



**The Economics of Recreational and
Commercial Striped Bass Fishing**

“The Southwick Study”

Prepared by Southwick Associates, Inc.

Fernandina Beach, Florida

For:

Stripers Forever

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Executive Summary

Economic Impacts:

This report assesses the economic contributions of commercial and recreational marine striped bass fishing in estuarine and marine waters from Maine to North Carolina, and fish produced through aquaculture as an alternative for wild fish.

The mission of Stripers Forever is as follows:

“Stripers Forever advocates 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, fish captured by the recreational sector are far more valuable on a per pound basis than when 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 3.2 times more fish, yet produce more than 26 times the economic activity as a result -- see 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.

| | Commercial | Recreational | Recreational Impacts Are: |
|---|---------------|-----------------|---------------------------|
| <u>Total:</u> | | | |
| Pounds Harvested | 7,085,427 | 22,952,673 | 3.2 times greater |
| Retail Sales (angler expenditures; seafood retail and restaurants) | \$43,115,704 | \$2,412,284,999 | 55.9 times greater |
| Total Multiplier Effect (output, or ripple effect) | \$250,079,578 | \$6,625,411,457 | 26.5 times greater |
| Jobs | 5,023 | 63,278 | 12.6 times greater |
| <u>Per Pound:</u> | | | |
| Retail Sales (angler expenditures; seafood retail and restaurants) | \$6.09 | \$105.10 | 17.3 times greater |
| Total Multiplier Effect (output, or ripple effect) | \$35.29 | \$288.66 | 8.2 times greater |
| Jobs | 0.0007 | 0.0028 | 3.9 times greater |

Coastal economies and the national 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 and Hypothetical Economic Impacts

| <u>Actual 2003 Harvest Levels:</u> | Commercial | Recreational | Total |
|---|---------------|-----------------|----------------------|
| Pounds Harvested | 7,085,427 | 22,952,675 | 30,038,102 |
| Retail Sales | \$43,115,704 | \$2,412,284,999 | 2,455,400,703 |
| Total Multiplier Effect | \$250,079,578 | \$6,625,411,457 | 6,875,491,035 |
| Jobs | 5,023 | 63,278 | 68,301 |
| <u>If Stripers Fully Allocated to Recreation:</u> | | | |
| Pounds Harvested | 0 | 30,038,166 | 30,038,166 |
| Retail Sales | \$0 | 3,150,000,000 | 3,150,000,000 |
| Total Multiplier Effect | \$0 | 8,660,000,000 | 8,660,000,000 |
| Jobs | 0 | 82,750 | 82,750 |
| <u>Net Increase in Impacts:</u> | | | |
| Pounds Harvested | -7,085,427 | 7,085,427 | 0 |
| Retail Sales | -43,115,704 | 742,000,000 | 698,880,000 |
| Total Multiplier Effect | -250,079,578 | 2,039,000,000 | 1,789,000,000 |
| Jobs | -5,023 | 19,450 | 14,400 |

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. This is a measure of satisfaction you receive 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.

By adapting information from existing sources (Kirkley et al. 2000), rough estimates of the total economic value of the striped bass fishery to the Atlantic coast were possible. 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, interpretation of results should be cautioned. Nevertheless, based

on these best available data, a hypothetical 100% 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).

Aquaculture as a Substitute:

In 2003, aquaculture produced 11.447 million pounds of striped bass, 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 aquaculture and wild striped bass were basically the same, averaging \$2.78 in 2003 for aquaculture 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 their extra desirability.

Once aquaculture fish 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 aquaculture striped bass or could do so in the future are likely handling wild striped bass. Therefore, any dislocation in the overall U.S. economy would be very minimal if wild fish are 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 the aquaculture sector. 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, 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 | \$48,458,674.3 7 | \$9,021,019.52 | 349 |
| Commercial Fisheries (wild harvest only, does not include processing, wholesale, retail, restaurants, etc.) | \$12,741,553 | \$34,288,983.9 6 | \$11,674,958.1 5 | 342 |
| Difference: | | 41.3% | -22.7% | 1.9% |

The impacts in Table E-3 must be considered estimates only based on the differing data sources used for the aquaculture and commercial fisheries analyses. 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 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 would be minimal.

Striped bass production on farms already exceeds wild production, 11.447 million pounds in 2003 versus 7.085 million pounds. Annual aquaculture production would need to increase an additional 38 percent to produce the equivalent of 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 is 222 percent, indicating that the ability to expand production is real.

1.0 Introduction

This report assesses the economic contributions of commercial and recreational marine striped bass fishing from Maine to South Carolina, and the potential of aquaculture as an alternate source for wild fish to be sold in the marketplace. The purpose is to help readers understand the relative difference in economic activity resulting from recreational and commercial striped bass fishing. This report is based on data 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 surpluses). 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 and financial values individuals receive from either catching fish recreationally and eating them 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 means all types of fishing, including catch-and-release fishing, that ultimately involve people pursuing fish as a recreational activity. This 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 guides and charter boats. **Commercial** fishing includes all types of harvests made 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 impact of the initial purchase made by the consumer. 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 various 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 about 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 per state by striper fishing, for fish landed, eaten or released, regardless of where. Therefore, resident & 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 consumer and producer surplus issues.

3.0 Economic Impacts

3.1 Recreational Harvests

The methods used here are separated into three stages:

- 1) Listing the number of recreational trips taken per state in 2003 that primarily targeted striped bass (the year 2003 is the latest for which data were available, and it presents the best current picture.
- 2) Estimating the expenditures made by striped bass anglers per trip and total per state.
- 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 target 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 expenditures. Recognizing this study measures the total impacts of trips targeting striper, 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).

South Carolina, Georgia and northern Florida have relatively low levels of striped bass angling activity compared to other Atlantic coast states. While stripers are sought in those three states, the data source used in this report - NOAA Fisheries' Marine Recreational Fisheries Statistics Survey - did not identify enough striped bass anglers to report any usable data (SC = 1 recorded observation, GA and FL = 0). Economic impacts from striper angling are expected for these states, but cannot be reported here.

Trip Data:

The number of all marine fishing trips per state and the number of trips targeting striped bass per state 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. It covers all Atlantic states and reports angler trips taken for specific species, the number of anglers, and total fish caught. The MRFSS provided trip data per state annually. SAS software was used to analyze the MRFSS data to calculate on a per state basis the total number of marine recreational fishing trips taken and the number of trips for striped bass. Table 1 presents estimates of trips taken.

Expenditures made to pursue striped bass *per state* were estimated based on the average expenditures made *regionally* for striped bass. This was a necessary step. 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. For example, in Maine, only eight charter boat customers who targeted striped bass were identified, and in New York, only 18 were identified as shore anglers ("shore" fishing includes beaches and other shorelines, docks, canals and seawalls, and similar access points). Typically, a reliable sample size will be approximately 40 to 50 individuals. Using small samples to develop expenditure

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

profiles could result in wide differences and odd variations between states. Recognizing that the types of expenditures made by striped bass 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.

Expenditures

Angler expenditures were obtained directly from the NOAA Fisheries' MRFSS. 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 dataset 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 Southeast profile representing striped bass anglers in North Carolina, and the Northeast profile representing all striped bass anglers from Virginia to Maine.

Both trip and equipment expenditures are included in the analysis. A state's 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, was multiplied by the total number of trips reported per state. The equipment expenditures in the regional profiles report 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. This 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.

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 for the Northeast expenditure data and 1999 for the Southeast region. According to the Department of Commerce (U.S. Department of Commerce, 2004), the inflation adjustment factors were 1.13 (+13%) for the Northeast and 1.1 (+10%) for the Southeast.

Table 2 presents the expenditure estimates; Appendix I presents the expenditures per state.

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 were derived from data taken for an American Sportfishing Association study finished in 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 sportfishing 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, i.e.: jobs or earnings estimates by total expenditures. The resulting ratios were then used as multipliers and are listed in Appendix III. The expenditures per state were multiplied by the respective multipliers to derive the final economic impact estimates.

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 experience minimal change 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 shift regularly. 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 is presented in Table 3. The effects from only travel-related expenses are presented in Table 4 and explain the importance of striped bass angling to coastal-related tourism. Detailed expenditures per state are presented in Appendix I. Appendix II presents rough estimates of the number of striped bass anglers per state.

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

| | Mode: ² | Estimated Total Fishing Trips | Trips Targeting Striped Bass | % of Trips Targeting Striped Bass |
|-----------------------------------|---------------------|-------------------------------|------------------------------|-----------------------------------|
| Connecticut | Shore | 624,972 | 229,715 | 36.8% |
| | Party/Charter Boat | 63,570 | 42,340 | 66.6% |
| | Private/Rental Boat | 875,228 | 429,956 | 49.1% |
| | Total | 1,563,770 | 702,011 | 44.9% |
| Delaware | Shore | 514,318 | 124,128 | 24.1% |
| | Party/Charter Boat | 37,685 | 4,523 | 12.0% |
| | Private/Rental Boat | 552,258 | 106,711 | 19.3% |
| | Total | 1,104,261 | 235,362 | 21.3% |
| Maine | Shore | 495,238 | 303,447 | 61.3% |
| | Party/Charter Boat | 14,246 | 4,577 | 32.1% |
| | Private/Rental Boat | 409,653 | 344,071 | 84.0% |
| | Total | 919,137 | 652,095 | 70.9% |
| Maryland | Shore | 1,109,866 | 202,258 | 18.2% |
| | Party/Charter Boat | 186,916 | 92,263 | 49.4% |
| | Private/Rental Boat | 2,033,190 | 1,008,585 | 49.6% |
| | Total | 3,329,972 | 1,303,106 | 39.1% |
| Massachusetts | Shore | 1,610,570 | 1,013,660 | 62.9% |
| | Party/Charter Boat | 145,303 | 38,069 | 26.2% |
| | Private/Rental Boat | 2,329,167 | 1,580,206 | 67.8% |
| | Total | 4,085,040 | 2,631,935 | 64.4% |
| New Hampshire | Shore | 150,284 | 102,811 | 68.4% |
| | Party/Charter Boat | 35,376 | 3,544 | 10.0% |
| | Private/Rental Boat | 230,103 | 139,058 | 60.4% |
| | Total | 415,763 | 245,413 | 59.0% |
| New Jersey | Shore | 2,711,223 | 735,493 | 27.1% |
| | Party/Charter Boat | 465,975 | 67,882 | 14.6% |
| | Private/Rental Boat | 3,602,089 | 926,046 | 25.7% |
| | Total | 6,779,287 | 1,729,421 | 25.5% |
| 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% |
| North Carolina³ | Shore | 2,102,022 | 759,655 | 36.1% |
| | Party/Charter Boat | 173,573 | 6,136 | 3.5% |
| | Private/Rental Boat | 2,180,687 | 180,026 | 8.3% |
| | Total | 4,456,282 | 945,817 | 21.2% |

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.

³ "Shore" fishing is derived from summing two participation categories unique to the North Carolina dataset, "beach" and "man-made." Differences regarding how North Carolina's data is reported may possibly result in inequalities when comparing "Shore" fishing estimates to other states' estimates.

Table 1: (Continued) Number of Trips Targeting Any Species and Trips Targeting Only Striped Bass, by Mode and State, 2003

| | Mode: | Estimated Total Fishing Trips | Trips Targeting Striped Bass | % of Trips Targeting Striped Bass |
|---------------------|---------------------|-------------------------------|------------------------------|-----------------------------------|
| Rhode Island | Shore | 952,329 | 422,273 | 44.3% |
| | Party/Charter Boat | 60,371 | 24,542 | 40.7% |
| | Private/Rental Boat | 581,909 | 255,443 | 43.9% |
| | Total | 1,594,609 | 702,258 | 44.0% |
| Virginia | Shore | 958,482 | 92,805 | 9.7% |
| | Party/Charter Boat | 86,243 | 10,721 | 12.4% |
| | Private/Rental Boat | 2,068,459 | 511,493 | 24.7% |
| | Total | 3,113,184 | 615,019 | 19.8% |
| Total | 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 | 31.0% |

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

Table 2: Average Costs Per Angler**Table 2a: Average Cost Per Angler/Trip^{4,5}**

| | | <u>New England</u> | <u>Mid-Atlantic</u> |
|--------------------------------|----------------|--------------------|---------------------|
| Private Transportation | Charter | \$6.68 | \$8.51 |
| | Private/Rental | \$5.45 | \$20.65 |
| | Shore | \$7.68 | \$16.45 |
| Food | Charter | \$22.21 | \$24.34 |
| | Private/Rental | \$15.02 | \$12.18 |
| | Shore | \$16.83 | \$14.57 |
| Lodging | Charter | \$15.00 | \$7.20 |
| | Private/Rental | \$2.45 | \$2.64 |
| | Shore | \$5.91 | \$1.49 |
| Public Transportation | Charter | \$3.90 | \$1.82 |
| | Private/Rental | \$1.86 | \$0.67 |
| | Shore | \$1.87 | \$0.43 |
| Boat Fuel | Private/Rental | \$12.07 | \$13.64 |
| Charter Fees | Charter | \$107.08 | \$56.48 |
| Access/Boat Launching | Charter | \$0.15 | \$0.06 |
| | Private/Rental | \$2.68 | \$1.59 |
| | Shore | \$0.30 | \$1.64 |
| Equipment Rental | Charter | \$2.22 | \$5.03 |
| | Private/Rental | \$0.08 | \$0.48 |
| | Shore | \$0.09 | \$0.34 |
| Bait | Charter | \$1.89 | \$1.41 |
| | Private/Rental | \$4.37 | \$6.83 |
| | Shore | \$5.78 | \$7.28 |
| Ice | Charter | \$2.65 | \$0.60 |
| | Private/Rental | \$0.99 | \$2.13 |
| | Shore | \$0.73 | \$2.21 |
| <i>Travel Costs Sub-Total:</i> | Charter | \$161.78 | \$105.46 |
| | Private/Rental | \$44.96 | \$60.81 |
| | Shore | \$39.20 | \$44.41 |

⁴ Charter fishing includes party boats or head boats and guides. Shore fishing includes beaches, bank fishing, docks, piers and other man-made structures.

⁵ 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 Bass⁶

| | | <u>Maine to Virginia</u> | <u>North Carolina</u> |
|-----------------------------|----------------|--------------------------|-----------------------|
| Rods and Reels | Charter | \$18.49 | \$46.73 |
| | Private/Rental | \$84.03 | \$61.02 |
| | Shore | \$74.99 | \$71.32 |
| Other Tackle | Charter | \$18.76 | \$19.34 |
| | Private/Rental | \$34.40 | \$26.34 |
| | Shore | \$29.20 | \$32.31 |
| Camping Equipment | Charter | \$27.97 | \$0.40 |
| | Private/Rental | \$2.95 | \$3.35 |
| | Shore | \$3.77 | \$3.15 |
| Binoculars | Charter | \$2.40 | \$0.29 |
| | Private/Rental | \$3.05 | \$4.34 |
| | Shore | \$0.83 | \$2.11 |
| Clothing | Charter | \$4.31 | \$5.41 |
| | Private/Rental | \$6.31 | \$9.28 |
| | Shore | \$2.32 | \$9.20 |
| Processing/Taxidermy | Charter | - | \$0.00 |
| | Private/Rental | - | \$0.38 |
| | Shore | \$0.00 | - |
| Magazines | Charter | \$3.23 | \$2.08 |
| | Private/Rental | \$2.97 | \$2.90 |
| | Shore | \$1.92 | \$0.89 |
| Club Dues | Charter | \$5.19 | \$1.23 |
| | Private/Rental | \$3.24 | \$3.34 |
| | Shore | \$8.29 | \$7.57 |
| Miscellaneous | Charter | \$0.00 | \$3.70 |
| | Private/Rental | \$1.90 | \$4.72 |
| | Shore | \$4.40 | \$2.97 |
| Boat Expenses | Charter | \$227.29 | \$162.41 |
| | Private/Rental | \$347.10 | \$320.96 |
| | Shore | \$113.29 | \$142.04 |
| Power Boat Purchases | Charter | \$15.51 | \$294.44 |
| | Private/Rental | \$1,818.68 | \$1,537.37 |
| | Shore | \$818.71 | \$139.18 |
| Non-Power Boat Purchases | Charter | \$47.71 | \$0.00 |
| | Private/Rental | \$4.94 | \$7.48 |
| | Shore | \$5.72 | \$3.56 |
| Electronics | Charter | \$13.72 | \$9.73 |
| | Private/Rental | \$37.40 | \$31.80 |
| | Shore | \$9.02 | \$5.72 |
| Fishing Vehicle | Charter | \$0.00 | \$1.03 |
| | Private/Rental | \$404.50 | \$644.57 |
| | Shore | \$211.43 | \$1,162.34 |
| Vacation Home | Charter | \$0.00 | \$19.15 |
| | Private/Rental | \$5.48 | \$0.13 |
| | Shore | \$2.50 | \$1.81 |
| <i>Equipment Sub-Total:</i> | Charter | \$384.57 | \$565.93 |
| | Private/Rental | \$2,756.96 | \$2,657.98 |
| | Shore | \$1,286.39 | \$1,584.17 |

⁶ The results for North Carolina are based on a smaller sample size than the Maine-to-Virginia results, potentially leading to large variations or error in the results when reported for detailed categories, such as "Rods and Reels" as compared to "Fishing Equipment." This is possibly seen in the "Rods and Reels" results for charterboat fishing. While the degree of such errors varies per item, the overall variation is expected to be smaller when the results are totaled.

Table 3: Estimated Economic Impacts from 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 |
|---------------------------|------------------------|---|---------------------------|---------------|-----------------------------------|---------------------------|-----------------------------|
| Connecticut | \$222,254,949 | \$377,285,116 | \$93,427,522 | 3,267 | \$15,495,026 | \$2,734,022 | \$16,462,878 |
| Delaware | \$59,980,944 | \$95,365,131 | \$19,242,800 | 888 | \$1,482,320 | \$700,564 | \$2,000,882 |
| Maine | \$88,635,066 | \$148,449,952 | \$34,702,186 | 1,681 | \$4,846,590 | \$1,899,218 | \$3,528,111 |
| Maryland | \$338,645,900 | \$646,137,975 | \$166,368,355 | 7,037 | \$18,878,689 | \$6,072,329 | \$25,872,140 |
| Massachusetts | \$649,742,549 | \$1,158,014,659 | \$294,680,317 | 10,986 | \$39,106,039 | \$13,795,261 | \$50,002,935 |
| New Hampshire | \$58,384,327 | \$102,010,873 | \$22,631,538 | 1,085 | \$1,271,041 | \$0 | \$3,158,300 |
| New Jersey | \$234,660,325 | \$440,185,826 | \$107,251,912 | 4,059 | \$14,030,034 | \$2,528,235 | \$18,028,546 |
| New York | \$209,246,206 | \$364,518,115 | \$81,088,629 | 2,753 | \$7,542,405 | \$2,510,282 | \$14,522,254 |
| North Carolina | \$333,159,934 | \$647,349,752 | \$159,467,883 | 7,342 | \$16,267,286 | \$7,308,291 | \$23,113,000 |
| Rhode Island | \$85,508,523 | \$134,087,156 | \$30,403,994 | 1,371 | \$8,768,296 | \$1,167,108 | \$4,488,875 |
| South Carolina | * | * | * | * | * | * | * |
| Virginia | \$131,422,467 | \$243,092,474 | \$54,987,504 | 2,264 | \$7,812,953 | \$2,406,857 | \$8,726,772 |
| United States | <u>\$2,412,284,999</u> | <u>\$6,625,411,457</u> | <u>\$1,734,556,255</u> | <u>63,278</u> | <u>\$105,130,245</u> | <u>\$18,213,520</u> | <u>\$289,422,017</u> |
| Per lb harvested: | \$105.10 | \$288.66 | \$75.57 | \$0.00 | \$4.58 | \$0.79 | \$12.61 |
| Per fish caught and kept: | \$963.45 | \$2,646.14 | \$692.77 | \$0.03 | \$41.99 | \$7.27 | \$115.59 |
| Per trip: | \$216.67 | \$595.10 | \$155.80 | \$0.01 | \$9.44 | \$1.64 | \$26.00 |

* = sample size too small to report results with a level of reliability

Table 4: Estimated Economic Impacts from Travel Expenditures Only

| | Retail Sales | Total Multiplier Effect (output) | Salaries and Wages | Jobs | Sales and Motor Fuel Taxes | State Income Taxes | Federal Income Taxes |
|---------------------------|----------------------|---|---------------------------|---------------|-----------------------------------|---------------------------|-----------------------------|
| Connecticut | \$39,759,222 | \$67,492,593 | \$16,713,264 | 584 | \$2,771,908 | \$489,090 | \$2,945,047 |
| Delaware | \$14,101,567 | \$22,420,417 | \$4,523,997 | 209 | \$348,495 | \$164,703 | \$470,409 |
| Maine | \$31,758,828 | \$53,191,099 | \$12,434,139 | 602 | \$1,736,581 | \$680,509 | \$1,264,157 |
| Maryland | \$90,455,607 | \$172,589,724 | \$44,438,602 | 1,880 | \$5,042,681 | \$1,621,978 | \$6,910,700 |
| Massachusetts | \$132,142,253 | \$235,512,768 | \$59,931,001 | 2,234 | \$7,953,243 | \$2,805,629 | \$10,169,413 |
| New Hampshire | \$12,266,820 | \$21,432,960 | \$4,754,992 | 228 | \$267,052 | \$0 | \$663,574 |
| New Jersey | \$108,638,287 | \$203,788,324 | \$49,653,320 | 1,879 | \$6,495,341 | \$1,170,471 | \$8,346,491 |
| New York | \$89,444,553 | \$155,817,209 | \$34,662,211 | 1,177 | \$3,224,082 | \$1,073,047 | \$6,207,695 |
| North Carolina | \$49,865,799 | \$96,892,241 | \$23,868,396 | 1,099 | \$2,434,810 | \$1,093,870 | \$3,459,444 |
| Rhode Island | \$36,169,861 | \$56,718,484 | \$12,860,803 | 580 | \$3,708,964 | \$493,683 | \$1,898,781 |
| South Carolina | * | * | * | * | * | * | * |
| Virginia | \$41,085,087 | \$75,995,191 | \$17,190,108 | 708 | \$2,442,473 | \$752,428 | \$2,728,150 |
| United States | <u>\$645,816,927</u> | <u>\$1,773,755,120</u> | <u>\$464,375,391</u> | <u>16,941</u> | <u>\$28,145,469</u> | <u>\$4,876,123</u> | <u>\$77,484,061</u> |
| Per lb harvested: | \$28.14 | \$77.28 | \$20.23 | \$0.00 | \$1.23 | \$0.21 | \$3.38 |
| Per fish caught and kept: | \$257.93 | \$708.42 | \$185.47 | \$0.01 | \$11.24 | \$1.95 | \$30.95 |
| Per trip: | \$58.01 | \$159.32 | \$41.71 | \$0.00 | \$2.53 | \$0.44 | \$6.96 |

3.2 Commercial Harvest

The methods used to generate the economic impact estimates of Atlantic commercial striped bass landings are separated into two basic stages:

- 1) Obtain NOAA Fisheries data regarding the value of fish landed in each state and for the coast as a whole, and
- 2) Combine 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 by state were obtained from NOAA Fisheries. Data were retrieved for pounds harvested and dollars earned by harvesters.

Commercial Harvest Multiplier Data

A search for multiplier data for Atlantic commercial finfish harvest produced only a few sources. 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 and more recent multipliers were available for other states that covered all major commercial fishery sectors (harvesting, processing, distribution and retail and restaurants/food service). Therefore, the Virginia multipliers were adapted for use in the other Atlantic coast states.

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 IV. Please note that all adjustments were made in a manner where any possible error was skewed towards maximizing estimates of commercial harvest data. The results reported herein are the maximum impact that could result from commercial striped bass harvests. The true economic impacts are expected to be lower.

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 for Atlantic coast striped bass commercial harvests, the total dock-side value of all 2003 landings per state were applied to the appropriate multipliers. Landings value per state and the resulting economic impact estimates are reported in Table 5.

Table 5: Estimated Economic Impacts of Commercial Striped Bass Landings, 2003¹

| State: | Landings | Consumer Level Retail Sales ³ | Total Multiplier Effect (Output) | Income (salaries, wages, business profits) | Jobs (Full-time equivalent) |
|-------------------|--------------|--|----------------------------------|--|-----------------------------|
| Connecticut | \$0 | \$0 | \$0 | \$0 | 0 |
| Delaware | \$478,607 | \$1,619,542 | \$6,377,324 | \$4,694,261 | 138 |
| Maine | \$0 | \$0 | \$0 | \$0 | 0 |
| Maryland | \$3,916,027 | \$13,251,309 | \$52,180,123 | \$38,409,078 | 1,129 |
| Massachusetts | \$1,819,354 | \$6,156,450 | \$24,242,457 | \$17,844,542 | 524 |
| New Hampshire | \$0 | \$0 | \$0 | \$0 | 0 |
| New Jersey | \$0 | \$0 | \$0 | \$0 | 0 |
| New York | \$1,970,098 | \$6,666,547 | \$26,251,085 | \$19,323,066 | 568 |
| North Carolina | \$717,980 | \$2,429,548 | \$9,566,912 | \$7,042,073 | 207 |
| Rhode Island | \$450,492 | \$1,524,404 | \$6,002,698 | \$4,418,504 | 130 |
| South Carolina | \$0 | \$0 | \$0 | \$0 | 0 |
| Virginia | \$3,388,995 | \$11,467,904 | \$45,157,548 | \$33,239,856 | 977 |
| U.S. ² | \$12,741,553 | \$43,115,704 | \$250,079,578 | \$188,542,356 | 5,023 |
| Per lb harvested: | \$1.80 | \$6.09 | \$35.29 | \$26.61 | 0.0007 |

¹ Blank cells ("\$ - ") are states that 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. See Appendix III.

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 mission of Stripers Forever is as follows: "Stripers Forever advocates 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 the importance of striped bass management to their livelihoods, the recreational dollars analyzed here are based on Table 3, 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 6. Please note that these numbers do not reflect the fish allocated by 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 generates greater impacts for the coastal economy, with 17 times more in retail sales value per pound landed, over eight times more economic activity across the U.S. economy, and nearly four times as many jobs.

Table 6. Recreational Landings Compared to Commercial Harvests, 2003:

| | Commercial | Recreational | Recreational Impacts Are: |
|---|---------------|-----------------|---------------------------|
| <u>Total:</u> | | | |
| Pounds Harvested | 7,085,427 | 22,952,673 | 3.2 times greater |
| Retail Sales | \$43,115,704 | \$2,412,284,999 | |
| (angler expenditures; seafood retail and restaurants) | | | |
| Total Multiplier Effect (or new economic activity) | \$250,079,578 | \$6,625,411,457 | 26.5 times greater |
| Jobs | 5,023 | 63,278 | 12.6 times greater |
| <u>Per Pound:</u> | | | |
| Retail Sales | \$6.09 | \$105.10 | 17.3 times greater |
| (angler expenditures; seafood retail and restaurants) | | | |
| Total Multiplier Effect (or new economic activity) | \$35.29 | \$288.66 | 8.2 times greater |
| Jobs | 0.0007 | 0.0028 | 3.9 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 methods, 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.

4.1 Approach #1:

Total allowable striped bass harvests, as set by the Atlantic States Marine Fisheries Commission (ASMFC) are based on overall mortality of fish stocks. If the 7.1 million fish currently harvested by commercial fishermen were reallocated to the recreational sector, state authorities would be able to adjust seasons and bag and size limits in a way that permits the harvest of the additional fish.⁷ Do not mistake this as recognition that anglers are or 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 the method about to be described is based on total fish harvested by anglers, it automatically includes catch-and-release angling. Catch and release angling which is increasingly popular among anglers, and to a degree even sustained the recreational fishery for striped bass during the harvest moratoriums during the late 1980's and early 1990's.

Without being able to accurately predict how each state would ultimately adjust their regulations, estimates are made here based on the regulations as they existed in 2003, the latest year with available data. 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 those caught in deeper waters and areas populated by large, fully mature fish.
- 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.) 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).
- 4) Therefore, the average weight of striped bass harvested per trip was 0.6419 pounds per trip (9.17 pounds per fish x .07 fish per trip = 0.6419 pounds per trip).

⁷ Stripers Forever, Inc. emphasizes it is not seeking to simply replace commercial harvest with recreational harvest. 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.

- 5) Hypothetically, if the commercial striped bass allocation was assigned to the recreational sector, their 7,085,427 pounds taken commercially in 2003 could be harvested by recreational anglers taking a maximum of 11,038,210 additional targeted and non-targeted trips ($7,085,427 \text{ lbs} / .6419 = 11,038,210$ fishing trips, assuming striped bass populations remain steady at 2003 levels. Increases in striped bass populations could result in more recreational fishing trips to harvest and/or to catch and release more fish. Further discussion of these scenarios appears in the next section.

This hypothetical scenario helps to highlight the greater economic returns of recreational striped bass fishing, but 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 changes from year to 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 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 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 for items like boats and tackle made for fishing at lower harvest levels would suffice for their additional fishing activities. By the same token, some anglers who may be compelled to spend more on equipment if the fishing improves. In addition, increased fishing activity can increase 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, we have made the assumption that economic impacts will increase linearly with fish populations. This assumption is partially supported by Table 12 which shows that 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 7 and 8 present the additional economic impacts reallocation could produce, and Tables 9 and 10 present the overall impacts that could result.

Table 7: Estimated Additional 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 |
|--------------------------------|----------------------|---|---------------------------|---------------|-----------------------------------|---------------------------|-----------------------------|
| Connecticut | \$68,232,269 | \$115,826,531 | \$28,682,249 | 1,003 | \$4,756,973 | \$839,345 | \$5,054,104 |
| Delaware | \$18,414,150 | \$29,277,095 | \$5,907,539 | 273 | \$455,072 | \$215,073 | \$614,271 |
| Maine | \$27,210,965 | \$45,574,135 | \$10,653,571 | 516 | \$1,487,903 | \$583,060 | \$1,083,130 |
| Maryland | \$103,964,291 | \$198,364,358 | \$51,075,085 | 2,160 | \$5,795,757 | \$1,864,205 | \$7,942,747 |
| Massachusetts | \$199,470,962 | \$355,510,500 | \$90,466,857 | 3,373 | \$12,005,554 | \$4,235,145 | \$15,350,901 |
| New Hampshire | \$17,923,988 | \$31,317,338 | \$6,947,882 | 333 | \$390,209 | \$0 | \$969,598 |
| New Jersey | \$72,040,720 | \$135,137,048 | \$32,926,337 | 1,246 | \$4,307,221 | \$776,168 | \$5,534,764 |
| New York | \$64,238,585 | \$111,907,061 | \$24,894,209 | 845 | \$2,315,518 | \$770,657 | \$4,458,332 |
| North Carolina | \$102,280,100 | \$198,736,374 | \$48,956,640 | 2,254 | \$4,994,057 | \$2,243,645 | \$7,095,691 |
| Rhode Island | \$26,251,116 | \$41,164,757 | \$9,334,026 | 421 | \$2,691,867 | \$358,302 | \$1,378,085 |
| South Carolina | \$197,650 | \$388,411 | \$97,112 | 4 | \$12,139 | \$3,773 | \$15,079 |
| Virginia | \$40,346,697 | \$74,629,389 | \$16,881,164 | 695 | \$2,398,576 | \$738,905 | \$2,679,119 |
| United States | <u>\$740,571,495</u> | <u>\$2,034,001,317</u> | <u>\$532,508,770</u> | <u>19,426</u> | <u>\$32,274,985</u> | <u>\$5,591,551</u> | <u>\$88,852,559</u> |
| Per lb harvested | \$32.27 | \$88.62 | \$23.20 | 0.00 | \$1.41 | \$0.24 | \$3.87 |
| Per fish caught & not released | \$295.78 | \$812.37 | \$212.68 | 0.01 | \$12.89 | \$2.23 | \$35.49 |
| Per trip | \$66.52 | \$182.70 | \$47.83 | 0.00 | \$2.90 | \$0.50 | \$7.98 |

Table 8: Estimated 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 |
|-----------------------|----------------------|---|---------------------------|--------------|-----------------------------------|---------------------------|-----------------------------|
| Connecticut | \$12,206,081 | \$20,720,226 | \$5,130,972 | 179 | \$850,976 | \$150,151 | \$904,129 |
| Delaware | \$4,329,181 | \$6,883,068 | \$1,388,867 | 64 | \$106,988 | \$50,564 | \$144,416 |
| Maine | \$9,749,960 | \$16,329,667 | \$3,817,281 | 185 | \$533,131 | \$208,916 | \$388,096 |
| Maryland | \$27,769,871 | \$52,985,045 | \$13,642,651 | 577 | \$1,548,103 | \$497,947 | \$2,121,585 |
| Massachusetts | \$40,567,672 | \$72,302,420 | \$18,398,817 | 686 | \$2,441,645 | \$861,328 | \$3,122,010 |
| New Hampshire | \$3,765,914 | \$6,579,919 | \$1,459,782 | 70 | \$81,985 | \$0 | \$203,717 |
| New Jersey | \$33,351,954 | \$62,563,015 | \$15,243,569 | 577 | \$1,994,070 | \$359,335 | \$2,562,373 |
| New York | \$27,459,478 | \$47,835,883 | \$10,641,299 | 361 | \$989,793 | \$329,426 | \$1,905,762 |
| North Carolina | \$15,308,800 | \$29,745,918 | \$7,327,598 | 337 | \$747,487 | \$335,818 | \$1,062,049 |
| Rhode Island | \$11,104,147 | \$17,412,575 | \$3,948,266 | 178 | \$1,138,652 | \$151,561 | \$582,926 |
| South Carolina | \$39,616 | \$77,852 | \$19,465 | 1 | \$2,433 | \$756 | \$3,022 |
| Virginia | \$12,613,122 | \$23,330,524 | \$5,277,363 | 217 | \$749,839 | \$230,995 | \$837,542 |
| United States | <u>\$198,265,797</u> | <u>\$544,542,822</u> | <u>\$142,563,245</u> | <u>5,201</u> | <u>\$8,640,659</u> | <u>\$1,496,970</u> | <u>\$23,787,607</u> |
| Per lb harvested | \$8.64 | \$23.72 | \$6.21 | 0.00 | \$0.38 | \$0.07 | \$1.04 |
| Per fish caught | \$79.19 | \$217.49 | \$56.94 | 0.00 | \$3.45 | \$0.60 | \$9.50 |
| Per trip | \$17.81 | \$48.91 | \$12.81 | 0.00 | \$0.78 | \$0.13 | \$2.14 |

Table 9: Estimated TOTAL 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 |
|--------------------------------|------------------------|---|---------------------------|---------------|-----------------------------------|---------------------------|-----------------------------|
| Connecticut | \$290,487,219 | \$493,111,647 | \$122,109,771 | 4,270 | \$20,251,999 | \$3,573,367 | \$21,516,982 |
| Delaware | \$78,395,094 | \$124,642,227 | \$25,150,339 | 1,160 | \$1,937,392 | \$915,637 | \$2,615,153 |
| Maine | \$115,846,031 | \$194,024,087 | \$45,355,757 | 2,198 | \$6,334,493 | \$2,482,279 | \$4,611,241 |
| Maryland | \$442,610,192 | \$844,502,333 | \$217,443,440 | 9,197 | \$24,674,446 | \$7,936,534 | \$33,814,887 |
| Massachusetts | \$849,213,511 | \$1,513,525,160 | \$385,147,174 | 14,358 | \$51,111,593 | \$18,030,406 | \$65,353,836 |
| New Hampshire | \$76,308,315 | \$133,328,211 | \$29,579,420 | 1,418 | \$1,661,250 | \$0 | \$4,127,899 |
| New Jersey | \$306,701,044 | \$575,322,874 | \$140,178,250 | 5,305 | \$18,337,255 | \$3,304,403 | \$23,563,309 |
| New York | \$273,484,791 | \$476,425,176 | \$105,982,839 | 3,598 | \$9,857,923 | \$3,280,939 | \$18,980,586 |
| North Carolina | \$435,440,034 | \$846,086,126 | \$208,424,523 | 9,596 | \$21,261,343 | \$9,551,937 | \$30,208,690 |
| Rhode Island | \$111,759,639 | \$175,251,913 | \$39,738,021 | 1,792 | \$11,460,162 | \$1,525,410 | \$5,866,960 |
| South Carolina | \$841,460 | \$1,653,595 | \$413,438 | 18 | \$51,681 | \$16,062 | \$64,197 |
| Virginia | \$171,769,164 | \$317,721,863 | \$71,868,668 | 2,959 | \$10,211,529 | \$3,145,761 | \$11,405,891 |
| United States | <u>\$3,152,856,494</u> | <u>\$8,659,412,775</u> | <u>\$2,267,065,025</u> | <u>82,705</u> | <u>\$137,405,231</u> | <u>\$23,805,071</u> | <u>\$378,274,577</u> |
| Per lb harvested | \$137.36 | \$377.27 | \$98.77 | 0.00 | \$5.99 | \$1.04 | \$16.48 |
| Per fish caught & not released | \$1,259.23 | \$3,458.51 | \$905.45 | 0.03 | \$54.88 | \$9.51 | \$151.08 |
| Per trip | \$283.19 | \$777.80 | \$203.63 | 0.01 | \$12.34 | \$2.14 | \$33.98 |

Table 10: Estimated TOTAL Additional 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 |
|-----------------------|----------------------|---|---------------------------|---------------|-----------------------------------|---------------------------|-----------------------------|
| Connecticut | \$51,965,304 | \$88,212,819 | \$21,844,236 | 764 | \$3,622,883 | \$639,240 | \$3,849,176 |
| Delaware | \$18,430,748 | \$29,303,485 | \$5,912,864 | 273 | \$455,482 | \$215,267 | \$614,825 |
| Maine | \$41,508,789 | \$69,520,766 | \$16,251,420 | 787 | \$2,269,712 | \$889,425 | \$1,652,254 |
| Maryland | \$118,225,478 | \$225,574,769 | \$58,081,253 | 2,457 | \$6,590,784 | \$2,119,925 | \$9,032,285 |
| Massachusetts | \$172,709,925 | \$307,815,188 | \$78,329,818 | 2,920 | \$10,394,888 | \$3,666,958 | \$13,291,423 |
| New Hampshire | \$16,032,733 | \$28,012,879 | \$6,214,774 | 298 | \$349,036 | \$0 | \$867,291 |
| New Jersey | \$141,990,241 | \$266,351,339 | \$64,896,889 | 2,456 | \$8,489,411 | \$1,529,805 | \$10,908,864 |
| New York | \$116,904,031 | \$203,653,092 | \$45,303,510 | 1,538 | \$4,213,876 | \$1,402,473 | \$8,113,457 |
| North Carolina | \$65,174,599 | \$126,638,159 | \$31,195,994 | 1,436 | \$3,182,297 | \$1,429,689 | \$4,521,494 |
| Rhode Island | \$47,274,008 | \$74,131,059 | \$16,809,069 | 758 | \$4,847,616 | \$645,244 | \$2,481,707 |
| South Carolina | \$168,659 | \$331,440 | \$82,868 | 4 | \$10,359 | \$3,219 | \$12,867 |
| Virginia | \$53,698,209 | \$99,325,715 | \$22,467,471 | 925 | \$3,192,312 | \$983,423 | \$3,565,692 |
| United States | <u>\$844,082,724</u> | <u>\$2,318,297,942</u> | <u>\$606,938,636</u> | <u>22,142</u> | <u>\$36,786,128</u> | <u>\$6,373,093</u> | <u>\$101,271,668</u> |
| Per lb harvested | \$36.77 | \$101.00 | \$26.44 | 0.00 | \$1.60 | \$0.28 | \$4.41 |
| Per fish caught | \$337.12 | \$925.91 | \$242.41 | 0.01 | \$14.69 | \$2.55 | \$40.45 |
| Per trip | \$75.82 | \$208.23 | \$54.52 | 0.00 | \$3.30 | \$0.57 | \$9.10 |

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 not brought home but unable to 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 7.1 million fish to the recreational sector are much greater than the impacts these fish currently generate via the commercial fishery. Total economic activity from the 7.1 million fish would be over seven times greater, and nearly three times more jobs would be supported. Table 11 presents a comparison of the two allocation alternatives.

Table 11. Estimated Recreational Impacts, If Stripers Were Fully Allocated to Recreational Harvest

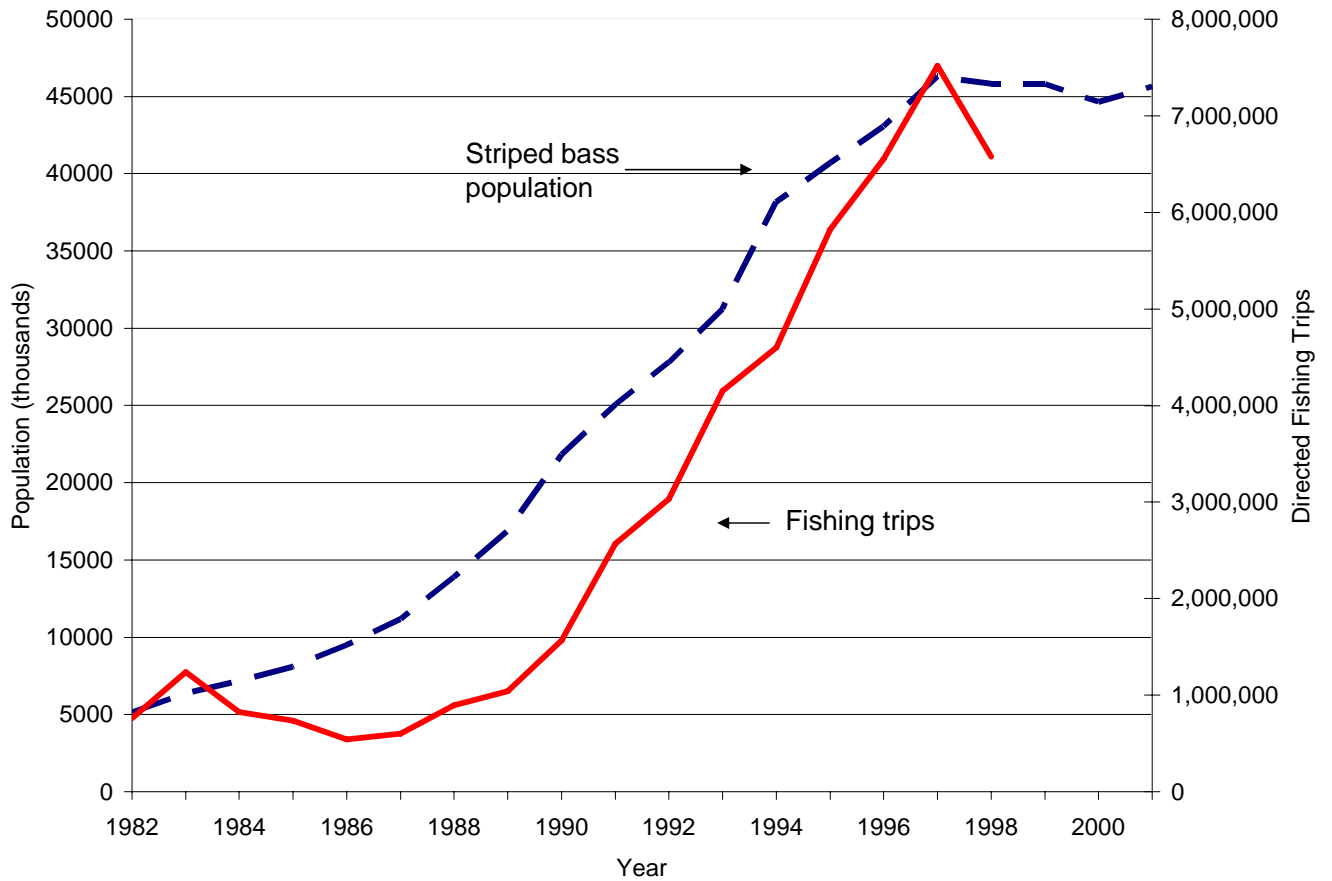
| <u>I. Current 2003 Scenario:</u> | Commercial | Recreational | Total |
|---|--------------|----------------|----------------|
| Pounds Harvested | 7,085,427 | 22,952,675 | 30,038,102 |
| Retail Sales | \$43,115,704 | \$2,412,284,99 | \$2,455,400,70 |
| Total Multiplier Effect | 8 | 9 | 3 |
| Jobs | 5,023 | \$6,625,411,45 | \$6,875,491,03 |
| | | 7 | 5 |
| | | 63,278 | 68,301 |
| <u>II. If Stripers Fully Allocated to Recreation:</u> | | | |
| Pounds Harvested | 0 | 30,038,102 | 30,038,102 |
| Retail Sales | \$0 | \$3,152,856,49 | \$3,152,856,49 |
| Total Multiplier Effect | \$0 | 4 | 4 |
| Jobs | 0 | \$8,659,412,77 | \$8,659,412,77 |
| | | 5 | 5 |
| | | 82,705 | 82,705 |
| <u>III. Net Increase in Impacts (I – II):</u> | | | |
| Pounds Harvested | -7,085,427 | 7,085,427 | 0 |
| Retail Sales | -43,115,704 | \$740,571,495 | \$697,455,791 |
| Total Multiplier Effect | -250,079,578 | \$2,034,001,31 | \$1,783,921,74 |
| Jobs | -5,023 | 8 | 0 |
| | | 19,427 | 14,404 |

4.2 Approach #2:

Evidence from this study indicates that an increase in the availability of striped bass may increase angling effort, even if harvests restrictions are tightened. Table 12 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 12, the increasing trend in targeted striped bass trips has continued through 2003, while the striper population held steady at 45 million, thus indicating a relative continuation of the long term trend seen since the mid-80's where 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 13, 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 all fisheries 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 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 12 and 13 indicate that angling trips can increase even when bag limits and harvest restrictions are tightened, when quality fishing opportunities exist.

Table 12. 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 13. 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 Maryland and Delaware from 1985-1990, 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 striped bas that would be made available to recreational anglers. Instead, a proxy estimate is used. In 2003, commercial anglers landed 7.1 million pounds, 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 12.⁸ 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, assumption that economic impacts will increase linearly with fish populations is made. This assumption is partially supported by Table 12 which shows that 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 paragraph 6 in the Method #1 discussion. It is unknown 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 to harvest one million fish, it will require another one million angler days to take the next one million fish. This

⁸ The goal of Stripers Forever, Inc. is to eliminate all market fishing for wild striped bas, thus reducing overall mortality, and manage the resource to improve recreational angling including catch and release fishing.

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 produce an increase in the harvest.

3. Anglers 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 are 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 14 presents the economic impacts that could result with a 30.9 percent increase in recreational striper angling.

Please note that the impact of sportfishing 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 12, 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.

Table 14. Potential Recreational Impacts If Stripers Were Fully Allocated to the Recreational Sector

| <u>Current 2003 Scenario:</u> | Commercial | Recreational | Total |
|---|----------------|-----------------|------------------------|
| Pounds Harvested | 7,085,427 | 22,952,675 | 30,038,102 |
| Retail Sales | \$43,115,704 | \$2,412,284,999 | 2,455,400,703 |
| Total Multiplier Effect | \$250,079,578 | \$6,625,411,457 | 6,875,491,035 |
| Jobs | 5,023 | 63,278 | 68,301 |
| <u>If Stripers Fully Allocated to Recreation:</u> | | | |
| Pounds Harvested | 0 | 30,038,166 | 30,038,166 |
| Retail Sales | \$0 | \$3,156,957,378 | 3,156,957,378 |
| Total Multiplier Effect | \$0 | \$8,670,675,974 | 8,670,675,974 |
| Jobs | 0 | 82,812 | 82,812 |
| <u>Net Increase in Impacts:</u> | | | |
| Pounds Harvested | -7,085,427 | 7,085,427 | 0 |
| Retail Sales | -\$43,115,704 | \$744,672,379 | \$701,556,675 |
| Total Multiplier Effect | -\$250,079,578 | \$2,045,264,517 | \$1,795,184,939 |
| Jobs | -5,023 | 19,534 | 14,511 |

The two alternatives, differing slightly in approach, produce results that differ by a very low amount. Both methods indicate that if all striped bass harvests were made by recreational anglers only, the U.S. economy would have been approximately \$1.78 billion larger, and supported over 14,400 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.

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 for 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.

Borrowing largely from the work of Edwards (1990), Kirkley et al. (2000) outline several shortcomings of economic impact analysis for allocation decisions. One reason is that economic impact analysis does not examine economic efficiency or assess changes in net economic value. In addition, 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. Net economic value would then equal producer surplus plus consumer surplus.

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 the 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), zero 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 trip 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. If the allocation was 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 15).

The net economic value of the commercial and recreational striped bass fisheries are presented in Table 16. 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 benefits 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 in which all of their fish are released. While this may be a valid assumption, closures of harvest to recreational fisheries elsewhere have met with significant opposition from 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 and aquaculture fish. The authors also recognize the data their results were based on may have been an anomaly. Given the highly restrictive striped bass fishery in the late 1980s and early 1990s, 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 would have to be to produce different results. Only when their estimates were off by 40 percent did the 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.

Table 15. 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 Only: | | | | | | | | | | |
| 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 16. 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 equal the sum of consumers' and producers' surpluses. Allocations are assessed relative to observed harvests in 1998. Economic values are presented in terms of 2000 dollars. Assessment is based on 49.4% consumption away from home, 50.6% consumption at home, and producers' surplus for the commercial sector estimated from survey data. The economic values for the recreational sector do not include producers' surpluses for commercial-recreational activities.

^b Consumers' surpluses with catch-and-release trips included.

^c Consumers' surpluses with catch-and-release trips excluded.

Although the aforementioned study concentrated on striped bass fishing in Virginia, some interesting comparisons can be estimated to include 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 \$20,095,861 of 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 cautioned. 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).

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 produced 11.447 million pounds of striped bass, which is 61.6 percent greater than the 7.085 million pounds of wild fish harvested 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, i.e.: the Fulton Fish Market and other similar points. By using existing distribution and sales channels, “hybrid” striped bass raised through aquaculture provide product and income opportunity to many of the same businesses now handling wild striped bass.

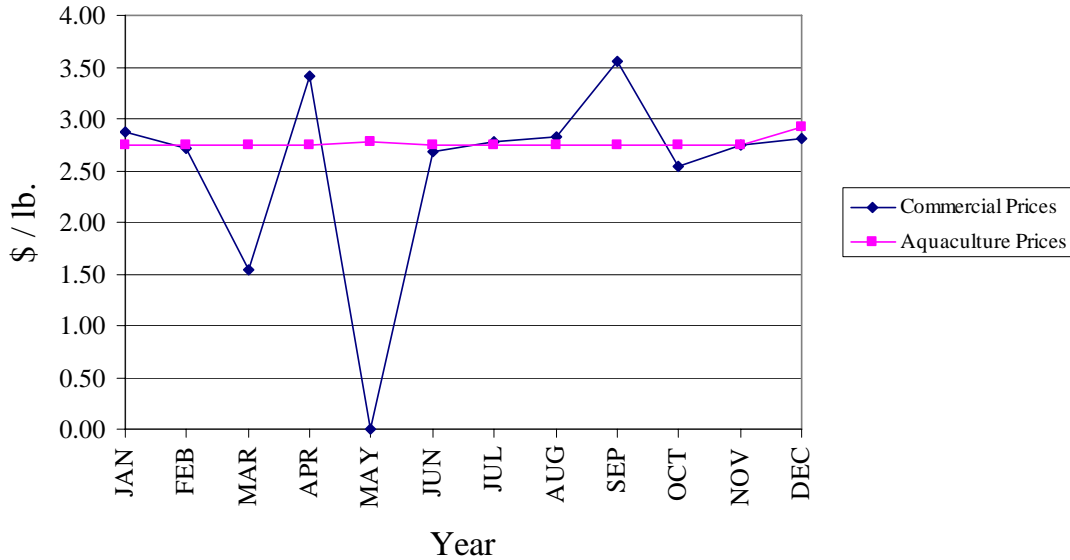
Farm production of striped bass (aquaculture) has been growing rapidly over the past decade. Table 17 shows the increase in production and capacity. Aquaculture operations are able to control when fish are harvested and enter the market, thus providing a reliable year-round source of fresh fish. Queried as part of this project, spokespersons for leading aquaculture operations reported the ability to continue increasing capacity further as demand increases (Personal communications, Striped Bass Growers Association, 2004). Currently, producers report that their sales drop in the major months for wild fish harvests, but sales are strong for the remaining months.

Table 17. Yearly 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 | 1362.5% |
| 1995 | 5,175,000 | 2,325,000 | 125,000 | 7,626,995 | 1774.0% |
| 1996 | 3,870,000 | 3,730,000 | 250,000 | 7,851,996 | 1829.3% |
| 1997 | 4,722,000 | 3,615,000 | 100,000 | 8,438,997 | 1973.5% |
| 1998 | 4,260,000 | 5,075,000 | 50,000 | 9,386,998 | 2206.5% |
| 1999 | 4,378,000 | 5,317,750 | 38,000 | 9,735,749 | 2292.2% |
| 2000 | 4,364,000 | 6,822,000 | 51,000 | 11,239,000 | 2661.5% |
| 2001 | 4,383,000 | 6,500,000 | 20,000 | 10,905,001 | 2579.4% |
| 2002 | 4,479,000 | 5,988,000 | 22,500 | 10,491,502 | 2477.8% |
| 2003 | 4,848,000 | 6,509,000 | 90,000 | 11,447,003 | 2713.1% |

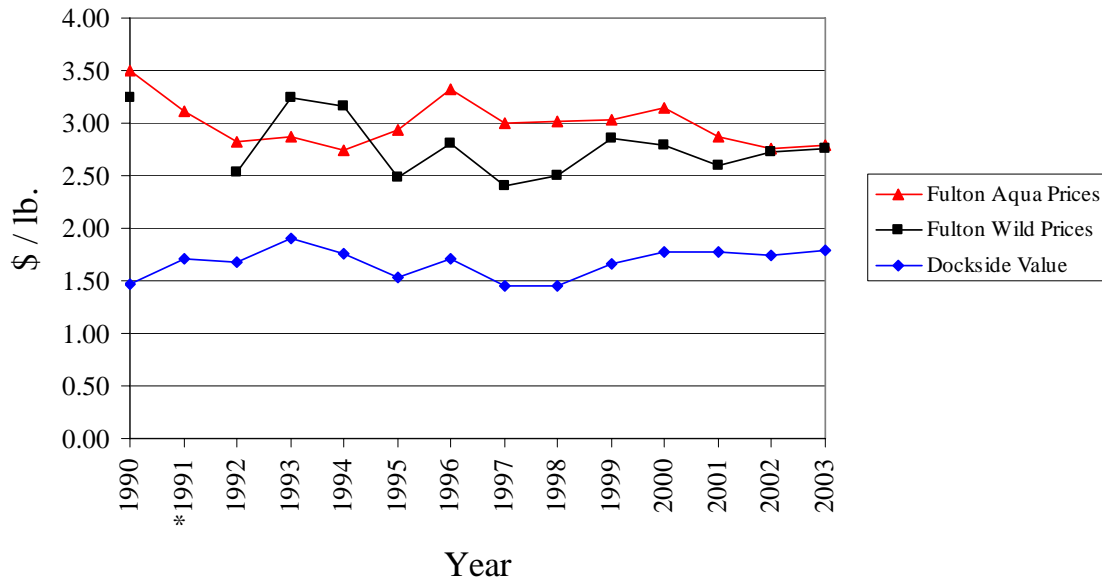
Prices for fish raised through aquaculture and wild fish are comparable. Farmed fish enter the market at a major distribution level. As of 2003, prices for farmed striped bass (reported as hybrid striped bass) have been stable at approximately \$2.78 per pound at New York’s Fulton Fish Market. Wild striped 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 raised through aquaculture offer advantages by providing restaurants and retailers with steady, reliable supplies. 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 Through Aquaculture by Month⁹



Source: NOAA Fisheries; Fulton’s Fish Market

Figure 2. Average Price for Aquaculture Produced Striped Bass, 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

⁹ The \$0 value for striped bass sales in May was recorded at the Fulton Fish Market. Sales may have been transacted in other markets, and wild striper harvests or demand may slacken in May. Aquaculture data indicate relatively stable demand and availability for striped bass in May.

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 Analysis¹⁰, a better understanding is gained of the national economic impact created by U.S. striped bass farmers. Table 18 presents the impacts created from the production of whole, raw fish (no processing or distribution effects are added, except those conducted directly on the fish farm):

Table 18: Economic Impacts of Striped Bass Aquaculture Production

| 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 its way to restaurant or home consumers. Starting with the major fish auctions and distributors, many of the same 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 by 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 19.

Table 19: Comparing the Economics of Obtaining Striped Bass for Human Consumption from Aquaculture Sources Versus Wild Sources, 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 | \$48,458,674.3 7 | \$9,021,019.52 | 349 |
| Commercial Fisheries (wild harvest only, does not include processing, wholesale, retail, restaurants, etc.) | \$12,741,553 | \$34,288,983.9 6 | \$11,674,958.1 5 | 342 |
| Difference: | | 41.3% | -22.7% | 1.9% |

The impacts in Table 19 are based on the economic multipliers for aquaculture 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,

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.

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 aquaculture and commercial fishery multipliers used in Table 19 and the adjustments made to the commercial multipliers to equate them in the best possible way to national level impacts, the economic estimates above cannot be considered scientific. Comparing the two directly is basically an “apples and oranges” comparison. Instead, Table 19 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

Striped bass production on farms already exceeds wild production, 11.447 million pounds versus 7.085 million pounds in 2003. Annual aquaculture production 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 increased 21.9 percent, and over the past 10 years it has grown by 222 percent, indicating that 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 in R. A. Barnhart and T. D. Roelofs, editors. Catch and release fishing as a management tool: A national sport fishing symposium. 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.

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

This appendix presents the total expenditure per category for marine striped bass fishing trips, per state and by mode.

Connecticut

| <u>Trip Expenditures:</u> | <u>MODE:</u> | <u>Per Mode</u> <u>(x \$1000)</u> | <u>\$ Per Item:</u> <u>(x \$1000)</u> |
|----------------------------------|----------------|--------------------------------------|--|
| Private Transportation | Charter | \$282,835 | 4,389,791 |
| | Private/Rental | \$2,342,400 | |
| | Shore | \$1,764,556 | |
| Food | Charter | \$940,553 | 11,263,912 |
| | Private/Rental | \$6,456,520 | |
| | Shore | \$3,866,839 | |
| Lodging | Charter | \$635,100 | 3,046,636 |
| | Private/Rental | \$1,053,736 | |
| | Shore | \$1,357,799 | |
| Public Transportation | Charter | \$165,002 | 1,393,716 |
| | Private/Rental | \$798,863 | |
| | Shore | \$429,852 | |
| Boat Fuel | Private/Rental | \$5,188,494 | 5,188,494 |
| Charter Fees | Charter | \$4,533,598 | 4,533,598 |
| Access/Boat Launching | Charter | \$6,227 | 1,227,892 |
| | Private/Rental | \$1,152,011 | |
| | Shore | \$69,654 | |
| Equipment Rental | Charter | \$94,020 | 151,356 |
| | Private/Rental | \$35,562 | |
| | Shore | \$21,775 | |
| Bait | Charter | \$80,044 | 3,284,697 |
| | Private/Rental | \$1,877,360 | |
| | Shore | \$1,327,293 | |
| Ice | Charter | \$112,284 | 705,060 |
| | Private/Rental | \$425,188 | |
| | Shore | \$167,589 | |
| <i>Trip Sub-Total:</i> | Charter | 6,849,662 | |
| | Private/Rental | 19,330,134 | |
| | Shore | 9,005,356 | |
| | Total: | 35,185,152 | 35,185,152 |
| x CPI Adjustment to 2003: | 1.13 | 39,759,222 | |

| | Resident | Non-resident | Total: |
|---|------------------|----------------|-------------------------|
| Rods and Reels | \$36,709,000.00 | \$5,287,000.00 | \$41,996,000.00 |
| Other Tackle | \$15,676,000.00 | \$1,957,000.00 | \$17,633,000.00 |
| Camping Equipment | \$6,205,000.00 | | \$6,205,000.00 |
| Binoculars | \$2,100,000.00 | | \$2,100,000.00 |
| Clothing | \$4,526,000.00 | | \$4,526,000.00 |
| Processing/Taxidermy | \$54,000.00 | | \$54,000.00 |
| Magazines | \$2,645,000.00 | | \$2,645,000.00 |
| Club Dues | \$3,763,000.00 | | \$3,763,000.00 |
| Miscellaneous | \$1,763,000.00 | | \$1,763,000.00 |
| Boat Expenses | \$6,605,000.00 | | \$6,605,000.00 |
| Power Boat Purchases | \$255,966,000.00 | | \$255,966,000.00 |
| Non-Power Boat Purchases | \$1,058,000.00 | | \$1,058,000.00 |
| Electronics | \$3,127,000.00 | | \$3,127,000.00 |
| Licenses | n/a | | n/a |
| Fishing Vehicle | \$11,895,000.00 | | \$11,895,000.00 |
| Vacation Home | \$416,000.00 | | \$416,000.00 |
| Equipment Total, ALL FISHING: | | | \$359,752,000.00 |
| Durable \$\$ assigned to striped bass: | | | \$161,500,643.49 |
| TOTAL STRIPED BASS EXPENDITURES, 1998 | | | \$196,685,796 |
| x CPI Adjustment to 2003: | 1.13 | | |
| TOTAL 2003 EST. STRIPED BASS \$: | | | \$222,254,949 |

Delaware

| <u>Trip Expenditures:</u> | <u>MODE:</u> | <u>Per Mode</u> | <u>\$ Per Item:</u> |
|----------------------------------|----------------|-------------------|---------------------|
| | | <u>(x \$1000)</u> | <u>(x \$1000)</u> |
| Private Transportation | Charter | \$38,482 | 4,283,394 |
| | Private/Rental | \$2,203,379 | |
| | Shore | \$2,041,533 | |
| Food | Charter | \$110,112 | 3,218,776 |
| | Private/Rental | \$1,299,921 | |
| | Shore | \$1,808,744 | |
| Lodging | Charter | \$32,586 | 499,109 |
| | Private/Rental | \$281,461 | |
| | Shore | \$185,062 | |
| Public Transportation | Charter | \$8,224 | 133,991 |
| | Private/Rental | \$71,922 | |
| | Shore | \$53,845 | |
| Boat Fuel | Private/Rental | \$1,455,762 | 1,455,762 |
| Charter Fees | Charter | \$255,473 | 255,473 |
| Access/Boat Launching | Charter | \$251 | 373,953 |
| | Private/Rental | \$169,939 | |
| | Shore | \$203,762 | |
| Equipment Rental | Charter | \$22,766 | 116,685 |
| | Private/Rental | \$51,409 | |
| | Shore | \$42,510 | |
| Bait | Charter | \$6,382 | 1,638,108 |
| | Private/Rental | \$728,335 | |
| | Shore | \$903,391 | |
| Ice | Charter | \$2,714 | 504,010 |
| | Private/Rental | \$227,465 | |
| | Shore | \$273,831 | |
| <i>Trip Sub-Total:</i> | Charter | 476,989 | |
| | Private/Rental | 6,489,594 | |
| | Shore | 5,512,680 | |
| | <i>Total:</i> | <u>12,479,263</u> | 12,479,263 |
| x CPI Adjustment to 2003: | 1.13 | 14,101,567 | |

| | Resident | Non-resident | <i>Total:</i> |
|---|------------------|----------------|-------------------------|
| Rods and Reels | \$11,068,000.00 | \$6,535,000.00 | \$17,603,000.00 |
| Other Tackle | \$4,448,000.00 | \$3,008,000.00 | \$7,456,000.00 |
| Camping Equipment | \$191,000.00 | | \$191,000.00 |
| Binoculars | \$177,000.00 | | \$177,000.00 |
| Clothing | \$747,000.00 | | \$747,000.00 |
| Processing/Taxidermy | \$154,000.00 | | \$154,000.00 |
| Magazines | \$561,000.00 | | \$561,000.00 |
| Club Dues | \$479,000.00 | | \$479,000.00 |
| Miscellaneous | \$1,006,000.00 | | \$1,006,000.00 |
| Boat Expenses | \$2,928,000.00 | | \$2,928,000.00 |
| Power Boat Purchases | \$107,431,000.00 | | \$107,431,000.00 |
| Non-Power Boat Purchases | \$57,000.00 | | \$57,000.00 |
| Electronics | \$2,015,000.00 | | \$2,015,000.00 |
| Licenses | n/a | | n/a |
| Fishing Vehicle | \$49,038,000.00 | | \$49,038,000.00 |
| Vacation Home | \$648,000.00 | | \$648,000.00 |
| <i>Equipment Total, ALL FISHING:</i> | | | <u>\$190,491,000.00</u> |
| Durable \$\$ assigned to striped bass: | | | \$40,601,219.04 |
| TOTAL STRIPED BASS EXPENDITURES, 1998 | | | \$53,080,482 |
| x CPI Adjustment to 2003: | 1.13 | | |
| TOTAL 2003 EST. STRIPED BASS \$: | | | \$59,980,944 |

Maine

| <u>Trip Expenditures:</u> | MODE: | <u>Per Mode</u> (x \$1000) | <u>\$ Per Item:</u> (x \$1000) |
|----------------------------------|----------------|-------------------------------|-----------------------------------|
| Private Transportation | Charter | \$30,575 | 4,236,002 |
| | Private/Rental | \$1,874,499 | |
| | Shore | \$2,330,928 | |
| Food | Charter | \$101,675 | 10,376,470 |
| | Private/Rental | \$5,166,811 | |
| | Shore | \$5,107,984 | |
| Lodging | Charter | \$68,655 | 2,705,519 |
| | Private/Rental | \$843,249 | |
| | Shore | \$1,793,615 | |
| Public Transportation | Charter | \$17,837 | 1,224,946 |
| | Private/Rental | \$639,287 | |
| | Shore | \$567,822 | |
| Boat Fuel | Private/Rental | \$4,152,077 | 4,152,077 |
| Charter Fees | Charter | \$490,087 | 490,087 |
| Access/Boat Launching | Charter | \$673 | 1,014,578 |
| | Private/Rental | \$921,894 | |
| | Shore | \$92,011 | |
| Equipment Rental | Charter | \$10,164 | 67,385 |
| | Private/Rental | \$28,458 | |
| | Shore | \$28,764 | |
| Bait | Charter | \$8,653 | 3,264,321 |
| | Private/Rental | \$1,502,352 | |
| | Shore | \$1,753,317 | |
| Ice | Charter | \$12,138 | 573,773 |
| | Private/Rental | \$340,255 | |
| | Shore | \$221,380 | |
| Trip Sub-Total: | Charter | 740,456 | |
| | Private/Rental | 15,468,882 | |
| | Shore | 11,895,820 | |
| | <i>Total:</i> | <u>28,105,158</u> | 28,105,158 |
| x CPI Adjustment to 2003: | 1.13 | 31,758,828 | |

| | Resident | Non-resident | Total: |
|---|-----------------|----------------|------------------------|
| Rods and Reels | \$11,539,000.00 | \$2,759,000.00 | \$14,298,000.00 |
| Other Tackle | \$5,723,000.00 | \$1,819,000.00 | \$7,542,000.00 |
| Camping Equipment | \$601,000.00 | | \$601,000.00 |
| Binoculars | \$40,000.00 | | \$40,000.00 |
| Clothing | \$789,000.00 | | \$789,000.00 |
| Processing/Taxidermy | \$9,000.00 | | \$9,000.00 |
| Magazines | \$336,000.00 | | \$336,000.00 |
| Club Dues | \$235,000.00 | | \$235,000.00 |
| Miscellaneous | \$658,000.00 | | \$658,000.00 |
| Boat Expenses | \$2,471,000.00 | | \$2,471,000.00 |
| Power Boat Purchases | \$38,446,000.00 | | \$38,446,000.00 |
| Non-Power Boat Purchases | \$140,000.00 | | \$140,000.00 |
| Electronics | \$1,637,000.00 | | \$1,637,000.00 |
| Licenses | n/a | | n/a |
| Fishing Vehicle | \$3,743,000.00 | | \$3,743,000.00 |
| Vacation Home | \$0.00 | | \$0.00 |
| <i>Equipment Total, ALL FISHING:</i> | | | <u>\$70,945,000.00</u> |
| Durable \$\$ assigned to striped bass: | | | \$50,332,953.38 |
| TOTAL STRIPED BASS EXPENDITURES, 1998 | | | \$78,438,111 |
| x CPI Adjustment to 2003: | 1.13 | | |
| TOTAL 2003 EST. STRIPED BASS \$\$: | | | \$88,635,066 |

Maryland

| <u>Trip Expenditures:</u> | MODE: | <u>Per Mode</u> (x \$1000) | <u>\$ Per Item:</u> (x \$1000) |
|----------------------------------|----------------|-------------------------------|-----------------------------------|
| Private Transportation | Charter | \$784,974 | 24,936,875 |
| | Private/Rental | \$20,825,364 | |
| | Shore | \$3,326,537 | |
| Food | Charter | \$2,246,124 | 17,479,627 |
| | Private/Rental | \$12,286,280 | |
| | Shore | \$2,947,223 | |
| Lodging | Charter | \$664,709 | 3,626,499 |
| | Private/Rental | \$2,660,244 | |
| | Shore | \$301,546 | |
| Public Transportation | Charter | \$167,751 | 935,264 |
| | Private/Rental | \$679,776 | |
| | Shore | \$87,737 | |
| Boat Fuel | Private/Rental | \$13,759,217 | 13,759,217 |
| Charter Fees | Charter | \$5,211,291 | 5,211,291 |
| Access/Boat Launching | Charter | \$5,126 | 1,943,335 |
| | Private/Rental | \$1,606,192 | |
| | Shore | \$332,017 | |
| Equipment Rental | Charter | \$464,390 | 1,019,553 |
| | Private/Rental | \$485,896 | |
| | Shore | \$69,267 | |
| Bait | Charter | \$130,192 | 8,486,101 |
| | Private/Rental | \$6,883,895 | |
| | Shore | \$1,472,013 | |
| Ice | Charter | \$55,358 | 2,651,447 |
| | Private/Rental | \$2,149,900 | |
| | Shore | \$446,189 | |
| | Charter | 9,729,915 | |
| <i>Trip Sub-Total:</i> | Private/Rental | 61,336,764 | |
| | Shore | 8,982,531 | |
| | Total: | 80,049,209 | 80,049,209 |
| x CPI Adjustment to 2003: | 1.13 | 90,455,607 | |

| | Resident | Non-resident | Total: |
|---|------------------|-----------------|----------------------|
| Rods and Reels | \$54,517,000.00 | \$15,128,000.00 | \$69,645,000.00 |
| Other Tackle | \$21,463,000.00 | \$7,374,000.00 | \$28,837,000.00 |
| Camping Equipment | \$2,783,000.00 | | \$2,783,000.00 |
| Binoculars | \$711,000.00 | | \$711,000.00 |
| Clothing | \$3,687,000.00 | | \$3,687,000.00 |
| Processing/Taxidermy | \$55,000.00 | | \$55,000.00 |
| Magazines | \$2,335,000.00 | | \$2,335,000.00 |
| Club Dues | \$2,767,000.00 | | \$2,767,000.00 |
| Miscellaneous | \$1,916,000.00 | | \$1,916,000.00 |
| Boat Expenses | \$22,352,000.00 | | \$22,352,000.00 |
| Power Boat Purchases | \$301,667,000.00 | | \$301,667,000.00 |
| Non-Power Boat Purchases | \$282,000.00 | | \$282,000.00 |
| Electronics | \$11,790,000.00 | | \$11,790,000.00 |
| Licenses | n/a | | n/a |
| Fishing Vehicle | \$102,300,000.00 | | \$102,300,000.00 |
| Vacation Home | \$10,137,000.00 | | \$10,137,000.00 |
| <i>Equipment Total, ALL FISHING:</i> | | | \$561,264,000.00 |
| Durable \$\$ assigned to striped bass: | | | \$219,637,428.18 |
| TOTAL STRIPED BASS EXPENDITURES, 1998 | | | \$299,686,638 |
| x CPI Adjustment to 2003: | 1.13 | | |
| TOTAL 2003 EST. STRIPED BASS \$\$: | | | \$338,645,900 |

Massachusetts

| <u>Trip Expenditures:</u> | <u>MODE:</u> | <u>Per Mode</u> <u>(x \$1000)</u> | <u>\$ Per Item:</u> <u>(x \$1000)</u> |
|----------------------------------|----------------|--------------------------------------|--|
| Private Transportation | Charter | \$254,305 | 16,649,696 |
| | Private/Rental | \$8,608,962 | |
| | Shore | \$7,786,429 | |
| Food | Charter | \$845,676 | 41,638,297 |
| | Private/Rental | \$23,729,479 | |
| | Shore | \$17,063,142 | |
| Lodging | Charter | \$571,035 | 10,435,345 |
| | Private/Rental | \$3,872,769 | |
| | Shore | \$5,991,542 | |
| Public Transportation | Charter | \$148,357 | 4,981,197 |
| | Private/Rental | \$2,936,039 | |
| | Shore | \$1,896,801 | |
| Boat Fuel | Private/Rental | \$19,069,136 | 19,069,136 |
| Charter Fees | Charter | \$4,076,276 | 4,076,276 |
| Access/Boat Launching | Charter | \$5,598 | 4,546,917 |
| | Private/Rental | \$4,233,957 | |
| | Shore | \$307,362 | |
| Equipment Rental | Charter | \$84,536 | 311,319 |
| | Private/Rental | \$130,699 | |
| | Shore | \$96,085 | |
| Bait | Charter | \$71,969 | 12,828,708 |
| | Private/Rental | \$6,899,811 | |
| | Shore | \$5,856,927 | |
| Ice | Charter | \$100,957 | 2,403,155 |
| | Private/Rental | \$1,562,682 | |
| | Shore | \$739,516 | |
| <i>Trip Sub-Total:</i> | Charter | 6,158,710 | |
| | Private/Rental | 71,043,533 | |
| | Shore | 39,737,803 | |
| | <i>Total:</i> | <u>116,940,047</u> | 116,940,047 |
| x CPI Adjustment to 2003: | 1.13 | 132,142,253 | |

| | Resident | Non-resident | Total: |
|---|------------------|-----------------|-------------------------|
| Rods and Reels | \$73,339,000.00 | \$24,943,000.00 | \$98,282,000.00 |
| Other Tackle | \$33,438,000.00 | \$6,443,000.00 | \$39,881,000.00 |
| Camping Equipment | \$6,520,000.00 | | \$6,520,000.00 |
| Binoculars | \$1,612,000.00 | | \$1,612,000.00 |
| Clothing | \$6,814,000.00 | | \$6,814,000.00 |
| Processing/Taxidermy | \$211,000.00 | | \$211,000.00 |
| Magazines | \$3,265,000.00 | | \$3,265,000.00 |
| Club Dues | \$3,616,000.00 | | \$3,616,000.00 |
| Miscellaneous | \$2,672,000.00 | | \$2,672,000.00 |
| Boat Expenses | \$4,340,000.00 | | \$4,340,000.00 |
| Power Boat Purchases | \$361,455,000.00 | | \$361,455,000.00 |
| Non-Power Boat Purchases | \$2,672,000.00 | | \$2,672,000.00 |
| Electronics | \$6,228,000.00 | | \$6,228,000.00 |
| Licenses | n/a | | n/a |
| Fishing Vehicle | \$173,055,000.00 | | \$173,055,000.00 |
| Vacation Home | \$324,000.00 | | \$324,000.00 |
| <i>Equipment Total, ALL FISHING:</i> | | | <u>\$710,947,000.00</u> |
| Durable \$\$ assigned to striped bass: | | | \$458,053,358.71 |
| TOTAL STRIPED BASS EXPENDITURES, 1998 | | | \$574,993,406 |
| x CPI Adjustment to 2003: | 1.13 | | |
| TOTAL 2003 EST. STRIPED BASS \$: | | | \$649,742,549 |

New Hampshire

| <u>Trip Expenditures:</u> | MODE: | <u>Per Mode</u> (x \$1000) | <u>\$ Per Item:</u> (x \$1000) |
|----------------------------------|----------------|-------------------------------|-----------------------------------|
| Private Transportation | Charter | \$23,674 | 1,571,005 |
| | Private/Rental | \$757,588 | |
| | Shore | \$789,743 | |
| Food | Charter | \$78,727 | 3,897,558 |
| | Private/Rental | \$2,088,192 | |
| | Shore | \$1,730,638 | |
| Lodging | Charter | \$53,160 | 1,001,659 |
| | Private/Rental | \$340,803 | |
| | Shore | \$607,695 | |
| Public Transportation | Charter | \$13,811 | 464,566 |
| | Private/Rental | \$258,371 | |
| | Shore | \$192,384 | |
| Boat Fuel | Private/Rental | \$1,678,082 | 1,678,082 |
| | Charter Fees | \$379,477 | 379,477 |
| Access/Boat Launching | Charter | \$521 | 404,283 |
| | Private/Rental | \$372,588 | |
| | Shore | \$31,174 | |
| Equipment Rental | Charter | \$7,870 | 29,117 |
| | Private/Rental | \$11,501 | |
| | Shore | \$9,745 | |
| Bait | Charter | \$6,700 | 1,207,925 |
| | Private/Rental | \$607,183 | |
| | Shore | \$594,042 | |
| Ice | Charter | \$9,399 | 221,920 |
| | Private/Rental | \$137,516 | |
| | Shore | \$75,006 | |
| Trip Sub-Total: | Charter | 573,340 | |
| | Private/Rental | 6,251,825 | |
| | Shore | 4,030,428 | |
| | Total: | 10,855,593 | 10,855,593 |
| x CPI Adjustment to 2003: | 1.13 | 12,266,820 | |

| | Resident | Non-resident | Total: |
|---|-----------------|----------------|------------------------|
| Rods and Reels | \$4,435,000.00 | \$5,010,000.00 | \$9,445,000.00 |
| Other Tackle | \$1,262,000.00 | \$1,615,000.00 | \$2,877,000.00 |
| Camping Equipment | \$322,000.00 | | \$322,000.00 |
| Binoculars | \$288,000.00 | | \$288,000.00 |
| Clothing | \$720,000.00 | | \$720,000.00 |
| Processing/Taxidermy | \$78,000.00 | | \$78,000.00 |
| Magazines | \$308,000.00 | | \$308,000.00 |
| Club Dues | \$387,000.00 | | \$387,000.00 |
| Miscellaneous | \$111,000.00 | | \$111,000.00 |
| Boat Expenses | \$5,104,000.00 | | \$5,104,000.00 |
| Power Boat Purchases | \$27,249,000.00 | | \$27,249,000.00 |
| Non-Power Boat Purchases | \$169,000.00 | | \$169,000.00 |
| Electronics | \$1,354,000.00 | | \$1,354,000.00 |
| Licenses | n/a | | n/a |
| Fishing Vehicle | \$20,729,000.00 | | \$20,729,000.00 |
| Vacation Home | \$0.00 | | \$0.00 |
| Equipment Total, ALL FISHING: | | | \$69,141,000.00 |
| Durable \$\$ assigned to striped bass: | | | \$40,811,953.52 |
| TOTAL STRIPED BASS EXPENDITURES, 1998 | | | \$51,667,546 |
| x CPI Adjustment to 2003: | 1.13 | | |
| TOTAL 2003 EST. STRIPED BASS \$\$: | | | \$58,384,327 |

New Jersey

| <u>Trip Expenditures:</u> | MODE: | <u>Per Mode</u> (x \$1000) | <u>\$ Per Item:</u> (x \$1000) |
|----------------------------------|----------------|-------------------------------|-----------------------------------|
| Private Transportation | Charter | \$577,540 | 31,795,284 |
| | Private/Rental | \$19,121,090 | |
| | Shore | \$12,096,653 | |
| Food | Charter | \$1,652,574 | 23,650,698 |
| | Private/Rental | \$11,280,815 | |
| | Shore | \$10,717,310 | |
| Lodging | Charter | \$489,056 | 4,028,141 |
| | Private/Rental | \$2,442,539 | |
| | Shore | \$1,096,547 | |
| Public Transportation | Charter | \$123,422 | 1,066,617 |
| | Private/Rental | \$624,146 | |
| | Shore | \$319,050 | |
| Boat Fuel | Private/Rental | \$12,633,212 | 12,633,212 |
| Charter Fees | Charter | \$3,834,179 | 3,834,179 |
| Access/Boat Launching | Charter | \$3,772 | 2,685,867 |
| | Private/Rental | \$1,474,747 | |
| | Shore | \$1,207,349 | |
| Equipment Rental | Charter | \$341,673 | 1,039,689 |
| | Private/Rental | \$446,132 | |
| | Shore | \$251,884 | |
| Bait | Charter | \$95,788 | 11,769,175 |
| | Private/Rental | \$6,320,542 | |
| | Shore | \$5,352,845 | |
| Ice | Charter | \$40,729 | 3,637,216 |
| | Private/Rental | \$1,973,960 | |
| | Shore | \$1,622,527 | |
| <i>Trip Sub-Total:</i> | Charter | 7,158,732 | |
| | Private/Rental | 56,317,182 | |
| | Shore | 32,664,163 | |
| | Total: | 96,140,077 | 96,140,077 |
| x CPI Adjustment to 2003: | 1.13 | 108,638,287 | |

| | Resident | Non-resident | Total: |
|---|------------------|-----------------|-------------------------|
| Rods and Reels | \$75,998,000.00 | \$15,602,000.00 | \$91,600,000.00 |
| Other Tackle | \$37,550,000.00 | \$9,581,000.00 | \$47,131,000.00 |
| Camping Equipment | \$4,769,000.00 | | \$4,769,000.00 |
| Binoculars | \$2,438,000.00 | | \$2,438,000.00 |
| Clothing | \$9,136,000.00 | | \$9,136,000.00 |
| Processing/Taxidermy | \$435,000.00 | | \$435,000.00 |
| Magazines | \$4,778,000.00 | | \$4,778,000.00 |
| Club Dues | \$4,563,000.00 | | \$4,563,000.00 |
| Miscellaneous | \$3,828,000.00 | | \$3,828,000.00 |
| Boat Expenses | \$26,682,000.00 | | \$26,682,000.00 |
| Power Boat Purchases | \$160,174,000.00 | | \$160,174,000.00 |
| Non-Power Boat Purchases | \$333,000.00 | | \$333,000.00 |
| Electronics | \$7,158,000.00 | | \$7,158,000.00 |
| Licenses | n/a | | n/a |
| Fishing Vehicle | \$73,907,000.00 | | \$73,907,000.00 |
| Vacation Home | \$239,000.00 | | \$239,000.00 |
| <i>Equipment Total, ALL FISHING:</i> | | | \$437,171,000.00 |
| Durable \$\$ assigned to striped bass: | | | \$111,523,926.92 |
| TOTAL STRIPED BASS EXPENDITURES, 1998 | | | \$207,664,004 |
| x CPI Adjustment to 2003: | 1.13 | | |
| TOTAL 2003 EST. STRIPED BASS \$\$: | | | \$234,660,325 |

New York

| <u>Trip Expenditures:</u> | <u>MODE:</u> | <u>Per Mode</u> <u>(x \$1000)</u> | <u>\$ Per Item:</u> <u>(x \$1000)</u> |
|----------------------------------|------------------------|--------------------------------------|--|
| 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 | |
| Ice | Charter | \$49,504 | 2,826,901 |
| | Private/Rental | \$1,731,258 | |
| | Shore | \$1,046,139 | |
| | <i>Trip Sub-Total:</i> | | |
| | Charter | 8,701,062 | |
| | Private/Rental | 49,392,884 | |
| | Shore | 21,060,525 | |
| | <i>Total:</i> | <u>79,154,472</u> | 79,154,472 |
| x CPI Adjustment to 2003: | 1.13 | 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 |
| <i>Equipment Total, ALL FISHING:</i> | | | <u>\$427,909,000.00</u> |
| Durable \$\$ assigned to striped bass: | | | \$106,019,161.78 |
| TOTAL STRIPED BASS EXPENDITURES, 1998 | | | \$185,173,633 |
| x CPI Adjustment to 2003: | 1.13 | | |
| TOTAL 2003 EST. STRIPED BASS \$\$: | | | \$209,246,206 |

North Carolina

| <u>Trip Expenditures:</u> | MODE: | <u>Per Mode</u> (x \$1000) | <u>\$ Per Item:</u> (x \$1000) |
|----------------------------------|----------------|-------------------------------|-----------------------------------|
| Private Transportation | Charter | \$52,205 | 16,263,446 |
| | Private/Rental | \$3,717,195 | |
| | Shore | \$12,494,046 | |
| Food | Charter | \$149,380 | 13,411,792 |
| | Private/Rental | \$2,193,023 | |
| | Shore | \$11,069,389 | |
| Lodging | Charter | \$44,207 | 1,651,613 |
| | Private/Rental | \$474,837 | |
| | Shore | \$1,132,570 | |
| Public Transportation | Charter | \$11,156 | 462,023 |
| | Private/Rental | \$121,336 | |
| | Shore | \$329,531 | |
| Boat Fuel | Private/Rental | \$2,455,933 | 2,455,933 |
| | Charter | \$346,580 | 346,580 |
| Access/Boat Launching | Charter | \$341 | 1,534,048 |
| | Private/Rental | \$286,695 | |
| | Shore | \$1,247,012 | |
| Equipment Rental | Charter | \$30,885 | 377,773 |
| | Private/Rental | \$86,729 | |
| | Shore | \$260,159 | |
| Bait | Charter | \$8,659 | 6,766,083 |
| | Private/Rental | \$1,228,731 | |
| | Shore | \$5,528,693 | |
| Ice | Charter | \$3,682 | 2,063,254 |
| | Private/Rental | \$383,743 | |
| | Shore | \$1,675,829 | |
| Trip Sub-Total: | Charter | 647,093 | |
| | Private/Rental | 10,948,222 | |
| | Shore | 33,737,230 | |
| | Total: | 45,332,545 | 45,332,545 |
| x CPI Adjustment to 2003: | 1.1 | 49,865,799 | |

| | Resident | Non-resident | Total: |
|---|------------------|-----------------|---------------------------|
| Rods and Reels | \$92,877,000.00 | \$39,548,000.00 | \$132,425,000.00 |
| Other Tackle | \$42,077,000.00 | \$17,690,000.00 | \$59,767,000.00 |
| Camping Equipment | \$6,173,000.00 | | \$6,173,000.00 |
| Binoculars | \$3,882,000.00 | | \$3,882,000.00 |
| Clothing | \$5,984,000.00 | | \$5,984,000.00 |
| Processing/Taxidermy | \$4,534,000.00 | | \$4,534,000.00 |
| Magazines | \$3,533,000.00 | | \$3,533,000.00 |
| Club Dues | \$2,923,000.00 | | \$2,923,000.00 |
| Miscellaneous | \$6,104,000.00 | | \$6,104,000.00 |
| Boat Expenses | \$99,937,000.00 | | \$99,937,000.00 |
| Power Boat Purchases | \$451,170,000.00 | | \$451,170,000.00 |
| Non-Power Boat Purchases | \$1,151,000.00 | | \$1,151,000.00 |
| Electronics | \$11,031,000.00 | | \$11,031,000.00 |
| License fees | \$4,782,000.00 | | \$4,782,000.00 |
| Fishing Vehicle | \$343,048,000.00 | | \$343,048,000.00 |
| Vacation Home | \$76,974,000.00 | | \$76,974,000.00 |
| Equipment Total, ALL FISHING: | | | \$1,213,418,000.00 |
| Durable \$\$ assigned to striped bass: | | | \$257,540,122.58 |
| TOTAL STRIPED BASS EXPENDITURES, 1998 | | | \$302,872,667 |
| x CPI Adjustment to 2003: | 1.1 | | |
| TOTAL 2003 EST. STRIPED BASS \$\$: | | | \$333,159,934 |

Rhode Island

| <u>Trip Expenditures:</u> | MODE: | <u>Per Mode</u> (x \$1000) | <u>\$ Per Item:</u> (x \$1000) |
|----------------------------------|----------------|-------------------------------|-----------------------------------|
| Private Transportation | Charter | \$163,943 | 4,799,287 |
| | Private/Rental | \$1,391,653 | |
| | Shore | \$3,243,690 | |
| Food | Charter | \$545,183 | 11,489,300 |
| | Private/Rental | \$3,835,911 | |
| | Shore | \$7,108,206 | |
| Lodging | Charter | \$368,130 | 3,490,141 |
| | Private/Rental | \$626,040 | |
| | Shore | \$2,495,971 | |
| Public Transportation | Charter | \$95,642 | 1,360,431 |
| | Private/Rental | \$474,616 | |
| | Shore | \$790,174 | |
| Boat Fuel | Private/Rental | \$3,082,558 | 3,082,558 |
| Charter Fees | Charter | \$2,627,859 | 2,627,859 |
| Access/Boat Launching | Charter | \$3,609 | 816,077 |
| | Private/Rental | \$684,426 | |
| | Shore | \$128,042 | |
| Equipment Rental | Charter | \$54,498 | 115,653 |
| | Private/Rental | \$21,128 | |
| | Shore | \$40,027 | |
| Bait | Charter | \$46,397 | 3,601,656 |
| | Private/Rental | \$1,115,366 | |
| | Shore | \$2,439,893 | |
| Ice | Charter | \$65,084 | 625,764 |
| | Private/Rental | \$252,610 | |
| | Shore | \$308,069 | |
| <i>Trip Sub-Total:</i> | Charter | 3,970,345 | |
| | Private/Rental | 11,484,309 | |
| | Shore | 16,554,073 | |
| | <i>Total:</i> | <u>32,008,727</u> | 32,008,727 |
| x CPI Adjustment to 2003: | 1.13 | 36,169,861 | |

| | Resident | Non-resident | Total: |
|---|-----------------|----------------|------------------------|
| Rods and Reels | \$10,599,000.00 | \$8,883,000.00 | \$19,482,000.00 |
| Other Tackle | \$5,343,000.00 | \$4,779,000.00 | \$10,122,000.00 |
| Camping Equipment | \$640,000.00 | | \$640,000.00 |
| Binoculars | \$371,000.00 | | \$371,000.00 |
| Clothing | \$1,871,000.00 | | \$1,871,000.00 |
| Processing/Taxidermy | \$59,000.00 | | \$59,000.00 |
| Magazines | \$573,000.00 | | \$573,000.00 |
| Club Dues | \$1,548,000.00 | | \$1,548,000.00 |
| Miscellaneous | \$403,000.00 | | \$403,000.00 |
| Boat Expenses | \$1,687,000.00 | | \$1,687,000.00 |
| Power Boat Purchases | \$57,573,000.00 | | \$57,573,000.00 |
| Non-Power Boat Purchases | \$33,000.00 | | \$33,000.00 |
| Electronics | \$2,850,000.00 | | \$2,850,000.00 |
| Licenses | n/a | | n/a |
| Fishing Vehicle | \$1,932,000.00 | | \$1,932,000.00 |
| Vacation Home | \$0.00 | | \$0.00 |
| <i>Equipment Total, ALL FISHING:</i> | | | <u>\$99,144,000.00</u> |
| Durable \$\$ assigned to striped bass: | | | \$43,662,532.42 |
| TOTAL STRIPED BASS EXPENDITURES, 1998 | | | \$75,671,259 |
| x CPI Adjustment to 2003: | 1.13 | | |
| TOTAL 2003 EST. STRIPED BASS \$: | | | \$85,508,523 |

Virginia

| <u>Trip Expenditures:</u> | <u>MODE:</u> | <u>Per Mode</u> <u>(x \$1000)</u> | <u>\$ Per Item:</u> <u>(x \$1000)</u> |
|----------------------------------|----------------|--------------------------------------|--|
| Private Transportation | Charter | \$91,214 | 12,178,937 |
| | Private/Rental | \$10,561,359 | |
| | Shore | \$1,526,364 | |
| Food | Charter | \$261,001 | 7,844,172 |
| | Private/Rental | \$6,230,854 | |
| | Shore | \$1,352,317 | |
| Lodging | Charter | \$77,239 | 1,564,716 |
| | Private/Rental | \$1,349,114 | |
| | Shore | \$138,363 | |
| Public Transportation | Charter | \$19,493 | 404,492 |
| | Private/Rental | \$344,741 | |
| | Shore | \$40,258 | |
| Boat Fuel | Private/Rental | \$6,977,839 | 6,977,839 |
| Charter Fees | Charter | \$605,554 | 605,554 |
| Access/Boat Launching | Charter | \$596 | 967,503 |
| | Private/Rental | \$814,563 | |
| | Shore | \$152,344 | |
| Equipment Rental | Charter | \$53,962 | 332,162 |
| | Private/Rental | \$246,417 | |
| | Shore | \$31,783 | |
| Bait | Charter | \$15,128 | 4,181,647 |
| | Private/Rental | \$3,491,093 | |
| | Shore | \$675,426 | |
| Ice | Charter | \$6,433 | 1,301,463 |
| | Private/Rental | \$1,090,298 | |
| | Shore | \$204,732 | |
| <i>Trip Sub-Total:</i> | Charter | 1,130,620 | |
| | Private/Rental | 31,106,278 | |
| | Shore | 4,121,586 | |
| | <i>Total:</i> | <u>36,358,484</u> | 36,358,484 |
| x CPI Adjustment to 2003: | 1.13 | 41,085,087 | |

| | Resident | Non-resident | Total: |
|---|------------------|----------------|-------------------------|
| Rods and Reels | \$36,912,000.00 | \$9,398,000.00 | \$46,310,000.00 |
| Other Tackle | \$17,879,000.00 | \$7,479,000.00 | \$25,358,000.00 |
| Camping Equipment | \$2,135,000.00 | | \$2,135,000.00 |
| Binoculars | \$820,000.00 | | \$820,000.00 |
| Clothing | \$2,226,000.00 | | \$2,226,000.00 |
| Processing/Taxidermy | \$101,000.00 | | \$101,000.00 |
| Magazines | \$1,239,000.00 | | \$1,239,000.00 |
| Club Dues | \$1,049,000.00 | | \$1,049,000.00 |
| Miscellaneous | \$2,391,000.00 | | \$2,391,000.00 |
| Boat Expenses | \$18,534,000.00 | | \$18,534,000.00 |
| Power Boat Purchases | \$238,167,000.00 | | \$238,167,000.00 |
| Non-Power Boat Purchases | \$811,000.00 | | \$811,000.00 |
| Electronics | \$4,047,000.00 | | \$4,047,000.00 |
| Licenses | n/a | | n/a |
| Fishing Vehicle | \$61,303,000.00 | | \$61,303,000.00 |
| Vacation Home | \$183,000.00 | | \$183,000.00 |
| <i>Equipment Total, ALL FISHING:</i> | | | <u>\$404,674,000.00</u> |
| Durable \$\$ assigned to striped bass: | | | \$79,944,583.68 |
| TOTAL STRIPED BASS EXPENDITURES, 1998 | | | \$116,303,068 |
| x CPI Adjustment to 2003: | 1.13 | | |
| TOTAL 2003 EST. STRIPED BASS \$\$: | | | \$131,422,467 |

Appendix II: 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 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 Strippers 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.

| | % of Marine Fishing Trips Targeting Striped Bass (from Table 1) | Number of Marine Anglers | <i>Estimated</i> 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 III: Recreational Multipliers Used in This Analysis

| | Retail Sales | Total Multiplier Effect (output) | Salaries and Wages | Jobs | Sales and Motor Fuel Taxes | State Income Taxes | Federal Income Taxes |
|-----------------------|---------------------|---|---------------------------|-------------|-----------------------------------|---------------------------|-----------------------------|
| Connecticut | 1 | 1.697533024 | 0.42036194 | 0.000014700 | 0.069717348 | 0.012301289 | 0.074072042 |
| Delaware | 1 | 1.58992381 | 0.320815218 | 0.000014801 | 0.024713179 | 0.011679772 | 0.033358635 |
| Maine | 1 | 1.674844493 | 0.39151757 | 0.000018970 | 0.054680274 | 0.021427394 | 0.039804914 |
| Maryland | 1 | 1.908004716 | 0.491275265 | 0.000020779 | 0.055747578 | 0.017931206 | 0.076398799 |
| Massachusetts | 1 | 1.782266933 | 0.453533969 | 0.000016908 | 0.060186976 | 0.021231887 | 0.076958074 |
| New Hampshire | 1 | 1.747230428 | 0.387630362 | 0.000018585 | 0.021770235 | 0 | 0.054095004 |
| New Jersey | 1 | 1.875842566 | 0.457051752 | 0.000017296 | 0.059788694 | 0.010774018 | 0.076828266 |
| New York | 1 | 1.742053641 | 0.387527359 | 0.000013157 | 0.036045598 | 0.011996787 | 0.069402712 |
| North Carolina | 1 | 1.943060034 | 0.478652643 | 0.000022037 | 0.048827259 | 0.021936285 | 0.069375088 |
| Rhode Island | 1 | 1.568114526 | 0.355566829 | 0.000016030 | 0.102542944 | 0.013649021 | 0.052496233 |
| South Carolina | 1 | 1.965150887 | 0.491334287 | 0.000020823 | 0.061418764 | 0.019088592 | 0.076292326 |
| Virginia | 1 | 1.849702564 | 0.418402615 | 0.000017224 | 0.05944914 | 0.018313889 | 0.066402437 |
| 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.

Appendix IV: 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 over- and under-estimate impacts in states that commonly export or import striped bass for processing and sale, but is necessary given 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% 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 was increased 47%, the jobs multiplier upped 37%, and the income multiplier adjusted upward by 51%.



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