

# Aberdeen Creek Dredging Project – Restarting an Economic Engine

July 2015

**Thomas J. Murray**  
**Virginia Institute of Marine Science**  
**Virginia Sea Grant-Affiliated Extension**



**VIMS Marine Resource Report No. 2015-9**  
**VSG-15-02**

Additional copies of this publication are available from:

Thomas J. Murray  
Marine Advisory Services  
Virginia Institute of Marine Science  
P.O. Box 1346  
Gloucester Point, VA 23062  
804/684-7190  
[tjm@vims.edu](mailto:tjm@vims.edu)  
[www.vims.edu/adv](http://www.vims.edu/adv)

Cover Photo: Overhead aerial view from Google Earth.

This work is a result of research sponsored in part by, under Grant No. NA13NOS4190135, to the Virginia Department of Environmental Quality through the Virginia Coastal Zone Management Program. The views expressed herein do not necessarily reflect the views of any of those organizations.

In addition, this work is affiliated with the Virginia Sea Grant Program, by NOAA Office of Sea Grant, U.S. Department of Commerce, under Grant No. NA10OAR4170085. The views expressed herein do not necessarily reflect the views of any of those organizations.

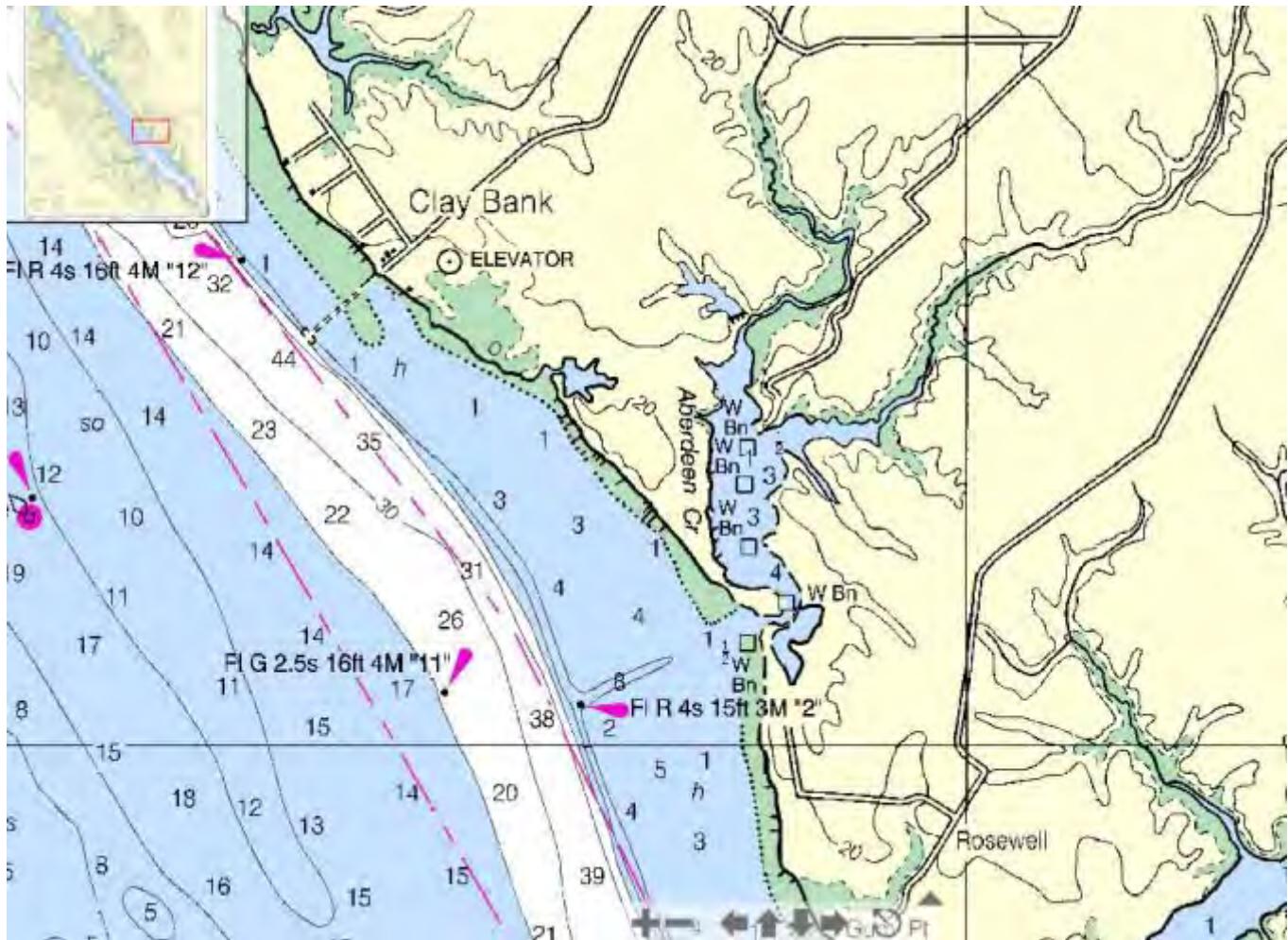


## Overview and Purpose of the Study

This study was performed to illustrate and quantify how much working waterfronts in this case, a small waterway serving seafood unloading and processing facility, contribute to the local and regional economy. Gloucester commercial workboats returning from harvesting trips face an often difficult navigation of Aberdeen Creek to unload at what once was the Gloucester Seafoods was a significant landing and processing facility. Aberdeen Creek is a classic example of a working waterway representing a critical nexus between the marine fisheries and the community; providing one of the few remaining commercial fishing unloading points in Gloucester. In view of this, the facilities economic place in the community once unique, may again be fiscally important.

This study estimates the economic impact (i.e., expenditures, economic output, incomes, and jobs) of Aberdeen Creek's commercial fisheries landings, processing/packing industry to the local economy. Gloucester's commercial fisheries

industry has historically represented an important component of the Commonwealth's commercial seafood industry. The off-loading of fishery products at the Gloucester landing facility sets in motion a number of economic activities that results in the sale of fresh and frozen value-added seafood products outside of Gloucester. These economic activities include spending and re-spending of dollars, which creates incomes and jobs within several associated industries and markets. The amount of economic activity associated with the Gloucester landings is directly related to the volume of seafood off-loaded into the local processing facilities. The volume harvested is determined by the number of watermen unloading at the facility which is also determined by a number of factors such as availability of competitive unloading facilities, stock abundance and fishing effort, which are in turn affected by environmental conditions in the regions, short-term weather conditions, and the general market for seafood specific fishery products such as flounder.



## **Methodology**

### **Collecting the Necessary Data**

In order to understand the linkages with related industry sectors associated with off-loading, processing and packing seafood in Gloucester, interviews were conducted with the owners of seafood facilities in Gloucester and the middle peninsula who have recently begun to use Aberdeen Creek as an loading and unloading point primarily for hard crabs and oyster production.

### **Economic Impact Estimation**

The fishery landing information collected is utilized in estimating the beginning economic activities in the Gloucester Economy. These economic activities take the form of initial expenditures, economic output, wages and salaries, and employment.

Values for each of these are estimated by employing the IMPLAN model, a computer software and database package designed for regional economic impact analysis in the United States at the county level (Minnesota Implan Group, Inc., 1997). The analytical framework for IMPLAN is the “input-output” economic modeling approach originally described by Leontief (1959). The model utilizes databases consisting of a set of social/economic accounts which describe the structure of the US economy in terms of transactions between households, governments, and over 500 standardized industry sectors classified on the basis of the primary commodity or service produced.

Regional models may be constructed in IMPLAN for any county, group of counties, or state or territory in the United States. Economic impacts and activities for a given region are specified in IMPLAN as a change in final demand, output, or employment for a particular industry sector or social institution (e.g., households, government). The aggregate economic impact of these changes is calculated by a matrix inversion procedure that develops economic multipliers, which reflect the direct, indirect and induced impacts. Direct, indirect, and induced impacts are set in motion within Gloucester County by changes in the supply and demand of raw seafood, which in turn affects the demand for the goods and services associated with producing raw seafood.

### **Gloucester Seafood**

The commercial seafood industry in Gloucester and the Middle Peninsula represents a “basic” industry e.g. producing a product for sale outside the local area. Dollars generated

through these out-of-county sales (or consumption locally by non-residents), when re-spent in the community, produce additional countywide economic impacts. A “basic” industry directly affects economic activity in the region when its product is sold outside the local area. For the commercial seafood industry in Gloucester, this would include sales, jobs, and earnings generated in commercial fishing and other activities related to the preparation of the seafood for shipping to market. These direct activities produce additional indirect effects in the local economy as dollars earned through the sale of seafood are re-spent locally. Indirect effects represent purchases of local products by seafood vessels, such as ice, fuel, gear and net repair, groceries, etc. All the indirect effects are additional economic activity in the community and are indicative of additional jobs and income generated by the sale of seafood outside the community.

Direct and indirect activities associated with commercial seafood harvesting, processing and the sale of seafood outside Gloucester then produce additional (induced) local impacts. These impacts are associated with the spending of income earned in the direct and indirect activities. This spending translates into local retail sales, local bank deposits, and the purchase of a diverse mix of consumer goods. An assessment of the total economic impact of a basic industry, such as commercial seafood on Gloucester, must consider the sum of the direct, indirect, and induced activities. In essence, the sale of Gloucester landed fishery products outside the community triggers a chain of local spending, which generates income and leads to additional spending. This process, however, is not infinite in nature. At each round of spending, for example, some dollars are lost (leaked) from the local economy. Leakages are in the form of savings in non-local institutions, taxes/fees paid to the state and federal governments, and payments for goods and services used in the preparation of raw seafood for market, which are initially purchased outside the local area. Thus, the true economic impact from non-local sales of Gloucester-landed seafood is represented by the new dollars remaining after accounting for the various leaks in the “economic hull” of the Gloucester economy and the Gloucester seafood processing/packing industry.

Total economic activities and impacts to the Gloucester economy associated with off-loading seafood in Gloucester are estimated below (Table 1). The direct, indirect, and induced affects, in terms of economic output (sales of seafood), personal incomes, total value added (wholesale margin), and employment is estimated via the IMPLAN model. The estimates are from actual landings and financial information for 2012.

## Results

### Gloucester Industry / Economy Linkages

The economic linkages between the Gloucester seafood processing/packing industry and other sectors of the local economy were revealed in part through individual interviews and consultations with members of the local business community in Gloucester.

The economic activities associated with the seafood industry are set in motion by the landing of seafood raw seafood flows to the processors/packers as dockside revenues flow to the vessels. The raw seafood is then processed (gutted, graded, boxed, iced, etc.) by the processors/packers. To accomplish this task, however, supplies are purchased from local suppliers of goods and services, while labor is purchased from local households.

Some seafood is sold to local seafood distributors and retailers, but the majority is sold to wholesale firms outside of the region. The revenue generated by these “export” sales represents new dollars in the Gloucester economy are then spent again and again within the local economy as earnings by local households are used to purchase goods and services from other local businesses and seafood from local seafood dealers. In addition, dockside revenues initially paid to seafood vessels is used by crewmembers to purchase goods and services from both fishing-related suppliers and other local businesses. Some dockside revenues are used to purchase labor from local households as seafood vessel crewmembers. Some dockside revenues may also be retained in the local economy by vessel

Harvest Only		Table 1. Aberdeen Creek Harvest Landed in Gloucester County							
		Baseline	Baseline + Increment Year 1	Baseline + Increment Year 2	Baseline + Increment Year 3	Baseline + Increment Year 4	Baseline + Increment Year 5	Baseline + Increment Year 6	Baseline + Increment Year 7
Labor Income Impacts	Direct Impacts	\$0.75	\$0.78	\$0.82	\$0.86	\$0.90	\$0.93	\$0.97	\$1.01
	Indirect Impacts	\$0.07	\$0.08	\$0.08	\$0.09	\$0.09	\$0.09	\$0.10	\$0.10
	Induced Impacts	\$0.10	\$0.10	\$0.10	\$0.11	\$0.11	\$0.12	\$0.12	\$0.13
	Total	\$0.92	\$0.96	\$1.01	\$1.05	\$1.10	\$1.15	\$1.19	\$1.24
Indirect Business Tax Impacts	Direct Impacts	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.04
	Indirect Impacts	\$0.01	\$0.01	\$0.01	\$0.01	\$0.02	\$0.02	\$0.02	\$0.02
	Induced Impacts	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03	\$0.04	\$0.04
	Total	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08	\$0.09	\$0.09
Other Property Income Impacts	Direct Impacts	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03
	Indirect Impacts	\$0.02	\$0.02	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.03
	Induced Impacts	\$0.09	\$0.09	\$0.09	\$0.10	\$0.10	\$0.11	\$0.11	\$0.12
	Total	\$0.13	\$0.14	\$0.14	\$0.15	\$0.15	\$0.16	\$0.17	\$0.17
Total Value Added Impacts	Direct Impacts	\$0.80	\$0.83	\$0.87	\$0.91	\$0.95	\$0.99	\$1.03	\$1.07
	Indirect Impacts	\$0.11	\$0.11	\$0.12	\$0.12	\$0.13	\$0.14	\$0.14	\$0.15
	Induced Impacts	\$0.21	\$0.22	\$0.23	\$0.24	\$0.25	\$0.26	\$0.27	\$0.28
	Total	\$1.11	\$1.17	\$1.22	\$1.28	\$1.33	\$1.39	\$1.45	\$1.50
Output Impacts	Direct Impacts	\$3.50	\$3.68	\$3.85	\$4.03	\$4.20	\$4.38	\$4.55	\$4.73
	Indirect Impacts	\$0.21	\$0.22	\$0.23	\$0.24	\$0.25	\$0.26	\$0.27	\$0.28
	Induced Impacts	\$0.35	\$0.37	\$0.38	\$0.40	\$0.42	\$0.44	\$0.45	\$0.47
	Total	\$4.05	\$4.26	\$4.46	\$4.66	\$4.87	\$5.07	\$5.27	\$5.47
Employment Impacts	Direct Impacts	99	104	109	114	119	124	129	134
	Indirect Impacts	2	2	2	2	2	2	2	3
	Induced Impacts	3	3	4	4	4	4	4	4
	Total	105	110	115	120	125	131	136	141

owners who reside in Gloucester households. Finally, some of this revenue is used to re-initiate the process by purchasing the next load of seafood that arrives at the dock.

### Economic Impacts Associated with Gloucester Seafood Industry

The economic impacts associated with the seafood industry on Gloucester were estimated with IMPLAN. Estimates for only one set of annual assumptions for a given year or set of resource/market conditions may be significantly different in the following year.

## **Findings of the IMPLAN Economic Impact Analysis**

The magnitude of the estimated economic impacts is directly related to landings volumes, dockside price, wholesale markup, and the export percentage. Thus, the actual economic impacts associated with the Gloucester seafood industry will vary from year to year. As landings increase, the economic impacts will increase (assuming all other factors remain proportionally constant). Similarly, as landings or market price for seafood decrease, the economic impacts will also likely fall.

This is of interest given the reported constraints on moorage space that confront the seafood processing/packing activities on Gloucester. Seafood-laden vessels returning from a trip will moor in a parallel fashion at the dock in front of one of the facilities. The seafood is off-loaded by hand or mechanically. This task is time consuming and requires the use of both vessel deckhands and workers

from the landside. Once the vessel is emptied, it will move out of the way to make room for the next vessel to be off-loaded. The empty vessel will moor at an adjacent location and begin servicing (i.e., maintenance, refueling, repair, etc.) required for the next trip. Vessels will be moored three and four abreast for several days as they wait servicing for the next trip. The logistics of accepting additional vessels to be off-loaded becomes a problem when there is insufficient room at the docks to moor empty vessels. When the moorage space within the basin is fully utilized, incoming vessels may need to be off-loaded at other suitable locations which are limited in number and capability.

In such an event the economic activity associated with the seafood products that would have been off-loaded in Gloucester is lost to the local economy; as well as the provisioning of the vessels for the next fishing voyage. These values provide an estimate of the economic impact that is lost to the local economy if a seafood vessel is turned away from Gloucester and off-loaded in an alternative port facility out of the region.

## **Aberdeen Creek Value Added Analysis**

As an additional inquiry the amount of locally landed seafood that remains in the County for further processing, handling and distribution at the wholesale and retail levels determine the additional impact of every dollar of seafood products landed at Aberdeen Creek.

There is not detailed market channel distribution information for Gloucester landed seafood to determine how much of the product adds additional value added levels to the community via processing, secondary wholesale and consumption (both retail and food service). It is known via the interview process that considerable quantities of crabs and oysters ultimately are consumed in Gloucester County or are subject to further value added distributions. To address that additional economic activity and for the sake of exposition it is assumed for additional modelling purposes that 25% or 50% of the product landed via Aberdeen Creek remains in County for additional value added activity. The impacts associated with the product flow/mark up assumptions are shown in Tables 2-5.

**Table 2. Markup and Value Added—25% of Aberdeen Creek Harvest Remains in Gloucester**

	<b>Value of Inputs</b>	<b>Markup (%)</b>	<b>Markup (\$)</b>	<b>Output Value</b>
Primary Wholesale	\$0.88	77.5%	\$0.68	\$1.55
Processors / Secondary Wholesale	\$1.55	62.7%	\$0.97	\$2.53
Retail: Food Service	\$1.26	182.4%	\$2.30	\$3.57
Retail: Food Marketing	\$1.26	33.4%	\$0.42	\$1.69

Harvesters + Processing		Table 3. Gloucester County—25% Aberdeen Creek Harvest Remains in County							
		Baseline	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Labor Income Impacts	Direct Impacts	\$3.33	\$3.49	\$3.66	\$3.83	\$3.99	\$4.16	\$4.33	\$4.49
	Indirect Impacts	\$0.15	\$0.15	\$0.16	\$0.17	\$0.18	\$0.18	\$0.19	\$0.20
	Induced Impacts	\$0.40	\$0.42	\$0.44	\$0.46	\$0.48	\$0.50	\$0.52	\$0.54
	Total	\$3.87	\$4.07	\$4.26	\$4.46	\$4.65	\$4.84	\$5.04	\$5.23
Indirect Business Tax Impacts	Direct Impacts	\$0.10	\$0.10	\$0.11	\$0.11	\$0.12	\$0.12	\$0.13	\$0.13
	Indirect Impacts	\$0.02	\$0.02	\$0.02	\$0.03	\$0.03	\$0.03	\$0.03	\$0.03
	Induced Impacts	\$0.12	\$0.12	\$0.13	\$0.13	\$0.14	\$0.14	\$0.15	\$0.16
	Total	\$0.24	\$0.25	\$0.26	\$0.27	\$0.28	\$0.30	\$0.31	\$0.32
Other Property Income Impacts	Direct Impacts	\$0.66	\$0.69	\$0.73	\$0.76	\$0.79	\$0.83	\$0.86	\$0.89
	Indirect Impacts	\$0.06	\$0.07	\$0.07	\$0.07	\$0.08	\$0.08	\$0.08	\$0.09
	Induced Impacts	\$0.36	\$0.38	\$0.40	\$0.41	\$0.43	\$0.45	\$0.47	\$0.49
	Total	\$1.09	\$1.14	\$1.19	\$1.25	\$1.30	\$1.36	\$1.41	\$1.47
Total Value Added	Direct Impacts	\$4.09	\$4.29	\$4.50	\$4.70	\$4.91	\$5.11	\$5.31	\$5.52
Impacts	Indirect Impacts	\$0.23	\$0.24	\$0.26	\$0.27	\$0.28	\$0.29	\$0.30	\$0.31
	Induced Impacts	\$0.88	\$0.92	\$0.96	\$1.01	\$1.05	\$1.10	\$1.14	\$1.18
	Total	\$5.20	\$5.46	\$5.72	\$5.98	\$6.24	\$6.50	\$6.76	\$7.02
Output Impacts	Direct Impacts	\$7.42	\$7.79	\$8.17	\$8.54	\$8.91	\$9.28	\$9.65	\$10.02
	Indirect Impacts	\$0.47	\$0.50	\$0.52	\$0.55	\$0.57	\$0.59	\$0.62	\$0.64
	Induced Impacts	\$1.47	\$1.54	\$1.62	\$1.69	\$1.76	\$1.84	\$1.91	\$1.99
	Total	\$9.37	\$9.84	\$10.30	\$10.77	\$11.24	\$11.71	\$12.18	\$12.65
Employment Impacts	Direct Impacts	160	168	176	184	192	200	208	216
	Indirect Impacts	4	4	4	5	5	5	5	5
	Induced Impacts	14	15	15	16	17	17	18	19
	Total	178	187	196	204	213	222	231	240

**Table 4. Markup and Value Added – 50% of Aberdeen Creek Harvest Remains in Gloucester**

	Value of Inputs	Markup (%)	Markup (\$)	Output Value
Primary Wholesale	\$1.75	77.5%	\$1.36	\$3.11
Processors / Secondary Wholesale	\$3.11	62.7%	\$1.95	\$5.05
Retail; Food Service	\$2.53	182.4%	\$4.61	\$7.14
Retail Markets	\$2.53	33.4%	\$0.84	\$3.37

**Table 5. Gloucester Count Impacts—50% of Products Remains in Gloucester**

	Baseline						
	+ Increment Year 1	+ Increment Year 2	+ Increment Year 3	+ Increment Year 4	+ Increment Year 5	+ Increment Year 6	+ Increment Year 7
Labor Income Impacts	Direct Impacts	\$5.91	\$6.20	\$6.50	\$6.79	\$7.09	\$7.39
	Indirect Impacts	\$0.22	\$0.23	\$0.24	\$0.25	\$0.26	\$0.27
	Induced Impacts	\$0.71	\$0.74	\$0.78	\$0.81	\$0.85	\$0.88
	Total	\$6.83	\$7.17	\$7.52	\$7.86	\$8.20	\$8.54
Indirect Business Tax Impacts	Direct Impacts	\$0.17	\$0.18	\$0.19	\$0.20	\$0.21	\$0.22
	Indirect Impacts	\$0.03	\$0.03	\$0.04	\$0.04	\$0.04	\$0.04
	Induced Impacts	\$0.20	\$0.21	\$0.22	\$0.23	\$0.24	\$0.25
	Total	\$0.41	\$0.43	\$0.45	\$0.47	\$0.49	\$0.51
Other Property Income Impacts	Direct Impacts	\$1.30	\$1.37	\$1.43	\$1.50	\$1.56	\$1.63
	Indirect Impacts	\$0.11	\$0.11	\$0.12	\$0.12	\$0.13	\$0.13
	Induced Impacts	\$0.63	\$0.67	\$0.70	\$0.73	\$0.76	\$0.79
	Total	\$2.04	\$2.15	\$2.25	\$2.35	\$2.45	\$2.55
Total Value Added Impacts	Direct Impacts	\$7.38	\$7.75	\$8.12	\$8.49	\$8.86	\$9.23
	Indirect Impacts	\$0.36	\$0.38	\$0.39	\$0.41	\$0.43	\$0.45
	Induced Impacts	\$1.54	\$1.62	\$1.70	\$1.78	\$1.85	\$1.93
	Total	\$9.28	\$9.75	\$10.21	\$10.68	\$11.14	\$11.60
Output Impacts	Direct Impacts	\$11.35	\$11.91	\$12.48	\$13.05	\$13.62	\$14.18
	Indirect Impacts	\$0.74	\$0.78	\$0.82	\$0.85	\$0.89	\$0.93
	Induced Impacts	\$2.59	\$2.72	\$2.85	\$2.98	\$3.11	\$3.24
	Total	\$14.68	\$15.41	\$16.15	\$16.88	\$17.62	\$18.35
Employment Impacts	Direct Impacts	220	231.46	242	254	265	276
	Indirect Impacts	6	\$6.43	7	7	7	8
	Induced Impacts	25	25.78	27	28	29	31
	Total	251	263.67	276	289	301	314

## Conclusions

The seafood processing/packing industry on Gloucester represents an important component of the local economy. Activities associated with harvesting, offloading, processing, packing, and shipping seafood from the Gloucester facilities has been shown to be intrinsically linked with several sectors of the local economy. These activities create positive economic impacts to the local economy as seafood products are sold to buyers located outside of Gloucester and non-residents purchase seafood locally. The sale of seafood to both local and non-local buyers results in the purchase of inputs from a variety of service and supply firms, and the distribution of incomes to local employees. These expenditures are circulated within the Gloucester economy as these dollars are spent and re-spent. The total economic impact of the Gloucester seafood industry depends on the amount of seafood landings and the general economic conditions that exist at any given time. Thus, the actual impact values will vary from year to year.

The recent resurgence of seafood landings at Aberdeen Creek provide a glimpse of what may be in the future. The tables above summarized a post dredging build-out in landings based upon an average increase of 5% per year. As summarized below in Table 6, even the existing economic activity is already significant for just the landings at Aberdeen Creek. As is also shown much of the product may remain in the County for further processing and distribution adding to the actual economic impacts are significant.

These values can also be viewed as the losses associated with an offloading event that may be diverted from Gloucester if commercial fishing waterfront facilities in Gloucester are inaccessible due to water depth or otherwise made unavailable.

This study has shown that the seafood processing/packing industry on Gloucester generates positive economic impacts to the local economy. Any decisions to address the water access for commercial seafood operations such as those that currently exist should carefully consider the economic contributions associated with the industry, while comparing against the costs of creating additional moorage space or reconfiguring the existing dock space.

**Table 6. Total Economic Impacts Based on Aberdeen Creek Product Flow (\$ Millions)**

Impact Measure	Landings Only	25% Remains in County	50% Remains In County
Output	\$4.05	\$9.37	\$14.68
Income	92	3.87	6.83
Employment	105	178	251
Value Added	1.11	5.20	9.28
Indirect Business Taxes	.07	.24	.41
Other Property Income Impacts	\$1.13	\$1.09	\$2.04

## References

- Leontief, W. 1959. The problem of quantity and quality in economics. *Daedalus*, 88(4), 45–57.
- Kirkley, J. E. and T. J. Murray. 2005. Economic Contributions of Virginia's Commercial Seafood and Recreational Fishing Industries: A User's Manual for Assessing Economic Impacts. VIMS Marine Resource Report No. 2005-9.
- Minnesota IMPLAN Group, Inc. 2008. IMPLAN Professional 3.0, Economic Impact and Social Accounting Software and Data. 2010 IMPLAN State Package for Virginia. Stillwater, MN. <http://www.implan.com>.
- Murray, T. J. and K. Hudson. 2013. Economic Activity Associated with Shellfish Aquaculture in Virginia - 2012. VIMS Marine Resource Report No. 2013-4.