Additional Economic Impacts from Reallocating Striped Bass, Based on Travel Expenditures Only

	Retail Sales	Total Multiplier Effect (Output)	Salaries and Wages	Jobs	Sales and Motor Fuel Taxes	State Income Taxes	Federal Income Taxes
New York	$116,904,031	$203,653,092	$45,303,510	1,538	$4,213,876	$1,402,473	$8,113,457
United States	$844,082,724	$2,318,297,942	$606,938,636	22,142	$36,786,128	$6,373,093	$101,271,668
Per lb. harvested in New York:	$34.29	$59.73	$13.29	0.000451	$1.24	$0.41	$2.38
Per fish caught and kept in New York:	$372.59	$649.07	$144.39	0.004902	$13.43	$4.47	$25.86
Per trip in New York:	$85.40	$148.77	$33.09	0.001124	$3.08	$1.02	$5.93

The estimated increase in economic impacts can be considered conservative. The average weight of a fish harvested by recreational anglers, calculated in this analysis to be 9.17 pounds, was determined using the total weight of fish landed as reported by NOAA Fisheries. However, NOAA's weight estimates do not include the weight of fish discarded or those that could not be released alive. Typically, such fish will be smaller as people are likely to keep the larger fish. But the average weight of fish brought home is used by NOAA to estimate the average weight of fish discarded, for lack of better data. Therefore, we assume the weight of discarded fish is likely lower than the estimates used in this report. If we used a lower average weight for fish caught, our calculations of additional trips taken would be larger, and the estimated economic impacts would also be higher.

The additional economic impacts from reallocating the Atlantic Coast's 7.1 million fish to the recreational sector are much greater than the impacts these fish currently generate via the commercial fishery. Economic activity from the 7.1 million fish would be over seven times greater, with nearly three times more jobs. Table 14 presents a comparison of the two allocation alternatives specific to New York.

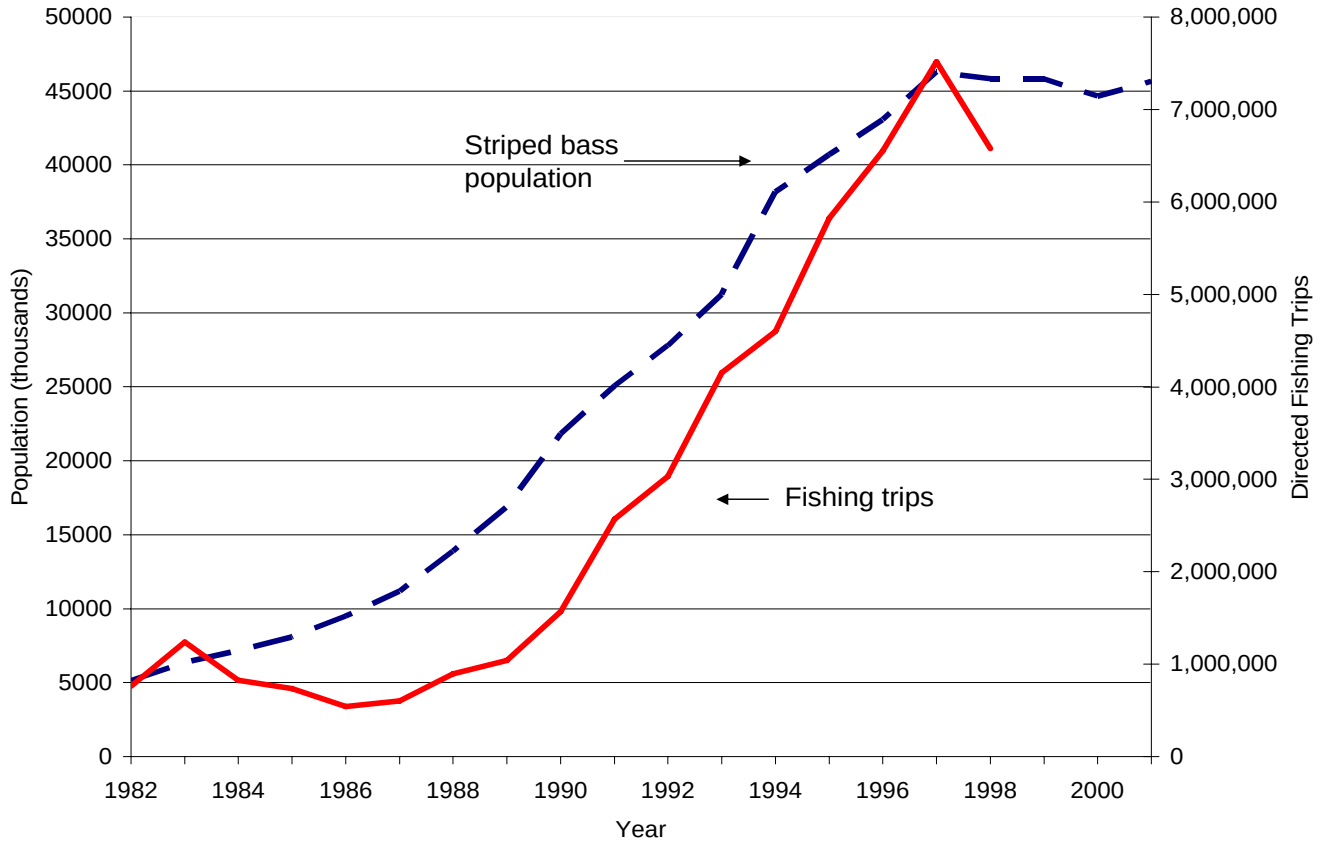
Table 14. Estimated Recreational Impacts, If Stripers Were Fully Allocated to Recreational Harvest

I. Current 2003 Scenario:	Commercial	Recreational	Total
Pounds Harvested	785,765	3,409,572	4,195,337
Retail Sales	$6,666,547	$209,246,206	$215,912,753
State Fuel & Sales Tax Revenues	n/a	$7,542,405	$7,542,405
State Income Tax Revenues	n/a	$2,510,282	$2,510,282
Total Multiplier Effect	$26,251,085	$364,518,115	$390,769,200
Jobs	568	2,753	3,321
II. If Stripers Fully Allocated to Recreation:			
Pounds Harvested	0	4,195,337	4,195,337
Retail Sales	$0	$273,484,791	$273,484,791
State Fuel & Sales Tax Revenues	n/a	$9,857,923	$9,857,923
State Income Tax Revenues	n/a	$3,280,939	$3,280,939
Total Multiplier Effect	$0	$476,425,176	$476,425,176
Jobs	0	3,598	3,598
III. Net Increase in Impacts (I – II):			
Pounds Harvested	-785,765	785,765	**0**
Retail Sales	-$6,666,547	$64,238,585	**$57,572,038**
State Fuel & Sales Tax Revenues	n/a	$2,315,518	**$2,315,518**
State Income Tax Revenues	n/a	$770,657	**$770,657**
Total Multiplier Effect	-$26,251,085	$111,907,061	**$85,655,976**
Jobs	-568	845	**277**

4.2 Approach #2:

This approach only examines the reallocation effects along the Atlantic coast from Maine to North Carolina. State-specific results were not produced. Instead, this approach takes a slightly different angle to the basic method presented in Section 4.1 when estimating the economic effects of reallocation. Evidence indicates that an increase in the availability of striped bass may increase angling effort, even if harvest restrictions are tightened. Table 15 (next page) presents the increase in striped bass stocks in the 1980's and 1990's and the corresponding increase in angler trips. According to more recent NOAA Fisheries (MRFSS) data released since the production of Table 15, the increasing trend in targeted striped bass trips has continued through 2003, while the striper population has held steady at 45 million, thus indicating a relative continuation of the long term trend seen since the mid-1980's when recreational fishing trips increased at the same basic pace as fish populations, with a slightly faster growth rate in the last several years. This was also clearly the case with Florida snook. As stock sizes increased over recent years, so has fishing activity, as measured by the sales of snook stamps by the Florida Fish and Wildlife Conservation Commission (personal communication, Dr. Russell Nelson). Table 16, using data provided by the Gulf States Marine Fisheries Commission for angling in all Gulf states except Texas, shows how red drum, commercially fished and over-exploited in the early 1980's, experienced a rapid increase in angling participation once commercial harvests were stopped and recreational limits tightened (mid-1980's), even while the average number of fish harvested per trip fell. Since 1988 or 1989, the average number of fish kept per trip has remained stable while the overall recreational fishery has increased, generating significant new economic impacts. Simultaneously, the snook fishery, also protected, grew significantly while the number of fish harvested per trip mostly held steady. Both fisheries saw harvest restrictions increase during this time. Together, tables 15 and 16 indicate that angling trips can increase even when bag limits and harvest restrictions are tightened, as long as quality fishing opportunities exist.

Table 15. Trends in Striped Bass Stocks and Recreational Trips



Data Sources: 2001 ASMFC Stock Assessment and National Marine Fisheries Service Marine Recreational Fisheries Statistics Survey. Graphic provided by Loftus Consulting.

Table 16. Trends in Gulf of Mexico Trips and Harvests

Year:	Red Drum Trips:	Reds Harvested/Trip:	Snook Trips:	Snook Harvested/Trip:
1982	1,756,690	1.43	133,957	0.04
1983	3,121,894	1.24	179,568	0.03
1984	2,629,398	1.09	158,792	0.21
1985	2,109,603	0.94	92,807	0.06
1986	2,519,744	0.96	224,162	0.05
1987	2,068,807	0.85	57,261	0.49
1988	1,170,916	0.77	295,903	0.11
1989	2,292,576	0.58	417,085	0.03
1990	1,835,229	0.44	184,084	0.06
1991	2,962,393	0.41	718,523	0.04
1992	3,485,479	0.64	942,162	0.03
1993	3,511,795	0.63	797,162	0.03
1994	3,470,940	0.49	757,649	0.07
1995	4,051,196	0.71	840,017	0.05
1996	3,725,091	0.67	908,434	0.07
1997	4,094,260	0.56	1,161,813	0.06
1998	3,485,233	0.53	935,167	0.04
1999	3,191,360	0.67	714,013	0.05
2000	4,466,200	0.73	1,032,578	0.03
2001	4,814,350	0.65	1,108,312	0.03
2002	4,252,717	0.58	1,169,459	0.02
2003	5,480,232	0.49	1,409,284	0.03

Past increases in striped bass fishing activity may not have necessarily resulted solely from changes in government allocations, but may have been influenced by increased angler expectations of catching fish. For example, even though there was a moratorium on fishing for striped bass in New York and Delaware from 1985 to1990, combined with increased restrictions in other states, the number of recreational fishing trips targeting striped bass increased during that period. The growth in trips after this time may likely be a combination of relaxed restrictions, healthier stocks and socio-economic changes. Angler expectations may have changed in response to increased fish stocks, longer seasons and more liberal rules, etc**.** Catch-and-release fishing is a factor too, as anglers do not necessarily have to keep fish as a requirement for taking more trips. Also, people fish for more reasons than just bringing home fish. Relaxation, socializing with family and friends, the challenge, etc., are all reasons why people fish (Knopf et al. 1973; Driver and Cooksey 1977; Fedler and Ditton 1994).

Due to the complex methods used to allocate annual harvests, it is not possible to fully estimate the additional pounds of fish that would be made available to recreational anglers if a reallocation occured. Instead, a proxy estimate is used. In 2003, commercial anglers landed 7.1 million pounds of striped bass, an amount equal to 30.9 percent of the recreational harvest. If recreational anglers were permitted to harvest these fish and managed to do so, the total recreational harvest could increase 30.9 percent as could the overall level of striper fishing and related economic activity, based on the trends seen in Table 15.[7] Several assumptions are incorporated here:

1. Increases in fish stocks do not necessarily result in linear increases in angling activity. However, with no information available regarding how anglers would respond to increases in fish available for harvest, the assumption that economic impacts will increase linearly with fish populations is made. This assumption is partially supported by Table 15 which shows angling activity increased in near-linear fashion as striped bass stocks grew in the 1980's and 1990's. To an unknown extent, it is reasonable to assume angler expenditures grew as well. The limitations are explained in more detail in step # 6 in section 4.1. It is not known how future changes in fish stocks would affect annual angling days and dollars spent by anglers. Using historical data about increases in fish stocks and fishing is regarded as the most reasonable approach.
2. There would be no marginal increases in fishing days or dollars required to harvest the additional pounds. For example, if it took one million angler-days of angling activity to harvest one million fish, it will require another one million angler-days to take the next one million fish. This assumption may minimize the estimated increase in angling days and dollars. With most activities, the cost to harvest or acquire each additional unit is greater than the previous unit, a theory known as "diminishing returns." More trips would likely be needed for the additional fish to be taken, including an increasing harvest in catch-and-release fishing.
3. Fishermen would increase fishing activity to a level where the additional fish will be taken. Recognizing the severe size and bag limits needed to maintain recreational harvests at current levels, an increase in the recreational allocation might be consumed if size, bag or season limits were adjusted accordingly by state fishery officials. This assumption recognizes the difficulty states might have addressing and developing size, bag and season limits that would allow anglers to harvest additional fish.

Table 17 presents the economic impacts that could result in New York with a 30.9 percent increase in recreational striper angling.

Please note that the impact of sport fishing economics results from anglers increasing their fishing participation rates, not by increasing the number of fish landed. Unlike commercial fisheries, the harvest or landing of fish is not a primary factor in generating additional economic impacts from recreational fishing. Increases in striper populations present greater catch-and-release opportunities as demonstrated in Table 15, and may be enough to stimulate greater fishing and economic impacts without a concurrent increase in recreational allocations. The calculations presented in this chapter are only intended to help demonstrate the greater economic returns from recreational harvests compared to commercial harvest of striped bass.

[7] Stripers Forever, Inc. emphasizes its goal is to create healthier fish stocks, and therefore better catch-and-release fishing and some limited harvests by reducing overall landings and mortality.

Table 17. Potential Recreational Impacts in New York, If Stripers Were Fully Allocated to the Recreational Sector

Current 2003 Scenario:	Commercial	Recreational	Total
Pounds Harvested	785,765	3,409,572	4,195,337
Retail Sales	$1,970,098	$209,246,206	$211,216,304
Total Multiplier Effect	$26,251,085	$364,518,115	$390,769,200
Jobs	568	2,753	3,321
If Stripers Fully Allocated to Recreation:			
Pounds Harvested	0	4,195,337	4,195,337
Retail Sales	$0	$273,903,284	$273,903,284
Total Multiplier Effect	$0	$477,154,213	$477,154,213
Jobs	0	3,604	3,604
Net Increase in Impacts:			
Pounds Harvested	-785,765	785,765	0
Retail Sales	-$1,970,098	$64,657,078	$62,686,980
Total Multiplier Effect	-$26,251,085	$112,636,098	$86,385,013
Jobs	-568	851	283

The two approaches, differing slightly in methods and results, produce the same basic result: if all striped bass harvests were made by recreational anglers only, the New York economy would have been approximately $198 million larger, and supported over 1,000 additional jobs. The goal of Stripers Forever is to eliminate all commercial fishing for wild striped bass and to set aside as much of the commercial quota as necessary to reduce overall mortality, increase the health of striped bass stocks, and improve recreational fishing. The arguments presented here state that the economic returns from striped bass stocks can be maximized through recreational angling, even when overall mortality is reduced.

Potential Striper Management Revenue:

To help offset revenues lost from diminished commercial licenses, and to boost striper management activities, a striper stamp could be required of anglers wanting to keep any striped bass. Considering the estimated number of striped bass anglers in New York, and setting several potential price points for a striped bass stamp, the potential revenues that could be earned for striper management are presented below. Please note this table assumes all striped bass anglers would purchase a stamp, and does not exclude seniors or youth who would be expected to be exempted from purchasing a striped bass stamp.

New York Striped Bass Anglers:	173,561
Potential Revenues from a New York Striper Stamp:	
@ $5 annually:	$867,805
@ $10 annually:	$1,735,610
@ $15 annually:	$2,603,415

5.0 Economic Value

Rather than rely solely on economic impacts, managers have to understand the value of a fishery to optimize allocation among competing interests. There are several reasons why economic impacts alone cannot be used to make the best choice when allocating scarce resources, including the degree to which anglers and fish consumers can substitute striped bass with other species and the net benefits received by each via substitute species. Realizing this, Kirkley et al. (2000) sought to understand the economic value associated with the Virginia striped bass fishery. The following discussion is a synopsis of this report and the shortcomings of exclusively relying on economic impacts when allocating resources.

The work of Edwards (1990) and Kirkley et al. (2000) outlines several shortcomings of economic impact analysis as the primary method for allocation decisions. One reason is that economic impact analysis does not assess changes in net economic value (the changes in the personal, or intrinsic, values held or received by individuals from a fishery). Also, relying on economic impacts alone does not provide sufficient information about producer surplus. Producer surplus is defined as the difference between what producers actually receive when selling a product and the amount they would be willing to accept for a unit of the goods for sale (Bade and Parkin 2003). For a seafood processor, producer surplus would be equal to the value of the price of a pound of fish minus the opportunity cost, or the productivity of the resources in their next most productive application. Consumer surplus is the value of a good or service beyond what the customer actually paid. In the case of recreational fishing, consumer surplus is a dollar measure of the benefit an angler receives from the enjoyment of going fishing. For example, an angler may pay $500 for a day of fishing, but would have been willing to pay $750 for the same trip. The consumer surplus for the trip would be $250.

Rather than simply presenting an economic impact analysis of different allocation scenarios, Kirkley et al. (2000) also use benefit-cost analysis or economic valuation to estimate net economic value of various allocation scenarios. The scenarios used in the analysis were the status quo (approximately 54 percent to the commercial sector, based on 1998 harvest), 0 percent to the commercial sector (i.e., 100 percent to the recreation sector), 25 percent, 50 percent, 75 percent, and 100 percent.

Estimates of consumer surplus for all commercial sectors (harvesting, processing, distributing, food service, and retail) were derived from survey data. Consumer surplus was estimated for the recreational sector via a demand model for angling trips based upon surveys of striped bass anglers. Producer surplus was estimated for the commercial sector using survey data; it was not included for the recreational sector due to lack of data availability. The analysis focused on the estimates that likely overstated the value of the commercial fishery and underestimated the value of the recreational fishery. This method provided the most defensible results.

When examining the economic impacts of the various management scenarios, the allocation of 100 percent to the recreational sector produced the greatest economic impacts. Under the status quo (i.e., their estimate of economic impacts under the current system), the commercial and recreational sectors produce approximately $166 million in total output, $95 million in income,

and 3,427 jobs. Even if the allocation were shifted entirely to the recreational sector, the total output grows to approximately $181 million, with $101 million in income generated, and 3,738 jobs. Under no other allocation scenario would the impacts be as great. When catch-and-release trips were excluded, the same pattern emerges. The 100 percent allocation to the recreational sector produces the greatest economic impact among all of the scenarios (Table 18).

The net economic value of the commercial and recreational striped bass fisheries are presented in Table 19. Again, the results show that a 100 percent allocation to the recreational sector would produce the greatest value to the people of Virginia. Under the current management scenario, Kirkley et al. (2000) report that the 3,436,615 lbs. of striped bass harvested in 1998 were valued at approximately $24 million (with catch-and-release trips included). If the entire catch was allocated to the recreational sector, the value would increase to $27 million.

Although both the analyses of the economic impacts and the net economic value indicated that a 100 percent allocation to the recreational sector would produce the greatest economic and societal benefit from the striped bass fishery, the authors outline several shortcomings of their work. First, they were not able to quantify the social impacts of a closure to the commercial striped bass fishery. These impacts have been examined in other areas (e.g., Florida) when certain commercial fisheries were closed (Thunberg et al. 1994; Smith 1995). While not readily quantifiable for inclusion into mathematical and statistical models, these impacts should not be overlooked in allocation decisions. Second, the authors did not examine the costs of purchasing tags from commercial fishers who hold them under the individual transferable tag program that Virginia had for regulating the commercial fishery. Also, the authors assumed that anglers would still fish for striped bass if the recreational striped bass fishery was closed to harvest (i.e., catch-and-release only) in the same proportion of trips on which all fish are released. While this may be a valid assumption, closures of harvest to recreational fisheries elsewhere have met with significant opposition by recreational anglers (Matlock et al. 1988; Ditton and Fedler 1989).

The authors also understood the importance of their estimates of commercial and recreational expense, and the associated models they produced to estimate economic impact and net economic value. Using Monte Carlo analysis, a widely accepted statistical technique to determine precision of model parameters (Metropolis and Ulam 1949; Mooney 1997), the authors concluded that there was a 0.03 percent chance that the commercial fishery would generate higher consumer surplus than the recreation fishery. For the commercial fishery to produce a greater economic impact and net economic value, the price of a pound of striped bass would have to exceed $29, a highly unlikely scenario given the availability of other wild fish and farmed fish. The authors also recognize that their results may have been based on anomalous data. Given the highly restrictive striped bass fishery in the late 1980's and early 1990's, the commercial demand for striped bass had declined and, as the authors state, it is difficult to restore lost markets for fishery products. In addition, the data for the recreational sector may be inflated due to "pent-up demand" for recreational striped bass fishing. In order to test the validity of the results, the authors subjected their estimates to an analysis of how "wrong" they

Table 18. Economic Impacts of 1998 Commercial and Recreational Striped Bass Fisheries and Alternative Resource Allocations in Virginia (Source: Kirkley et al. 2000)

Allocation		**Sales—Total Output 2000 Dollars**			**Total Income 2000 Dollars**			**Total Employment Full-time Equivalent**		
Commercial	Recreational	Commercial	Recreational	Total	Commercial	Recreational	Total	Commercial	Recreational	Total
Includes All Angler Trips: Harvest and Catch-and-Release Trips										
Status Quo	Status Quo	13,638,527	152,006,719	165,645,246	10,039,134	85,176,392	95,216,066	295	3,132	3,427
100%	0%	23,939,202	67,886,898	91,826,100	17,592,173	38,055,991	55,648,164	517	1,398	1,915
75%	25%	18,470,940	138,481,523	156,952,463	13,580,307	77,591,265	91,171,572	399	2,854	3,253
50%	50%	12,699,009	155,395,297	168,094,306	9,350,222	87,061,590	96,411,812	275	3,203	3,478
25%	75%	6,624,277	167,004,479	173,628,756	4,895,831	93,515,118	98,410,949	144	3,445	3,589
0%	100%	0	181,071,669	181,071,669	0	101,337,066	101,337,066	0	3,738	3,738
Excludes Catch-and-Release Trips: Harvest or Retention O nly										
Status Quo	Status Quo	13,638,527	84,119,821	97,758,348	10,039,134	47,120,941	57,160,075	295	1,734	2,029
100%	0%	23,939,202	0	23,939,202	17,592,173	0	17,592,173	517	0	517
75%	25%	18,470,940	70,594,625	89,065,565	13,580,307	39,535,274	53,115,581	399	1,456	1,855
50%	50%	12,699,009	87,508,399	100,207,408	9,350,222	49,005,599	58,355,821	275	1,805	2,080
25%	75%	6,624,277	99,117,581	105,741,858	4,895,831	55,459,127	60,354,958	144	2,047	2,191
0%	100%	0	113,184,770	113,184,770	0	63,281,075	63,281,075	0	2,340	2,340

Table 19. Net Economic Values of Commercial and Recreational Striped Bass Fisheries in Virginia, 1998 Reference Year[a] (Source: Kirkley et al. 2000)

Allocation				**Economic Value**			**Consumers' and Producers' Surplus**	
Commercial		Recreational		Commercial	Recreational[b]	Recreational[c]	Total[b]	Total[c]
Percent	Pounds	Percent	Pounds	Year 2000 Dollars			Year 2000 Dollars	
Status Quo	1,855,055	Status Quo	1,581,560	$2,533,988	$21,615,794	$12,085,143	$24,149,782	$14,619,131
100%	3,436,615	0%	0	5,626,841	9,530,651	0	15,157,492	5,626,841
75%	2,577,461	25%	859,154	3,847,994	19,824,693	10,294,041	23,672,687	14,142,035
50%	1,718,308	50%	1,718,308	2,318,496	22,316,503	12,785,852	24,634,999	15,104,348
25%	859,154	75%	2,577,461	1,041,691	24,711,242	15,180,591	25,752,933	16,222,282
0.0%	0	100%	3,436,615	0	27,619,605	18,088,954	27,619,605	18,088,954

[a] Net Economic value equals sum of consumer and producer surplus. Allocations are assessed relative to observed harvests in 1998. Economic values are presented in terms of 2000 dollars. The assessment is based on 49.4% consumption away from home, 50.6% consumption at home, and producer surplus for the commercial sector estimated from survey data. The economic values for the recreational sector do not include producer surplus for commercial/recreational activities.

[b] Consumer surplus with catch-and-release trips included.

[c] Consumer surplus with catch-and-release trips excluded.

would have to be to produce different results. Only when their estimates were off by 40 percent did their results change to show that a 100 percent allocation to the recreational sector was erroneous (i.e., they would have underestimated the economic value of the commercial sector by 40 percent and overestimated the value of the recreational fishery by 40 percent). Again, this is an unlikely scenario.

Although the aforementioned study concentrated on striped bass fishing in Virginia, some interesting comparisons can be made for New York and the entire Atlantic coast striped bass fishery. In 1998 (the year of the study), commercial fishers harvested 1,855,055 lbs. of striped bass in Virginia, which is about 28 percent of the entire commercial harvest for the Atlantic coast (6,713,764 lbs. of striped bass were harvested in the Atlantic in 1998). Likewise, recreational anglers caught 1,581,560 lbs. of striped bass in Virginia in 1998, which represents 12 percent of the entire catch of striped bass on the Atlantic coast (12,918,833 lbs). If we assume that the net economic values of the commercial and recreational fisheries in Virginia are representative of the total economic value of the fishery for the entire Atlantic coast, we can estimate the economic value of the fishery to the Atlantic coast. For example, since the pounds of fish harvested by commercial fishers represents 28 percent of the entire harvest for the Atlantic coast, the economic value of the Virginia commercial fishery ($2,533,988, Table 16) is 28 percent of a total economic value of $9,049,957 for the entire Atlantic coast (under the status quo). Under a 100 percent allocation scenario to the commercial fishery, the $5,626,841 in economic value would represent 28 percent of the $20,095,861 in total economic value to the Atlantic coast. Using the same reasoning for the recreational fishery produces $180,131,617 of total economic value under the status quo for the entire Atlantic coast, and $230,163,375 in economic value for a 100 percent allocation to the recreational sector.

Based on these rough estimates of the total economic value of the striped bass fishery to the Atlantic coast, it is apparent that the 100 percent allocation to the recreational fishery produces the greatest societal benefit among the management scenarios. However, without a detailed analysis of economic value, which was beyond the scope of this study, interpretation of results should be cautious. Nevertheless, based on these best available data, a 100 percent allocation to the recreational sector would produce nearly 11.5 times as much value compared to a complete allocation to the commercial sector, and about 1.3 times as much value compared to the status quo (or approximately $50 million). Anglers in New York place a high value on striped bass. With 24.8 percent of marine recreational fishing trips in New York targeting striped bass, compared to 20 percent in Virginia and 31 percent of all marine recreational fishing trips from Maine to North Carolina, it is certainly reasonable to expect that any economic valuation procedures applied in New York will show maximum value is derived from recreational fisheries.

6.0. Substitute Sources for Wild Striped Bass for the Commercial Market

Substitute sources for wild striped bass for public consumption already exist. In 2003, aquaculture nationally produced 11.447 million pounds of striped bass, which is 61.6 percent greater than the 7.085 million pounds of wild fish harvested along the Atlantic coast in the same year by the commercial sector (personal communications, Striped Bass Growers Association, 2004; Personal communication from the National Marine Fisheries Service, Fisheries Statistics and Economics Division). These fish currently enter the commercial market at the distribution level, in places like the Fulton Fish Market and other similar points. By using existing distribution and sales channels, striped bass raised through aquaculture provide product and income opportunity to many of the same businesses now handling wild striped bass.

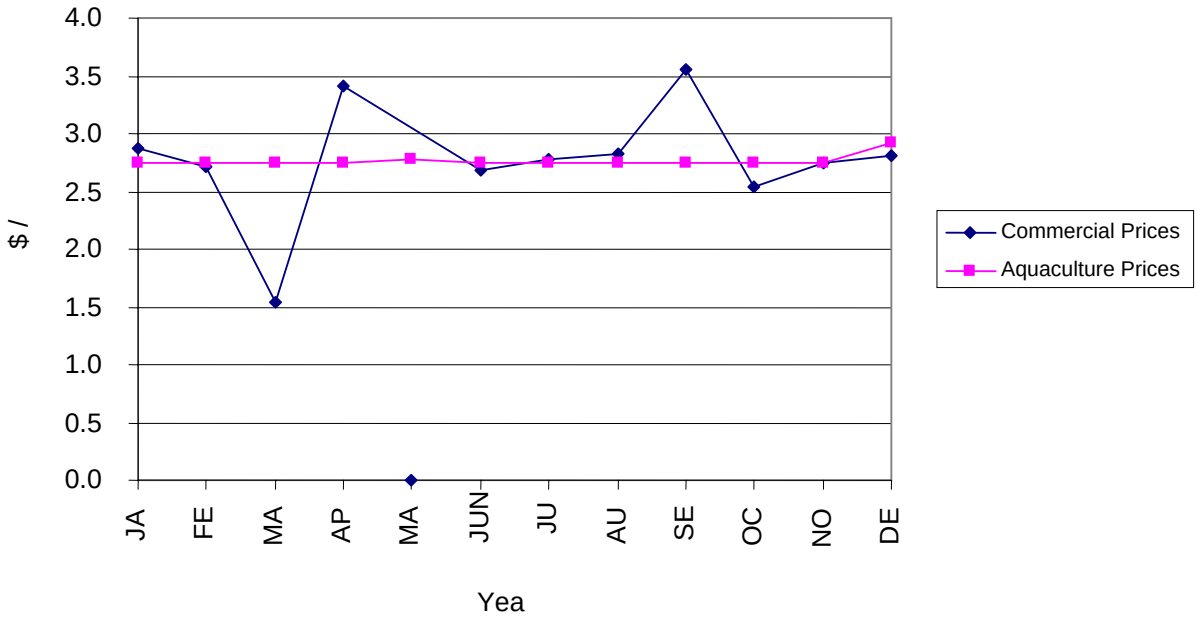
Farm production of striped bass (aquaculture) has been growing rapidly over the past decade. Table 20 shows the increase in production and capacity. Aquaculture operations are able to control when fish are harvested and enter the market, thus providing a reliable year-round source of fresh fish. Queried as part of this project, leading aquaculture producers reported the ability to continue increasing capacity further as demand increases (Personal communications, Striped Bass Growers Association, 2004). Currently, producers report their sales drop in the major months for wild fish harvests, but sales are strong for the remaining months.

Table 20. Yearly U.S. Production of Aquaculture Produced Striped Bass by Method of Production (lbs)

Year	Tanks	Ponds	Cages	Total	Increase Over 1987 Levels
1987	395,000	10,000	0	406,987	-
1988	800,000	80,000	0	881,988	116.7%
1989	870,000	150,000	0	1,021,989	151.1%
1990	1,220,000	370,000	0	1,591,990	291.2%
1991	1,520,000	730,000	0	2,251,991	453.3%
1992	1,520,000	730,000	0	2,251,992	453.3%
1993	2,600,000	950,000	0	3,551,993	772.8%
1994	4,350,000	1,525,000	75,000	5,951,994	1,362.5%
1995	5,175,000	2,325,000	125,000	7,626,995	1,774.0%
1996	3,870,000	3,730,000	250,000	7,851,996	1,829.3%
1997	4,722,000	3,615,000	100,000	8,438,997	1,973.5%
1998	4,260,000	5,075,000	50,000	9,386,998	2,206.5%
1999	4,378,000	5,317,750	38,000	9,735,749	2,292.2%
2000	4,364,000	6,822,000	51,000	11,239,000	2,661.5%
2001	4,383,000	6,500,000	20,000	10,905,001	2,579.4%
2002	4,479,000	5,988,000	22,500	10,491,502	2,477.8%
2003	4,848,000	6,509,000	90,000	11,447,003	2,713.1%

Prices for aquaculture and wild fish are comparable. Aquaculture fish enter the market at a major distribution level. As of 2003, prices for striped bass raised through aquaculture (reported as hybrid striped bass) have been stable at approximately $2.78 per pound at New York's Fulton Fish Market. Wild striped bass prices tend to experience greater price fluctuations during the year depending on the volume landed (Figure 1). It should be noted that for the month of May, the price of $0 indicates that no wild fish were available. The average price in 2003 for wild fish was $2.75 per pound, which reflects the amount received by commercial fishermen ($1.80 in 2003) plus the mark-up to the buyers who bring the fish to New York's Fulton Fish Market. When averaged by year, the prices for wild and farmed fish going into the next levels of the seafood industry are basically the same (Figure 2). Fish farmers offer advantages by providing restaurants and retailers with steady, reliable product. The end result for the consumer is a consistently priced and available product with consistent quality.

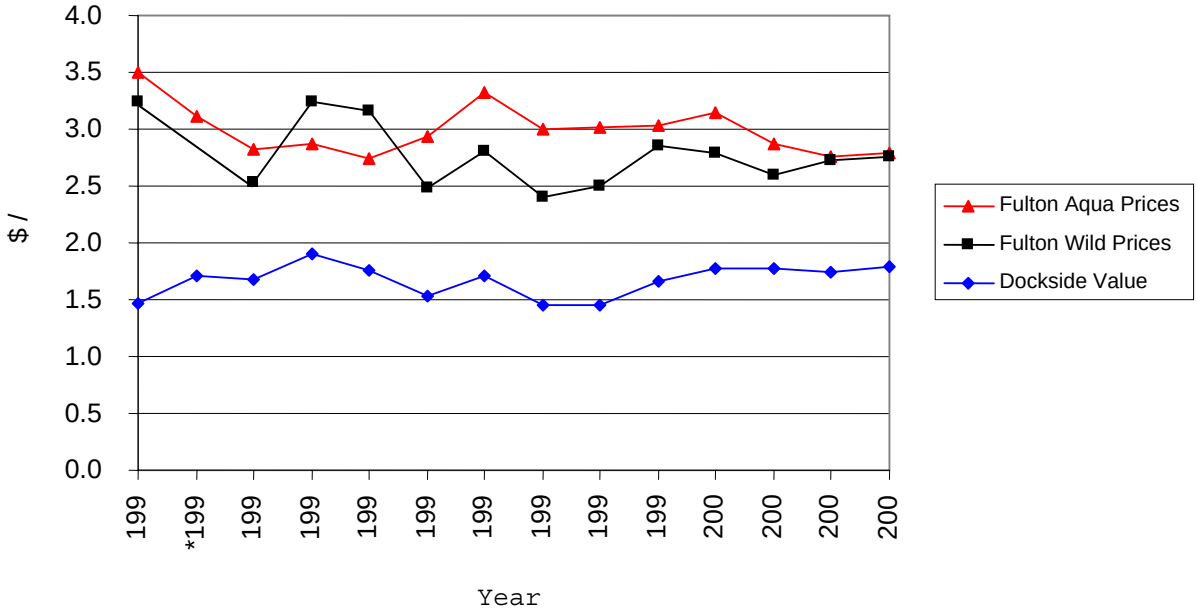
Figure 1. 2003 Prices for Commercially Caught Striped Bass and Striped Bass Produced By Aquaculture by Month[8,9]



Source: NOAA Fisheries; Fulton's Fish Market.

[8] The $0 value for May reports no striped bass sales were recorded at the Fulton Fish Market in May. Sales may have been transacted in other markets, and wild striper harvests or demand may slacken in May. Aquaculture data indicates relatively stable demand and availability for striped bass in May.
[9] Fish sold at Fulton and any major fish market come from many states. No attempt is made, or is possible, to separate Massachusetts fish from fish harvested elsewhere.

Figure 2. Average Price for Striped Bass Produced in the U.S. Through Aquaculture, Commercially Caught Striped Bass, and the Dockside Value of Commercially Caught Striped Bass by Year



* No data were available for commercially caught fish in 1991
Source: NOAA Fisheries; Fulton's Fish Market

Estimated Economic Impacts of Striped Bass Aquaculture

Per the Fulton Fish Market, in 2003, striped bass farms shipped $31.8 million in hybrid bass raised through aquaculture. Using economic multipliers produced by the U.S. Department of Commerce, Bureau of Economic Analysis[10], a better understanding is gained of the national economic impact created by U.S. striped bass farmers. Table 21 presents the impacts created from the production of whole, raw fish (no processing or distribution effects are added, except those conducted directly on fish farms):

Table 21: U.S Economic Impacts of Striped Bass Produced Through Aquaculture

2003 Industry Sales	Total Multiplier Effect (output)	Salaries and Wages	Jobs
$31,828,220	$121,049,086	$85,702,753	2,348

Once these fish enter the seafood processing and distribution chain, their impacts are expected to grow similarly to wild striped bass as the final product makes it way to restaurants or home consumers. Starting with the major fish auctions and distributors, many of the same

[10] Regional Input-Output Multipliers System (RIMS-II). Impacts reflect striped bass producers across the U.S., with impacts accruing to the U.S. as a whole.

businesses that currently handle (or could handle) farmed striped bass already work with wild striped bass. It is expected that any economic dislocation to these sectors will be minimal when substituting farm-raised fish for wild fish. Changes will occur in the production sector, with lost impacts from the wild harvest sector (i.e. commercial fishermen) offset by gains in the aquaculture sector. The estimated U.S.-wide losses and gains are presented in Table 22. Please note that given current data, it is not possible to separate the effects of substitutes for farmed fish in New York alone. A coast-wide analysis provides a better estimation, as the effects of trade policies in one state upon another need not be considered.

Table 22: Comparing the Economic Impacts of Obtaining Striped Bass for Human Consumption from Aquaculture VS. Wild Sources, U.S., 2003

	Dockside Value	Total Multiplier Effect	Salaries and Wages	Jobs
Aquaculture (farm activities only; does not include processing, wholesale, retail, restaurants, etc.)	$12,741,553	$48,458,674.37	$9,021,019.52	349
Commercial Fisheries (wild harvest only; does not include processing, wholesale, retail, restaurants, etc.)	$12,741,553	$34,288,983.96	$11,674,958.15	342
Difference:		*41.3%*	*-22.7%*	*1.9%*

The impacts in Table 22 are based on the economic multipliers of aquaculture as presented previously (Section 3.2 Commercial Harvests). The economic impact estimates for the commercial sector were derived from a 1997 Virginia Institute of Marine Science (VIMS) study (Kirkley 1997) that reported economic impacts for moderate to high-value finfish fisheries, including striped bass. Using the same methods employed in Section 3.2, the commercial fishery multipliers were adjusted to better reflect national impacts because the data from the VIMS study only reported impacts at the state level.

Recognizing the different sources of the multipliers from aquaculture and commercial fisheries used in Table 22 and the adjustments made to the commercial multipliers to equate them as best as possible to national level impacts, the economic estimates above cannot be considered scientific. Comparing the two directly is basically "apples and oranges." Instead, Table 22 approximates the economic impacts created by each source of raw product. The table is intended to express the point that a shift in striped bass production from wild harvests to aquaculture will result in minimal net economic losses for the U.S. economy. While local disruptions will occur, as they do whenever an industry experiences shifts in manufacturing sources, the overall effects on the U.S. economy are limited.

Capacity

U.S. striped bass production on farms already exceeds wild production, 11.447 million pounds in 2003 versus 7.085 million pounds. Annual production through aquaculture would need to

increase 38 percent to fully accommodate the additional 7.085 million pounds of wild striped bass harvested in 2003. In the past three years alone, annual production of striped bass by fish farms has grown 21.9 percent, and the growth over the past 10 years is 222 percent, indicating the ability to expand production certainly exists.

Bibliography

American Sportfishing Association. 2002. Sportfishing in America, Values of Our Traditional Pastime. Alexandria, VA.

Bade, Robin, and Michael Parkin. 2003. Principles of Microeconomics, 2nd Ed. Addison-Wesley, Boston, MA.

Bureau of Economic Analysis. 1992. Regional Multipliers: A User Handbook for the Regional Input-Output Modeling System (RIMS-II). U.S. Department of Commerce, U.S. Government Printing Office, Washington, D.C. 96pp.

Ditton, R. B., and A. J. Fedler. 1989. Importance of Fish Consumption to Sport Fishermen: A Reply to Matlock et al. (1988). Fisheries 14(4):4,6.

Driver, B. L., and R. W. Cooksey. 1977. Preferred Psychological Outcomes of Recreational Fishing. Pages 27-40. R. A. Barnhart and T. D. Roelofs, editors. Catch-and-Release Fishing as a Management Tool: A National Sport FishingSymposium. Humboldt State University, California Cooperative Fish Research Unit, Arcata, CA.

Edwards, S. F. 1990. An economics guide to allocation of fish stocks between commercial and recreational fisheries. National Marine Fisheries Service, National Oceanic and Atmospheric Administration, U.S. Department of Commerce.

Fedler, A. J., and R. B. Ditton. 1994. Understanding Angler Motivations in Fisheries Management. Fisheries 19(4):6-13.

Gentner, Brad, Michael Price and Scott Steinbeck. August, 2001 (revised November 2001). Marine Angler Expenditures in the Southeast Region, 1999. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. NOAA Technical Memorandum NMFS-F/SPO-47.

Kirkley, James. 1997. Virginia's Commercial Fishing Industry: Its Economic Performance and Contributions. Virginia Institute of Marine Science. Special Report #337.

Kirkley, James E., Kenneth E. McConnell, and Winnie Ryan. Economic Aspects of Allocating Striped Bass Among Competing User Groups in Virginia. Virginia Institute of Marine Science. Virginia Marine Resources Report No. 2000-05. April, 2000.

Knopf, R. C., B. L. Driver, and J. R. Bassett. 1973. Motivations for Fishing. Pages 191-204; J. B. Trefethen, editor. Proceedings of the 38th North American Wildlife and Natural Resources Conference. Wildlife Management Institute, Washington, D.C.

Matlock, G. C., G. E. Saul, and C. E. Bryan. 1988. Importance of Fish Consumption to Sport Fishermen. Fisheries 13(1):25-26.

Metropolis, Nicholas, and Stanislaw Ulam. 1949. The Monte Carlo Method. Journal of the American Statistical Association 44 (247): 335-341.

Mooney, Christopher Z. 1997. Monte Carlo simulation. Sage Publications, Thousand Oaks, CA.

NOAA Fisheries. Marine Recreational Fishery Statistics Survey, Personal communication from NOAA Fisheries, Fisheries Statistics and Economics Division. 2004.

Smith, S. 1995. Social Implications of Changes in Fisheries Regulation for Commercial Fishing Families. Fisheries 20(7):24-26.

Steinback, Scott R. March, 1999. Regional Economic Impact Assessments of Recreational Fisheries: An Application of the IMPLAN Modeling System to Marine Party and Charter Boat Fishing in Maine. North American Journal of Fisheries Management, 19:724-736.

Steinback, Scott and Brad Gentner. June, 2001. Marine Angler Expenditures in the Northeast Region, 1998. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. NOAA Technical Memorandum NMFS-F/SPO-47.

Stripers Forever. The Economics of Recreational and Commercial Striped Bass Fishing. Produced by Southwick Associates, Inc. Portland, Maine. 2005.

Thunberg, E. M., S. D. Smith, and M. Jepson. 1994. Social and Economic Issues in Marine Fisheries Allocations: A Florida perspective. Trends 31(1):31-36.

U.S. Department of Commerce, Bureau of Labor Statistics. Consumer Price Index web page (http://data.bls.gov/cgi-bin/cpicalc.pl). 2004.

U.S. Fish and Wildlife Service. 2001 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation. U.S. Department of the Interior, U.S. Government Printing Office, Washington, D.C. 2002.

Appendix I

Estimated Number of Striped Bass Anglers Per State

To assist in discussions about marine striped bass angling, estimates were developed regarding the number of striped bass anglers per state. The results are presented below. These numbers were estimated by assuming the percentage of marine fishing trips made for striped bass is approximate to the percentage of anglers who fished for striped bass. There are certainly errors in this assumption, but better data were not located. Only the overall number of anglers, regardless of species caught or pursued, is reported per state by NOAA Fisheries. By applying the percentage of trips targeting striped bass (as reported in Table 1) to the total number of anglers reported by NOAA Fisheries (personal communications, NOAA Fisheries Statistics and Economic Division), rough approximations are made. Recognizing many people will fish in more than one state each year, summing the number of anglers per state will likely overestimate the total number of striped bass anglers. The number of striped bass anglers for other states had to be estimated. The available source of necessary information was from the membership list of Stripers Forever. This list indicates that eight percent of its members reside in states not listed below. Eight percent is then used as a proxy estimate for striped bass anglers in other states. Note that the results below indicate New York has the highest number of striped bass anglers.

	% of Marine Fishing Trips Targeting Striped Bass (from Table 1)	Number of Marine Anglers	***Estimated*** Number of Striped Bass Anglers
Connecticut	44.90%	472,750	212,265
Delaware	21.30%	326,105	69,460
Maine	70.90%	358,103	253,895
Maryland	39.10%	997,421	389,992
Massachusetts	64.40%	852,004	548,691
New Hampshire	59.00%	182,419	107,627
New Jersey	25.50%	1,074,006	273,872
New York	24.80%	699,844	173,561
North Carolina	21.20%	2,102,925	445,820
Rhode Island	44.00%	400,374	176,164
Virginia	19.80%	724,398	143,431
Subtotal:			2,794,778
Other states		8%	223,582
TOTAL:			**3,018,361**

Appendix II: Commercial Fishery Multipliers

	Landings Value	Output/Total Economic Activity	Income	Jobs (FTE)
Reported by Kirkley et al (2000)	$2,558,869	$13,638,527	$10,039,134	295
Resulting Multiplier (Impact divided by Landings Value:)		**5.329904344**	**3.923270007**	**0.000115**
1. (see below) Adjustment to account for 60% of fish processed out of state (divided by .4):		***13.32476086***	***9.808175018***	***0.00028821***
2. (see below) Adjustment made to account for national level multipliers:		***19.6270877***	***14.79743918***	***0.00039426***

The multipliers used in this report were derived from Kirkley, et al (2000). The basis of the multipliers were the 1998 landings value for striped bass divided into the total output, income and jobs figures produced in this report. Several key adjustments were made to adapt the results to this study, and care was made to ensure all adaptations were done in the favor of commercial interests:

1. The multipliers provided in the report are based on the economic impacts created by commercial striped bass landed in Virginia. The report states that 60 percent of stripers caught by Virginia watermen are either sold or processed in other states. We do not know the percentage of the reported $2.6 million in landings sold in Virginia, then processed outside of the state. If these fish remained in Virginia, then the effect on the state economy would have been proportionally larger, and the multipliers would likewise have been higher. Recognizing the Virginia multipliers were to be used to estimate the typical economic impacts from commercial landings in the other Atlantic coast states, we have to make the assumption that all stripers are processed and distributed in the state where landed. This assumption will both overestimate and underestimate impacts in states that commonly export or import striped bass for processing and sale, but is necessary due to the lack of information on the export and import of striped bass products between states. To adjust the Virginia multipliers to account for this issue, the multipliers were divided by 40 percent, which then inflates the multipliers to account for all fish being processed in-state. Please note this should be considered the maximum increase possible. This error inflates the actual economic activity attributable to striped bass economics for Virginia, and has a varying effect on the other states. The economic impact in states that process and consume lower proportions of their striped bass landings will be overstated, while states that process a higher-than-average percentage will have their economic impacts understated.

2. The multipliers derived from Kirkley et al (2000) only reported the economic effects at the state level. However, some of the processing, distribution and final sale of striped bass occur outside of the state, and many of the in-state companies handling striped bass buy supplies and services from out-of-state businesses. These additional economic impacts are intentionally left out of any state-level economic study as they report economic activity in other states. To adapt the Virginia multipliers for use in estimating impacts at the U.S. level, they were inflated by percentages seen in other studies that examined impacts at the state and national levels. The U.S. level multipliers used to report overall economic activity (output) created by striper landings were increased 47 percent, the jobs multiplier upped 37 percent, and the income multiplier adjusted upward by 51 percent