

Economic Impacts of Reduced Uncertainty Associated with Fishery Management Actions with Summer Flounder

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June 2020

For

SCMFIS

Science Center for Marine Fisheries

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Introduction

Of all fishery species managed by MAFMC the summer flounder¹ is one of the most contentious. Stock status has recently improved from overfished – to less or even not so – with the inclusion of recent MRIP data on recreational fishery landings. A substantial increase in biomass estimates is reported in the most recent assessment, and there are expectations of continued debate over division of quota among commercial and recreational fisheries.

Absent from this debate is an economic assessment for the commercial sector of the fishery. The objective of this project on behalf of Science Center for Marine Fisheries (SCMFIS) is to provide a current market and economic impact assessment specifically for the Mid-Atlantic summer flounder fishery.

Methods & Analysis

Data collection and modeling completed, provide a basis for estimation of product market distribution, mark up, and associated economic impacts upon the Mid Atlantic summer flounder landings.

The market distribution model and economic assessments were developed based upon secondary data from NOAA Fisheries 2018 landings data (Appendix 1), and interviews during 2019 with seafood industry involved in landing and marketing summer flounder. The market sector markups contained herein are adapted from NOAA Fisheries “Summary of Value Added” tables presented in annual reports. Based upon those linkages the IMPLAN input-output model was utilized to convert the marketplace values to economic impact estimates²

This case study shows the market chain impacts derived from the number of transactions and markups the product encounters from the harvest to the consumer.

Estimates of changes to those markups and margins measures may be completed in the future based upon proposed management measures, or more current landings information when available from NOAA fisheries. During 2020, with most meat, seafood, and poultry products, impacts of the coronavirus closures have shifted the final retail distribution away from foodservice toward retail food markets. As seen with this analysis and data collection (completed prior to the coronavirus epidemic) such reallocations have significant impacts on ultimate product values and associated economic impacts.

¹ Summer Flounder (*paralichthys dentatus*) commonly called “fluke” is referred to as flounder in this report.

² For a description of IMPLAN and the input-output technique as adapted here see Appendix 2.

Discussion - Market Channel Distribution

Commercial fishery product landings begin the product development, processing, and distribution changes which create additional economic value and impacts beyond the initial landed value and economic impact. Here the scope and extent of economic impacts are evaluated at each level along the entire market chain of distribution from the fishermen in the harvest sector, through final sale to consumers generally by retail markets or restaurants.

The distinct market sectors for which data are presented are:

Harvesting sector – fishermen

Primary wholesaling and processing sector – initial phase of distribution typically unloading vessels and/or purchasing directly from the harvesters.

Secondary wholesaling or distributing sector – all distribution, storage, packing or repacking that takes place between the wholesale market or processor and the final retail point of sale.

Foodservice – all activities resulting in the sale of prepared foods to the end consumer, such as restaurants.

Retail markets – establishments selling seafood for at-home consumption. Includes supermarkets, independent grocers, and specialty seafood markets including “direct markets”.

As the products leave the boat and are sold initially, they are further marketed at some or all of the levels noted above. At each level the initial purchase price is increased to a product sale price which reflects the added utility provided by that function. Along each step of the market chain, the price of the fishery product is increased by virtue of that additional sector’s value-added function. The estimated product flow and associated markups for commercial summer flounder is summarized in Table 1.

From the \$26.5 million initial landings value industry estimates suggest that most (90%) of the landed summer flounder moved directly up the entire market chain via primary wholesalers. The final 10% of the landings were estimated to go directly to retail foodservice and markets, in many cases through local “mom & pop” retail outlets.

Based upon industry interviews and estimates, this analysis presents a final distribution of product of 50% reaching the consumer at retail, and 50% at foodservice or restaurants.

The markup values associated with those individual market sectors are estimated therein based upon data from NOAA.³ Those markups are: 80% at primary wholesale, 63% at secondary wholesale, 33% at retail markets, and 182% at foodservice.

In this case study the \$26.5 million in initial landings flow upward through the market ultimately generating \$151.1 million in total final flounder product consumer sales.

TABLE 1 summarizes this hierarchy of sales associated with summer flounder in the mid - Atlantic region commercial summer flounder fishery.

³ National Marine Fisheries Service (2018) Fisheries of the United States, 2017. U.S. Department of Commerce, NOAA Current Fishery Statistics No. 2017 Available at: <https://www.fisheries.noaa.gov/feature-story/fisheries-united-states-2017>

		Primary wholesale and processing	Secondary wholesale and distribution	Retail food sector	Totals
Allocation of Landings	100%	90%		10%	100%
Harvest value of allocated landings	\$26,575,000	\$23,918,000		\$2,658,000	\$26,575,000
Primary wholesale and processing	Value <i>entering</i> sector	\$23,918,000			\$23,918,000
	Markup for primary wholesale and processing	80%			
	Value of markup	\$19,134,000			\$19,134,000
	Value of sector <i>outputs</i>	\$43,052,000			\$43,052,000
Secondary wholesale and distribution	Value <i>entering</i> sector	\$43,052,000	0		\$43,052,000
	Markup for secondary wholesale and processing	63%	63%		
	Value of markup	\$27,122,000			\$27,122,000
	Value of sector <i>outputs</i>	\$70,174,000			\$70,174,000
Direct from Harvest	Value <i>entering</i> sector				\$2,658,000

	Value entering sector	Retail		\$72,831,000
Retail	Allocation among sectors	Foodservice or restaurant / 50%	Food Market Retail / 50%	
	Value <i>entering</i> sector	\$36,416,000	\$36,416,000	\$72,831,000
	Markup in final sector	182%	33%	
	Value of markup	\$66,277,000	\$12,017	\$78,294,000
	Total Retail Value	\$102,692,000	\$48,433,000	\$151,125,000

Economic Impacts

Economic impact analysis begins with introducing a change in the output of goods and services using the multiplier model to analyze the effects on a region’s economic base. Most regional input-output studies attempt to characterize either, the economic impacts of specified changes in final demand for a given set of products, services, and industries, or, the economic significance of specific industries in a regional and national economy. The research described herein accomplishes the latter task. It assesses the economic significance of commercial summer flounder fishing and marketing activity throughout the Mid-Atlantic regional economy.

The standard input-output model estimates the direct, indirect, and induced economic implications of this basic economic activity. The secondary effects (the indirect and induced impacts), along with the basic economic activity estimates, provide a cumulative estimate of the “multiplier” effects from the basic activity (direct impact).⁴

At each market level described above, the value-added activity in itself not only has a discrete markup value, but it also generates discrete additional direct and indirect economic impacts associated with that function. For example, the direct activity, boxing icing and transporting a flounder, requires the purchase of inputs such as corrugated or plastic boxes which constitute new and discrete indirect economic impact. In that way each market sector’s value-added function amount generates its own economic impact.

TABLE 2 reflects these cumulative direct economic impacts associated with the \$151.1 million in activities from harvest to consumer explained above. Output (sales), value-added, employment and income are other commonly used measures of economic impact. They are adapted here to assess the economic impacts of the commercial fishery and marketing of summer flounder.⁵

In the standard input-output model, measures of aggregate economic activity are used as a basis for estimating the total economic impact of the subject activity. For example, measures of direct employment or total sales in an industry are obtained, and these are then used as a basis for evaluating the total impact. In this report, estimates of the primary sales by category were obtained and used as the base measure of the “direct impact” of the industry reflected below.

Table 2. DIRECT Economic Impacts of the Commercial Summer Flounder Fishery Market on the Mid-Atlantic Region (2018)	
Impact Type	Mid-Atlantic Region
Output	\$151,125,000
Employment (FTES)	1,688
Labor Income	\$58,900,000
Total Value-Added	\$94,611,000

⁴ A Glossary of economic impact definitions is contained in Appendix 3. Herein “output” for wholesale and retail industries represents their markup margin only; it does not represent gross revenues (sales).

⁵ Impacts calculations, based on IMPLAN 2017 multipliers for Mid-Atlantic region. 2018.

As shown in TABLE 2, the direct impacts of the fishery and marketplace were \$151.1 million in output (sales), 1,688 associated jobs, which required \$58.9 million in labor income. Further, \$94.6 million in wages and salaries, interest, rent, profits, and indirect taxes paid by businesses, (“total value added”) was associated with this overall level of direct activity.

This measure of the market flow and associated direct impacts, allows estimation of the indirect impacts. IMPLAN uses information on the interactions between these direct industry sectors and other economic sectors which are, to varying extent, dependent upon flounder harvesting and marketing related industries.

For example, suppliers of materials into the retail and foodservice transportation, storage, marketing, and distribution are also dependent upon the initial harvest and sale of flounder. These added sales or impacts are referred to as the “indirect impacts.” Such “indirectly” dependent sectors include many other types of manufacturing and trade, for which industrial classifications range from “Boat Building and Repairing” to “Paper Board Container Manufacturing - Corrugated Boxes” to “Seafood Product Preparation and Packaging”.

TABLE 3 shows the cumulative indirect economic impacts across all harvest and marketing functions from boat to consumer.

Impact Type	Mid-Atlantic Region
Output	\$44,314,000
Employment (FTES)	231
Labor Income	\$15,518,000
Total Value-Added	\$25,449,000

Ultimately, the direct sales activity, and the resulting indirect activity, generate increases in the general level of employment and income in households within the study area. The extra income generated in this way leads to a third “wave” of economic impact through greater household expenditures on goods and services. Much of this additional re-spending will also occur within the broader region, further expanding economic activity. These effects are referred to as the “induced impacts” of the industry and are summarized in TABLE 4.

Impact Type	Mid-Atlantic Region
Output	\$64,552,000
Employment (FTES)	423
Labor Income	\$22,263,000
Total Value-Added	\$39,308,000

Conclusion – Total Economic Impact of Summer Flounder Harvest and Marketing

To summarize, because of the interrelationships among the many sectors involved from fishery harvest to marketing, new sales of goods and services required by those sectors generate additional waves of economic impact. Expenditures by non-local marketers and consumers are in fact “exports” from local economic bases and these transactions initiate the multiple rounds of economic impacts among businesses and households detailed above and summarized in Table 5.

Table 5. TOTAL Economic Impacts of the Commercial Summer Flounder Fishery Market on the Mid-Atlantic Region (2018)	
Impact Type	Mid-Atlantic Region
Output	\$259,994,000
Employment (FTES)	2,342
Labor Income	\$96,681,000
Total Value-Added	\$159,368,000

As shown in TABLE 5 the cumulative impacts of the fishery and marketplace were \$259.9 million in output (sales), 2,342 associated jobs, which required \$96.7 million in labor income. Further, \$159.4 million in wages and salaries, interest, rent, profits, and indirect taxes paid by businesses, (“total value added”) was associated with the flounder commercial harvest and markets in 2018.

This model will be useful in evaluating economic impacts of changes in harvests. For example, this case study is based upon the 2018 commercial harvest of summer flounder. Changes in harvest values, either via pounds landed or harvest prices, or both will initiate alteration in the 2018 valuations and economic impact estimates throughout the marketplace. TABLE 6 illustrates such a situation comparing the economic results of the 2018 and 2016 summer flounder commercial harvests.

The increase in average ex-vessel price in 2018 mitigated some of the losses in economic activity associated with the fishery and product market. On balance between the two seasons there was a decline in product flow along with significantly reduced impacts in overall output and value added. Value added is often seen as a critical measure of regional economic growth as it measures wages, salaries, interest, rents, profits and taxes paid by business throughout the region. As such it is an important measure to consider in assessing economic benefits of the fishery marketplace to the region’s population.

Table 6. Comparison of Summer Flounder Harvest & Values and Economic Impacts 2016-2018				
	Landings (lbs.)	Landings Value	Total Output	Total Value Added
2016	7,836,625	\$30,679,292	\$372,248,000	\$185,131,200
2018	6,225,360	\$26,575,805	\$272,071,000	\$159,368,000

Finally, during 2020 impacts of the coronavirus closures are now known to have significantly shifted the final distribution of seafood products at the retail level; away from foodservice toward retail. A significant shift between those ultimate outlets entail material changes in the final markup of the product as reflected in TABLE 1. This analysis demonstrates that such reallocations would create significant changes on ultimate product values and associated economic impacts. As such, this model will prove useful in assessing a changing seafood marketplace as well as alterations in harvest conditions in the future.

Information from secondary sources was utilized in this report. While the author believes such information is accurate, the author does not represent or warrant any information from secondary sources. Opinions contained herein are strictly those of the author. This report is issued as of the date first above written. The author is under no obligation to update this report for any change in circumstances, information, law, etc.

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Appendix 1.

Summer Flounder Landings by State, 2018 – NOAA FISHERIES			
State	Live Pounds	Dollars	\$/pound
RHODE ISLAND	1,022,615	\$4,709,969	\$4.61
FLORIDA	845	\$3,262	\$3.86
DELAWARE	677	\$2,000	\$2.95
MARYLAND	176,348	\$751,119	\$4.26
NEW JERSEY	1,045,566	\$4,548,905	\$4.35
NEW YORK	462,673	\$2,216,399	\$4.79
VIRGINIA	1,254,422	\$4,569,622	\$3.64
CONNECTICUT	177,206	\$855,922	\$4.83
MASSACHUSETTS	427,247	\$2,011,968	\$4.71
NORTH CAROLINA ⁶	1,657,761	\$6,906,639	\$4.17
Total	6,225,360	\$26,575,805	\$4.27

Appendix 2.

Economic Input-Output Model Application – IMPLAN

Many economic impact studies use information from a regional inter-industry impact (input-output) model such as Impact Planning for Analysis (IMPLAN).⁷ IMPLAN is a nationally recognized economic model used for community/regional economic impact analysis across the country. The model uses input-output analysis in tandem with regional social accounting matrices and multipliers. IMPLAN divides the total national economy into 440 sectors corresponding to North American Industry Classification System (NAICS) codes related to agriculture, extraction, manufacturing, transportation, wholesale trade, retail trade, services and government. Data on these 440 industry sectors is based on national input/output or industry transaction tables (Minnesota IMPLAN Group, 2017). The IMPLAN model used herein was regionalized for this study to reflect the Mid-Atlantic region states. In addition to the modeling software, individual state data must be purchased from IMPLAN to use in the model. Running the basic IMPLAN model with individual state data yields the necessary employment, income and output multipliers to apply to the expenditure data.

In order to estimate economic activity, each category of expenditure by the commercial fishing and marketing sectors was first matched to one or more of the IMPLAN sectors. In most instances, this matching is straightforward.

⁶ 2018 Landings, North Carolina Department of Marine Fisheries.

⁷ Implan Group, LLC. Implan social accounting and economic impact analysis software, version 3, and 2017 Implan regional Models state/county data for Mid-Atlantic states. www.Implan.com. Modelling completed by The Nearing Group, Baltimore Maryland.

Expenditures must be allocated by the proportion of the expenditure attributed to the value added by the retail, wholesale, transportation and producing sectors before applying the IMPLAN multipliers. Each of those sectors will have their own set of impacts on the region's economy. Allocation of the expenses is done through national averages of the margins for these expenditure categories as supplied in the IMPLAN data. If the expenditures are for services such as at a commercial fishing dock, it is not necessary to calculate margins, as the full expenditure is applied to the commercial fishing sector and matched to an IMPLAN multiplier.

After expenditures are broken down using margins into the various IMPLAN sectors, they are then multiplied by a regional purchase coefficient (RPC) before applying the economic activity multipliers. A regional purchase coefficient indicates the extent to which the demand for a good or service can be met by a local industry. RPC's, expressed as percentages, are provided by IMPLAN for all sectors in the region.

The final components of the economic impact analysis are the economic activity multipliers. The multipliers estimate the amount of employment, income or output that a given level of expenditure generates, after it has been adjusted by the RPC. Employment multipliers provide impacts in terms of jobs (full-time, part-time and seasonal). IMPLAN includes several income multipliers. For this project, total income is used, which includes personal income plus proprietor (self-employment) income and other property income (e.g., rent). For output impacts, IMPLAN utilizes a Type I and modified Type II multiplier. The Type I output multiplier provides the relationship between the local expenditure and the direct and indirect output or sales in the state and region. The Type II multiplier includes the additional induced (household) effects created by the direct and indirect expenditures. The Type II multiplier is used in this analysis.

Appendix 3.

Glossary of Input-Output Terms

Direct effects/impacts: Direct impacts represent the revenues, value-added, income, or jobs that result directly from an economic activity within the study area or a regional economy.

Employment or Jobs: Represents the total numbers of wage and salaried employees as well as self-employed jobs. This includes full-time, part-time and seasonal workers measured in annual **average jobs**.

Indirect business taxes: Include sales, excise, and property taxes as well as fees and licenses paid by businesses during normal operations. It does not include taxes on profits or income.

Indirect effects/impacts: Indirect effects occur when businesses use revenues originating from outside the region, or study area, to purchase inputs (goods and services) from local suppliers. This secondary, or indirect business, generates additional revenues, income, jobs and taxes for the area economy.

Induced effects/impacts: Induced effects or impacts occur when new dollars, originating from outside the study area, are introduced into the local economy. Induced economic impacts occur as the households of business owners and employees spend their earnings from these enterprises to purchase consumer goods and services from other businesses within the region. This induced effect generates additional revenues, income, jobs and taxes for the area economy.

Input-Output analysis: The use of input-output models to estimate how revenues or employment for one or more particular industries, businesses or activities in a regional economy impact other businesses and institutions in that region, and the regional as a whole.

Input-Output models: A mathematical representation of economic activity within a defined region using inter-industry transaction tables or matrices where the outputs of various industries are used as inputs by those same industries and other industries as well.

Labor income: All forms of employment compensation, including employee wages and salaries, and proprietor income or profits.

Local revenues/expenditures: Local revenues or spending represent simple transfers between individuals or businesses within a regional economy. These transactions do not generate economic spin-off or multiplier (indirect and induced) effects.

Margins: Represent the differences between retail, wholesale, distributor and producer's prices.

Non-local revenues/expenditures: When outside or new revenues flow into a local economy either from the sale of locally produced goods and services to points outside the study area, or from expenditures by non-local visitors to the study area, additional economic repercussions occur through indirect and induced (multiplier) effects.

Other Property Type Income: Income in the form of rents, royalties, interest, dividends, and corporate profits.

Output: Output is the value of production by industry in a calendar year. Output for wholesale and retail Industries represents their markup margin only; it does not represent revenues (sales).

Total Impacts: The sum of direct, indirect and induced effects or economic impacts.

Value-added: Includes wages and salaries, interest, rent, profits, and indirect taxes paid by businesses. In the IMPLAN results tables, Value-added equals the sum of Labor Income, Other Property Type Income, and Indirect Business Taxes.

