



Valuing the Coast: Economic Impacts of Connecticut's Maritime Industry

A Report by
Connecticut Sea Grant

Robert S. Pomeroy
Nataliya Plesha and
Umi Muawanah

March 2013

Sea Grant is a national network comprised of 32 Sea Grant programs based at flagship universities in coastal and Great Lake states throughout the U.S. and Puerto Rico. The National Sea Grant College Program encourages the wise stewardship of our marine resources through research, education, outreach and technology transfer. The Program is focused on making the United States the world leader in marine research and the sustainable development of marine resources.

About the authors

Robert S. Pomeroy is a Professor in the Department of Agricultural and Resource Economics and Connecticut Sea Grant College Fisheries Extension Specialist at the University of Connecticut, based at Avery Point in Groton.

Nataliya Plesha, PhD candidate in the Department of Agricultural and Resource Economics, is the first recipient of the Agricultural & Applied Economics Association Graduate Teaching Award.

Umi Muawanah is a Sea Grant Knauss Fellow working at the Division of Fish and Wildlife Service in the U.S. Department of Interior.

Acknowledgements

Special thanks to Dr. Sylvain DeGuise, Director, Connecticut Sea Grant for supporting this project. Thank you to Dr. Rigoberto Lopez and Dr. Deepak Joglekar of the Department of Agricultural and Resource Economics at the University of Connecticut for helpful comments. We also would like to express appreciation to Susan Schadt for a creative graphic design and to Peg Van Patten for useful suggestions.

STUDY HIGHLIGHTS

Scope and Methodology

The goal of this study was to ascertain and document the significance of the maritime industry to Connecticut's economy. The specific objective was to estimate the total economic impact of maritime industry sectors through the use of an economic model of the Connecticut economy. This study defines the Connecticut maritime industry as including, but not limited to, shipbuilding, commercial fishing, aquaculture, tourism, recreational boating and fishing, marine manufacturing, marine engineering, port services, marine terminal operation, marine construction, marina operation, marine environmental services, and marine transportation. Because this industry buys goods and services from other industries in the state and hires local labor, its economic impacts cascade throughout the entire state economy.

This analysis is undertaken through selection of seven study sectors identified in the United States Department of Commerce (DOC) classification as directly related to the maritime industry in Connecticut. These included:

- Commercial fishing,
- Seafood product preparation and packaging,
- Ship building and repairing,
- Boat building,
- Transport by water,
- Scenic and sightseeing transportation and support activities for transportation, and
- Amusement and recreation activities.

Results of the Analysis

For the seven sector grouping, the estimated total output impact at the state level was **nearly \$7 billion** in 2010 (approximately \$2000 per Connecticut resident). Connecticut's maritime economy contributes nearly 40,000 jobs to the state. **The total value-added impact at the state level is \$4 billion.** For comparison, the gross domestic product for the State of Connecticut in 2010 was **\$233 billion.**

For more information about the results reported here, visit: www.seagrant.uconn.edu





TABLE OF CONTENTS

Introduction	page 5-7
Methodology	page 8-11
Measure of Impact	page 9-10
Sector Selection	page 10-11
Study caveats and Limitations	page 11
Results and Analysis	page 12-15
Concluding Remarks	page 16
References	page 17
Appendix	page 19-23

VALUING THE COAST: ECONOMIC IMPACTS OF CONNECTICUT'S MARITIME INDUSTRY

INTRODUCTION

The goal of this study is to ascertain and document the significance of the maritime industry to Connecticut's economy. The specific objective is to estimate the total economic impact of maritime industry sectors through the use of an economic model of the Connecticut economy. This study defines the Connecticut maritime industry as including, but not limited to, shipbuilding, commercial fishing, aquaculture, tourism, recreational boating and fishing, marine manufacturing, marine engineering, port services, marine terminal operation, marine construction, marina operation, marine environmental services, and marine transportation. Because this industry buys goods and services from other industries in the state and hires local labor, its economic impacts cascade throughout the entire state economy.

Regional economic modeling, such as input-output models, can be used to capture the economic scope of maritime industry sectors, their linkages to the rest of the state economy, and translate direct sales into statewide output and jobs to account for coastal industries' purchase of goods and services from other industries. Results of such studies can be used for policy and economic development purposes.

Connecticut's Maritime Industry

The maritime industry has always been a vital component of Connecticut's economic base and heritage. Ports and waterways support a wide range of commercial enterprises. Business sectors within this industry include shipbuilding, commercial fishing, aquaculture, marine manufacturing, marine engineering, port services, marine terminal operation, marine construction, marina operation, marine environmental services, and marine transportation. Commercial fishing exists in clusters up and down the coast and is still an important component of Connecticut's coastal economy.





In addition, the waterways and shorelines provide a venue for recreation and tourism, and particularly an ever-increasing number of recreational boats and personal watercraft. Coastal Connecticut includes the four counties of New London, Fairfield, New Haven and Middlesex. The region consists of 36 towns, including several of the largest cities of the state (Figure 1).

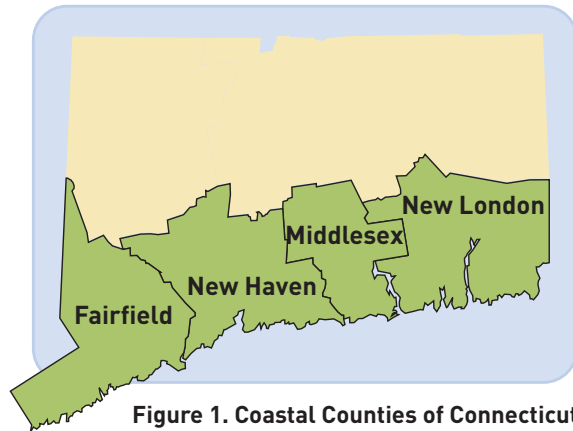


Figure 1. Coastal Counties of Connecticut

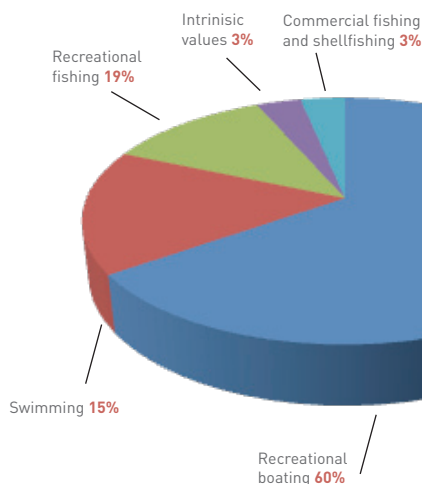
Two past studies have examined the economic impact of maritime industry sectors in Connecticut.

A 1992 study, conducted by Dr. Marilyn Altobello, of the Department of Agricultural and Resource Economics of the University of Connecticut, examined the economic importance of Long Island Sound's (LIS) water quality-dependent activities. The study focused on Long Island Sound (including both Connecticut and New York) and estimated use values for commercial finfishing and shellfishing, recreational beach swimming, boating and sportfishing. It also estimated the

"multiplier effects" resulting from commercial finfishing and shellfishing and recreational activities, and coastal wetland values and intrinsic or "non-use value". Using commercial fishing as an example, value would include the income received by a fisherman for his catch. *Direct effects* would include the fisherman's expenditures for necessities associated with his business, such as boat fuel, fishing gear, ice and insurance. *Indirect or multiplier effects* would include wages paid to employees of fishing-related businesses and subsequently spent on goods and services by those wage earners.

The total annual use-value estimates, which include **commercial finfishing and shellfishing and recreational activities and intrinsic** amounted to slightly

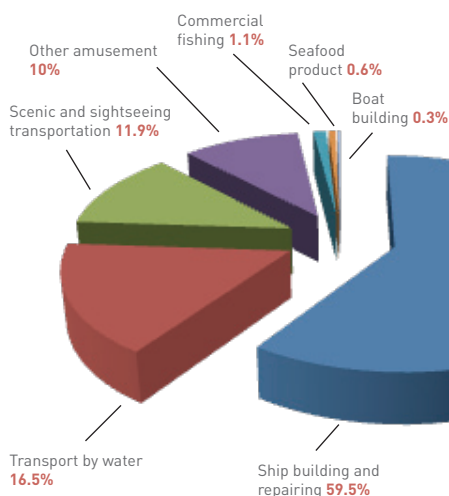
Figure 2. Overall Economic Effect by Selected Coastal Industries of Long Island Sound (1992)



over \$5.5 billion in 1990, and the total economic values for wetlands were estimated at \$93.75 million for 1990. It was estimated that recreational boating has the greatest overall economic effect (60% of the total LIS value), followed by recreational fishing (19%), and then by swimming (15%) (Figure 2). Of additional, but lesser, economic importance are commercial fishing and shellfishing (3%) and intrinsic values - those that are not easily measured, including intangibles such as aesthetics and uncertainties such as future demand (3%). **The estimated use value from Connecticut alone was \$2 billion dollars in 1990.**

In 2010, the Connecticut Maritime Coalition (CMC) commissioned a study, *The Economic Impact Study of Maritime Industries* in Connecticut. A consulting firm undertook the study to prepare an economic assessment of Connecticut's maritime industry sectors and its effects on the overall State's economy. The study assessed the direct, indirect and induced economic effects of the maritime-related industries and clusters in Connecticut using a combination of telephone and in-person interviews, compilation of available and pertinent secondary source data, and application of economic modeling techniques. The study used an input-output model, called the R/ECON™ I-O model, developed by Rutgers University. The evaluation results provide business output (revenues), jobs, household income, value added and local/state/federal taxes associated with the maritime industries identified by the CMC as critical elements of the State's maritime economy.

Figure 3. 2010 Sales of Connecticut Coastal Industry Related Sectors



The study found that in 2007, **Connecticut's maritime-dependent industries**, including their suppliers and related economic activities (total direct, indirect and induced effects that reflect changes in local spending from income changes in the affected industry sectors), were **estimated to account for over \$5 billion in business output, generating 30,000 jobs; approximately \$1.7 billion in household income; and \$2.7 billion in Connecticut's gross domestic product (GDP).** As a consequence of these direct, indirect, and induced economic effects within the statewide economy, maritime industries annually account for over \$56 million in taxes paid to local communities, \$54 million in State tax revenues, and over \$224 million in Federal tax revenues.

Wages within Connecticut's maritime-dependent industries averaged nearly \$63,000 per year per job in 2007. This average wage is 15 percent higher than the average wage of \$55,000 reported for all jobs in Connecticut in 2007. Ship building and repairing leads primary coastal industries; accounting for more than half of total sales (i.e., \$2,039 million in 2010), followed by transport by water, scenic and sightseeing transportation, and other amusement and recreation industries (Figure 3). Seafood products and boat building sectors account for the smallest share in total sales in the state.



METHODOLOGY

Because maritime industries purchase goods and services from other industries and hire local labor, its economic impact cascades throughout the state's economy. Maritime industries include such activities as fisheries, aquaculture, shipping, marinas, and tourism. Using direct sales of coastal industries, this study estimates the total economic impact of maritime industries through the use of an economic model of the Connecticut economy. This input-output model will capture the scope of coastal industries, their linkages to the rest of the state economy, and translate direct sales into statewide output and jobs to account for maritime industries purchase of goods and services from other industries.

In economics, an input-output model is a quantitative economic technique that represents the interdependencies between different branches of the economy (Isard 1960; Lahr and Dietzenbacher 2001; Leontief 1986; Miller and Blair 2009; ten Raa 2005; US Department of Commerce 1997). Wassily Leontief developed this type of analysis. Leontief's contribution was to state the model in such a way as to make computation feasible. He used a matrix representation of a nation's (or a region's) economy. His model depicts inter-industry relations of an economy. It shows how the output of one industry is an input to each other industry. Leontief put forward the display of this information in the form of a matrix. A given input is typically enumerated in the column of an industry and its outputs are enumerated in its corresponding row. This format, therefore, shows how dependent each industry is on all others in the economy both as customer of their outputs and as supplier of their inputs. Each column of the input-output matrix reports the monetary value of an industry's inputs and each row represents the value of an industry's outputs. Because the input-output model is fundamentally linear in nature, it lends itself well to rapid computation as well as flexibility in computing the effects of changes in demand. The structure of the input-output model has been incorporated into national accounting in many developed countries, and as such forms an important part of measures such as GDP (an indicator of the health of the nation's economy). In addition to studying the structure of national economies, input-output economics has been used to study regional economies

within a nation, and as a tool for national and regional economic planning. Indeed, a main use of input-output analysis is for measuring the economic impacts of events as well as public investments or programs. But it is also used to identify economically-related industry clusters and also so-called “key” or “target” industries—industries that are most likely to enhance the internal coherence of a specified economy. By linking industrial output to satellite accounts articulating energy use, effluent production, space needs, and so on, input-output analysts have extended the application of this approach to a wide variety of uses.

This study uses IMPLAN (Impact analysis for PLANning: Minnesota IMPLAN Group, Inc.) software to evaluate the economic impacts of Connecticut maritime industries, aiming to capture the scope of the maritime industry, its linkages to the rest of the state economy, and to

assess its contribution to statewide output and jobs. IMPLAN is a widely used model for input-output analysis. The IMPLAN model has recently been used to evaluate the economic impacts of Connecticut’s agricultural industry (ARE 2010).

IMPLAN looks at incremental impacts as a sector increases or decreases in activity via built-in multipliers based on input-output tables of the economy. The IMPLAN model uses as input the direct sales from a sector or the industry and calculates economy-wide impacts through multipliers (see Table A1 of the Appendix). Generally, economic multipliers estimate the economy-wide impact on related economic sectors of changes in one sector in the identified economy, such as a state, across all other sectors of the economy. An important feature of the IMPLAN model is that it focuses on “supply” to an industry, treating the sector of interest as the point of final “demand”.

Measures of Impacts

The IMPLAN model provides a means to capture not only the direct impact of maritime industries but also the indirect and induced impacts that occur when maritime industry’s dollars work their way through the economy. To be more specific, IMPLAN uses three effects to measure economic impact: direct effect, indirect effect and induced effect.

- Direct effect refers to production change associated with a change in demand for the good itself. It is the initial impact to the economy;
- Indirect effect refers to the secondary impact caused by changing input needs of directly affected industries (i.e., additional input purchases to produce additional output); and
- Induced effect is caused by changes in household spending due to the additional employment generated by direct and indirect effects.

Using the IMPLAN model, the study will develop three indicators of the economic importance or

impacts of maritime industries: (1) Total impact on state output, the value of which is measured by statewide sales; (2) Total impact on state employment, which includes full-time and part-time jobs generated; and (3) Total impact on value added, which measures the value added to raw materials. Although the primary focus is on the total impacts at the state level, this report also discusses impacts at the county and subsector levels.

For example, the economic importance of the ship building and repairing, boat building and transport by water in Connecticut is not limited to the \$4,690.8 million worth of goods



and services sold by those sectors (the direct impact). Those sectors' effect extends to other sectors of the economy (e.g., forestry and steel sector) because ship building, boat building and transport by water businesses buy goods and services from those other sectors (the indirect impact). Also, employees of the ship building and repairing, boat building and transport by water may spend a significant portion of their earnings buying goods and services from firms within the state (the induced impact). The total sales impact of the ship building and repairing, boat building and transport by water industries are the sum of the direct, indirect, and induced impacts. The same implies to other multipliers such as employment and value added impacts of the industry.

Finally, it should be noted that estimated impacts are limited to Connecticut's economy including the countywide analysis. For example, if the boat building industry in Connecticut purchases parts for a

vessel from a company in New York, the indirect impact of this transaction will not be felt in the Connecticut economy.

In addition, input-output models incorporate several assumptions that impose some limitations on the interpretation of results:

- The input-output model assumes a constant production function for each firm within the industry. The economies of scale are not taken into account in the input-output model. For example, it assumes that the small and the large firm will use the same inputs in the same proportion;
- Output is assumed to be homogeneous assuming that the two firms would produce the same percentage of goods and services;
- Input-output model assumes that there are no additional constraints on the supply side of any commodity.

¹At the present time the U.S. national income accounts contain an account for the gross output and income from housing, and it may be desirable to develop special accounts dealing with energy. Such supplementary or satellite accounts (i.e., special key sector) need not necessarily be fully articulated with other sector or subsector accounts. But they should be consistent with and logically fit into the national accounting system

Sector Selection

This study uses the U.S. Department of Commerce (DOC) classification of sectors of the economy. This classification divides the economy into 440 sectors. It was agreed in advance that the primary sectors to be studied would include:

- Commercial and recreational fisheries
- Marine transportation and ports
- Tourism
- Recreational boating
- Aquaculture

This analysis is undertaken through selection of seven sectors identified in the DOC classification as directly related to the maritime industry in Connecticut. The DOC data used in the analysis is for 2010.

These included:

- Commercial fishing,
- Seafood product preparation and packaging,
- Ship building and repairing,
- Boat building,
- Transport by water,
- Scenic and sightseeing transportation and support activities for transportation, and
- Amusement and recreation activities.

However, this study does not specifically include aquaculture which plays an important part in the economy of Connecticut's coastal region.

The aquaculture sector is classified in the DOC classification as a sub-sector of the agriculture sector, and data is not separated from agriculture as a whole (IMPLAN, 2010). The Connecticut agriculture industry provides approximately 20,000 jobs statewide and \$3.5 billion in output (Department of Agricultural and Resource Economics, 2010). Aquaculture is a relatively small portion of the total agriculture sector in the state and thus including the whole agriculture sector would not provide a true indication of the impact of aquaculture on the economy. According to the Connecticut Department of Agriculture, Bureau of Aquaculture, the Connecticut shellfishing industry provides more than 300 jobs statewide and generates \$30 million plus in farm-gate sales annually.

The study is undertaken at three scales:

- Statewide
- Coastal region (four counties)
- Individual county (New London, Fairfield, New Haven and Middlesex)

Study Caveats and Limitations

This is a preliminary analysis of the economic value of the maritime economy of Connecticut. The study will be limited to the market value of the maritime economy relying on secondary data provided by the U.S. Department of Commerce. It should be noted that the estimated impacts are limited to Connecticut's economy.

This study does not analyze the non-market value of ecosystem services provided by natural resources of the Connecticut coast. Ecosystem services (ecological services) are economic benefits provided to society by nature such as water filtration, flood reduction, and drinking water supply. Nor does

the study estimate the market value of natural resources (the value of ecosystem services) of the Connecticut coast for habitat such as wetlands and marine waters. Also excluded are the scenic views and social benefits from the estimation that result from such maritime industries as tourism, shipping and fishing. These non-market benefits that are not measured by market earnings are equally important when one measures economic benefits of the industry. However, this will require more resources than are currently available and some primary data collection. The current study will serve as a foundation for these additional analyses.



RESULTS AND ANALYSIS

for the Seven Core Maritime Sectors

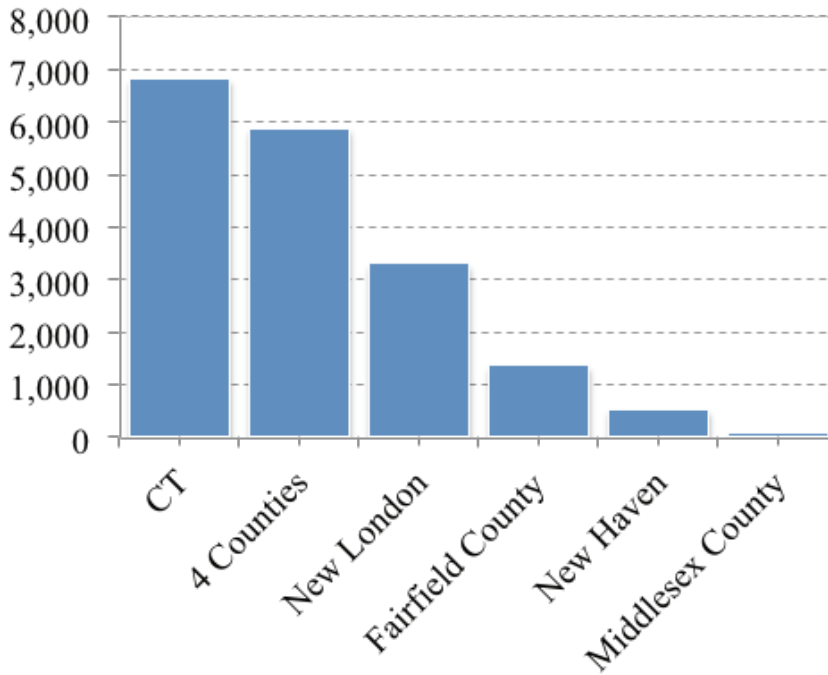
Total Output Impacts

The **total output impact** of maritime industries from seven core maritime sectors is presented in Figure 4 using state level and four coastal counties data for 2010. The **state level** and **four coastal counties output impacts** are **\$6.83** and **\$5.88 billion**, respectively. For these seven sectors, the **total four coastal counties output impact** comprises almost **86 percent** of the **total state impacts**. **Total output impact** of these sectors at the **county level** are **\$3,300**, **\$1,366**, **\$522.5**, and **\$87.9 million** for New London, Fairfield, New Haven and Middlesex County, respectively. Figure 4 shows that New London County has a little less than 50 percent of the total state output impacts. These estimated output impacts are **significantly higher** than the **\$2 billion** figure from the previous study by Altobello (1992). For comparison, the gross domestic product for the state of Connecticut in 2010 was \$233 billion (U.S. Bureau of Economic Analysis 2011).



Figure 4. Total output impact (influence of the economic sectors on the total of all state sales revenue in all sectors of the coastal economy) in 2010.

Total Output Impact (Million Dollars, 2010)



Detailed information on output impact for each of the seven selected sectors is shown in Table 1 for Connecticut, four counties, and each individual county. For Connecticut, ship building (for commercial and military purposes) is the sector contributing the most to the economy among the seven sectors. It is the same for the four counties, as well as New London County. However, for the other three counties, the most important sector contributing to the economy is transport by water for Fairfield; scenic and sightseeing transportation and support activities for transportation for New Haven; and other amusement and recreation industries for Middlesex.

Table 1. Total output impact by sector in 2010 million dollars

Sector	CT state	Four Counties	New London	Fairfield	New Haven	Middlesex
Commercial Fishing	65.1	63.9	15.8	9.2	23.4	12.5
Seafood product preparation and packaging	45.1	35.4	0.8	23.1	10.9	0.0
Ship building and repairing	3,664.6	3,519.2	2,982.4	0.0	1.3	0.0
Boat building	17.1	15.3	0.2	14.3	0.2	0.1
Transport by water	1,009.1	904.6	193.6	524.7	150.9	5.8
Scenic and sightseeing transportation and support activities for transportation	1,177.4	772.2	47.1	463.1	229.7	12.9
Other amusement and recreation industries	853.2	574.3	60.3	332.4	105.9	56.6

Total Employment Impact

Figure 5. Total maritime employment impact (full and part time jobs generated) on core (7) coastal sectors

Total maritime jobs generated in 2010

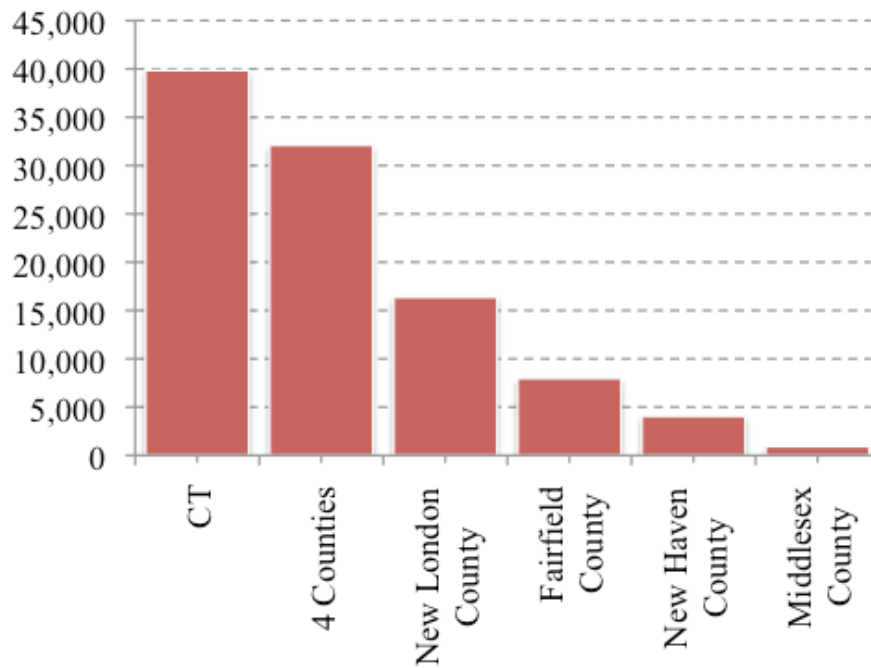


Table 2. Total employment impact (maritime jobs generated) by sector in 2010

Sector	CT state	Four counties	New London	Fairfield	New Haven	Middlesex
Commercial Fishing	820.6	811.9	184.8	69	338.2	212.3
Seafood product preparation and packaging	216.3	168.9	4.1	95.7	57.5	0
Ship building and repairing	17,607.1	16,724.2	14,434.4	0	6.6	0
Boat building	86.4	76.1	0.9	68.3	1.2	0.6
Transport by water	3,692.9	3,182.9	671	1,718.0	575.4	19.5
Scenic and sightseeing transportation and support activities for transportation	8,169.9	5,052.9	404.1	2,635.1	1,750.0	118.4
Other amusement and recreation industries	9,253.2	6,089.1	671.9	3,375.2	1,332.1	573.8



The total employment impact of maritime industries for the seven core sectors is presented in Figure 5 using State level and four coastal counties data for 2010. It exhibits a similar trend to total output impact with New London employment impact reaching about 75 percent of state level total employment impact. This study shows that Connecticut's maritime related industry is an important contributor to employment in the state. The state level and four-coastal counties total employment impacts are 39,846 and 32,106 jobs, respectively. For these chosen sectors, total four coastal counties employment impact comprises almost 86 percent of the total state impact. Total employment impacts for these sectors at county levels are 16,371, 7,961, 4,061, and 924 jobs for New London, Fairfield, New Haven and Middlesex County, respectively. Figure 5 shows that New London County has about 40 % of state employment impact. For comparison, there were 1,594,700 jobs in Connecticut in 2010 according to the Bureau of Economic Analysis (2011).

Total employment impact for each of the seven selected sectors is presented in Table 2 for Connecticut, four counties, and each county. Ship building is the sector contributing the most employment to the Connecticut economy among the seven sectors. It is the same for the four counties as well as New London County. However, for the other three counties, the most important sector contributing to employment is transport by water for Fairfield; scenic and sightseeing transportation and support activities for transportation for New Haven; and other amusement and recreation industries for Middlesex.





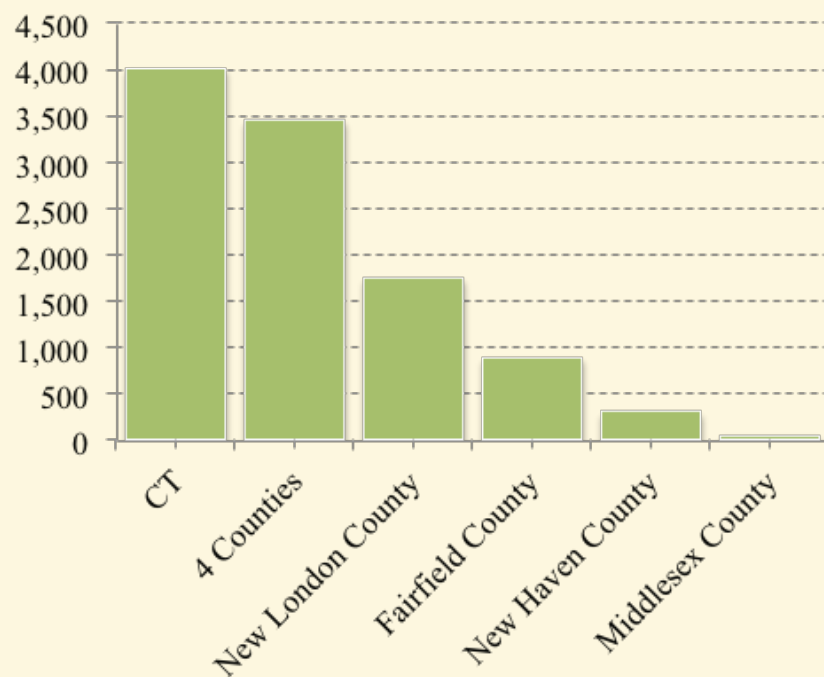
Total Value Added Impact

Value added impact is defined as the sum of salaries and wages earned by all workers in the state, income received by self-employed individuals, payments received by individuals and corporations in the form of interest, rents, royalties, dividends, and profit, and indirect business taxes paid by individuals to businesses (IMPLAN, 2004). This is an important measure of the impact of an economic sector. Hence, much of the value added by an economic activity, such as the maritime industry sectors, in a state is presented as money earned by the residents of the state, which they can then spend buying goods and services, inducing further economic activity in the state.

The total value added impact from the seven selected maritime sectors is presented in Figure 6. For state level and combined four counties, **the total added value impact is \$4,017.5 million and \$3,456 million, respectively**. Total added value impacts for the four individual counties are **\$1750.9, \$896.4, \$305.3 and \$54.11 million** for New London, Fairfield, New Haven, and Middlesex, respectively. The four counties total added value impact is almost 86 percent of total state level impact for the seven sectors. This implies that these seven sectors are major contributors to the state economy.

Figure 6. Total Value Added impact on core coastal sectors (salaries, wages, and other income added by an economic activity). Data is from the year 2010.

Total Value Added (Million Dollars,)





CONCLUDING REMARKS

The goal of this study is to ascertain and document the significance of the maritime industry to Connecticut's economy. The specific objective is to estimate the total economic impact of maritime industries through the use of an economic model of the Connecticut economy. This study defines the Connecticut maritime industry as including, but not limited to, shipbuilding, commercial fishing, aquaculture, tourism, recreational boating and fishing, marine manufacturing, marine engineering, port services, marine terminal operation, marine construction, marina operation, marine environmental services, and marine transportation. Because this industry buys goods and services from other industries in the state and hires local labor, its economic impacts cascade throughout the entire state economy.

This analysis is undertaken through selection of seven study sectors identified in the USDC classification as directly related to the maritime industry. These included:

- Commercial fishing,
- Seafood product preparation and packaging,
- Ship building and repairing,
- Boat building,
- Transport by water,
- Scenic and sightseeing transportation and support activities for transportation, and
- Amusement and recreation activities.

For the seven sector grouping, the estimated total output impact at the state level is \$6.83 billion. The total employment impact at the state level is 39,846 jobs. The total added value impact at the state level is \$4 billion. This compares to an estimated gross domestic product of \$233 billion and 1,594,700 jobs in Connecticut in 2010.

For comparison, the Connecticut Maritime Coalition (CMC) commissioned study, The Economic Impact Study of Maritime Industries in Connecticut, found that in 2007, Connecticut's maritime-dependent industries, including their suppliers and related economic activities (total direct, indirect and induced effects), were estimated to account for over \$5 billion in business output, generating 30,000 jobs.

Since both studies utilized slightly different methods, the results are not exactly similar but are comparable and highlight the economic importance of the maritime industry to Connecticut's economy.



REFERENCES

- Altobello, M. 1992 *The Economic Importance of Long Island Sound's Water Quality Dependent Activities*. University of Connecticut, (unpublished report on file with LISS). 41 pp.
- Bureau of Economic Analysis. 2011. U.S. Economic Accounts. U.S. Department of Commerce, Washington D.C. www.bea.gov
- Connecticut Department of Agriculture, Bureau of Aquaculture web site.
<http://www.ct.gov/doag/cwp/view.asp?a=3768&q=458588>
- Connecticut Maritime Coalition Inc. 2010. *Economic Impact Study of Maritime Industries in Connecticut*. Apex Companies LLC and FXM Associates. 136 pp.
- Department of Agricultural and Resource Economics. 2010. *Economic Impacts of Connecticut's Agricultural Industry*, University of Connecticut. 28 pp.
- IMPLAN. 2004. User's, analysis, and data guides. IMPLAN Professional Version 2.0. Minnesota IMPLAN Group, Inc. 414 pp.
- Isard, Walter et al. 1960. *Methods of Regional Analysis: An Introduction to Regional Science*. MIT Press. 784 pp.
- Lahr, Michael L. and Erik Dietzenbacher, eds. 2001. *Input-Output Analysis: Frontiers and Extensions*. Palgrave. 503 pp.
- Leontief, Wassily W. *Input-Output Economics*. 2nd ed. 1986. New York: Oxford University Press. 448 pp.
- Miller, Ronald E. and Peter D. Blair. 2009. *Input-Output Analysis: Foundations and Extensions*, 2nd edition. Cambridge University Press,.781 pp.
- Ten Raa, Thijs. 2005. *The Economics of Input-Output Analysis*. Cambridge University Press,. 212 pp.
- US Department of Commerce, Bureau of Economic Analysis 1997. *Regional multipliers: A user handbook for regional input-output modeling system (RIMS II)*. Third edition. Washington, D.C.: U.S. Government Printing Office. 62 pp.

APPENDIX

Table A1: 2010 Data and Multipliers for the Connecticut Maritime Industry

Sector	Direct Sales (\$2010 million)					
	CT	Four Counties	NL	FF	NH	MS
Commercial Fishing	37.9	37.9	10.5	5.5	13.7	8.0
Seafood product preparation and packaging	26.4	21.1	0.5	14.0	6.5	-
Ship building and repairing	2,039.4	2,039.4	2,038.6	-	.07	-
Boat building	10.0	9.3	0.1	9.0	0.1	0.08
Transport by water	606.1	565.2	134.1	329.3	97.6	4.1
Scenic and sightseeing transportation and Support activities for transportation	597.2	410.8	28.1	254.5	120.2	7.8
Other amusement and recreation industries	494.5	343.9	40.9	201.0	64.8	37.0

Sector	Direct Employment (Number of jobs)					
	CT	Four Counties	NL	FF	NH	MS
Commercial Fishing	653.6	653.4	146.7	47.1	274.5	185.0
Seafood product preparation and packaging	76.2	60.7	1.6	40.3	18.7	-
Ship building and repairing	7,685.8	7,685.8	7.6	-	2.7	-
Boat building	45.5	41.9	0.5	40.3	0.7	.03
Transport by water	1,078.5	992.5	234.6	557.2	193.3	7.3
Scenic and sightseeing transportation and Support activities for transportation	4,212.6	2,594.9	262.3	1,331.6	919.8	81.0
Other amusement and recreation industries	7,248.1	4,787.7	548.2	2,718.8	1,074.7	445.8

CT- Connecticut
 NL - New London
 FF - Fairfield

NH - New Haven
 MS - Middlesex

APPENDIX

Sector	Description
<p>Commercial fishing</p>	<p>Anchovy fishing; bluefish fishing; cod catching; cod fishing; croaker fishing; dolphin fishing; eel fishing; finfish fishing (e.g., flounder, salmon, trout); fisheries, finfish; grouper fishing; had-dock fishing; hake fishing; halibut fishing; lingcod fishing; mackerel fishing; mahimahi fishing; menhaden fishing; mullet fishing; perch fishing; pilchard fishing; pollock fishing; porgy fishing; ray fishing; rockfish fishing; sablefish fishing; salmon fishing; sea bass fishing; sea herring fishing; sea trout fishing; shark fishing; snapper fishing; swordfish fishing; tilefish fishing; trout fishing; tuna fishing; whiting fishing; clam digging; crabbing; crayfish fishing; fisheries, shellfish; lobster fishing; mussel fishing; octopus fishing; oyster dredging; scallop fishing; sea urchin fishing; shellfish fishing (e.g., clam, crab, oyster, shrimp); shrimp fishing; squid fishing; frog fishing; other marine fishing; seaweed gathering; sponge gathering; terrapin fishing; turtle fishing</p>
<p>Seafood product preparation and packaging</p>	<p>Cannery, fish; cannery, shellfish; canning, fish, crustacean, and mollusks; chowders, fish and seafood, canning; cod liver oil extraction, crude, produced in a cannery; curing fish and seafood; drying fish and seafood; fish and marine animal oils produced in a cannery; fish and seafood chowder canning; fish egg bait canning; fish meal produced in a cannery; fish, canned and cured, manufacturing; fish, curing, drying, pickling, salting, and smoking; floating factory ships seafood processing; seafood and seafood products canning; seafood and seafood products curing; seaweed processing (e.g., dulse); shellfish and shellfish products canning; shellfish curing; soups, fish and seafood, canning; surimi canning; chowders, frozen fish and seafood, manufacturing; cod liver oil extraction, crude, produced in a fresh and frozen seafood plant; dinners, frozen seafood, manufacturing; fish and marine animal oils produced in a fresh and frozen seafood plant; fish freezing (e.g., blocks, fillets, ready-to-serve products); fish meal produced in a fresh and frozen seafood plant; fish, fresh or frozen, manufacturing; fish, fresh prepared, manufacturing; freezing fish (e.g., blocks, fillets, ready-to-serve products); fresh and frozen seafood processing; picking crab meat; seafood dinners, frozen, manufacturing; seafood products, fresh prepared, manufacturing; seafood products, frozen, manufacturing; seafood, fresh prepared, manufacturing; seafood, frozen, manufacturing; shellfish products, fresh prepared, manufacturing; shellfish products, frozen, manufacturing; shellfish, fresh prepared, manufacturing; shellfish, frozen, manufacturing; shucking and lacking fresh shellfish; soups, frozen fish and shellfish, manufacturing; surimi, fresh and frozen, manufacturing</p>

APPENDIX

Sector	Description
<p>Ship building and repairing</p>	<p>Barge building; cargo ship building; container ship building; dredge building; drilling and production platforms, floating, oil and gas, building; drydock, floating, building; ferryboat building; fireboat building; fishing boat, commercial, building; hydrofoil vessel building and repairing in shipyard; naval ship building; oil and gas offshore floating platforms manufacturing; passenger ship building; patrol boat building; sailing ships, commercial, manufacturing; ship dismantling at shipyards; ship repair done in a shipyard; ship scaling services done at a shipyard; ships (i.e., not suitable or intended for personal use) manufacturing; shipyard (i.e., facility capable of building ships); submarine building; towboat building and repeating; tugboat building; yachts built in shipyards</p>
<p>Boat building</p>	<p>Air boat building; boat yards; (i.e., boat manufacturing facilities); boats (i.e., suitable or intended for personal use) manufacturing; cabin cruiser; dinghy (except inflatable rubber) manufacturing; dories building; hovercraft building; motorboat, inboard or outboard, building; pleasure boats manufacturing; rowboats manufacturing; sailboat building, not done in shipyards; yacht building, not done in shipyards; boats, inflatable plastics, manufacturing; life rafts, inflatable plastics manufacturing; dinghies, inflatable rubber, manufacturing; life rafts inflatable rubberized fabric, manufacturing; rafts, rubber inflatable, manufacturing; boats, inflatable plastics (except toy-type), manufacturing; inflatable plastic boats, heavy-duty, manufacturing; inflatable rubber boats, heavy-duty, manufacturing; rigid inflatable boats (RIBs) manufacturing; underwater remotely operated vehicles (ROVs) manufacturing; boats, inflatable plastics (except toy-type) , manufacturing; inflatable plastic boats, heavy-duty, manufacturing; inflatable rubber boats, heavy-duty, manufacturing; rigid inflatable boats (RIBs) manufacturing; underwater remotely operated vehicles (ROVs) manufacturing; boats, inflatable plastics (except toy-type) manufacturing; inflatable plastic boats, heavy-duty, manufacturing; inflatable rubber boats, heavy-duty, manufacturing; rigid inflatable boats (RIBs) manufacturing; underwater remotely operated vehicles (ROVs) manufacturing; boats, inflatable plastics (except toy-type) manufacturing; inflatable plastic boats, heavy-duty, manufacturing; inflatable rubber boats, heavy-duty, manufacturing; rigid inflatable boats (RIBs) manufacturing; underwater remotely operated vehicles (ROVs) manufacturing</p>
<p>Transport by water</p>	<p>Water transportation; deep sea, coastal, and Great Lakes water transportation; deep sea freight transportation to or from foreign ports; freight transportation , deep sea, to or from foreign ports; ship chartering with crew, deep sea freight transportation to or from foreign ports; shipping freight to or from foreign ports deep sea; transporting freight to or from foreign ports, deep sea; cruise lines (i.e., deep sea passenger transportation to or from foreign ports); deep sea passenger transportation to or from foreign ports;</p>

APPENDIX

Sector	Description
<p>Transport by water</p>	<p>passenger transportation, deep sea, to or from foreign ports; ship chartering with crew, deep sea passenger transportation to or from foreign ports; transporting passengers to or from foreign ports, deep sea; barge transportation, coastal or great Lakes (including St. Lawrence Seaway); coastal freight transportation to and from domestic ports; coastal shipping of freight to and from domestic ports; deep sea freight transportation to or from domestic ports (including Puerto Rico); freight shipping on the Great Lakes system (including St. Lawrence Seaway); freight transportation, deep sea, to and from domestic ports; Great Lakes freight transportation (including St. Lawrence Seaway); intercoastal freight transportation to and from domestic ports; lake freight transportation, Great Lakes (including St. Lawrence Seaway); ship chartering with crew, coastal or Great Lakes freight transportation (including St. Lawrence Seaway); shipping freight to and from domestic ports (i.e., coastal, deep sea (including Puerto Rico), Great Lakes system (including St. Lawrence Seaway); coastal passenger transportation to and from domestic ports; cruise lines (i.e., deep sea passenger transportation to and from domestic ports, including Puerto Rico); deep sea passenger transportation to and from domestic ports (including Puerto Rico); ferry passenger transportation, Great Lakes (including St. Lawrence Seaway); Great Lakes passenger transportation (including St. Lawrence Seaway); intercoastal transportation of passengers to and from domestic ports; lake passenger transportation, Great Lakes (including St. Lawrence Seaway); passenger transportation, coastal or Great Lakes (including St. Lawrence Seaway); passenger transportation deep sea, to and from domestic ports (including Puerto Rico); ship chartering with crew, coastal or Great Lakes passenger transportation (including St. Lawrence Seaway); inland water transportation; barge transportation, canal (freight); canal barge transportation (freight); freight transportation inland waters (except on Great Lakes system); inland water freight transportation; intercoastal transportation of freight; lake freight transportation (except on Great Lakes system); lighterage (i.e., freight transportation except vessel supply services); river freight transportation; ship chartering with crew, freight transportation, inland waters (except on Great Lakes system); shipping freight, inland waters (except on Great Lakes system); towing service, inland waters (except on Great Lakes system); canal passenger transportation; car lighters (i.e., ferries), inland waters (except on Great Lakes system); inland water passenger transportation; intercoastal transportation of passengers; lake passenger transportation (except on Great Lakes system); passenger transportation, inland waters (except on Great Lakes system); river passenger transportation; ship chartering with crew, passenger transportation, inland waters (except on Great Lakes system); water taxi services; water shuttle services</p>

APPENDIX

Sector	Description
<p>Scenic and sightseeing transportation & Support activities for transportation</p>	<p>Scenic and sightseeing transportation; busses, scenic and sightseeing operation; cable car, land, scenic and sightseeing operation; carriage, horse-drawn, operation; cog railway, scenic and sightseeing operation; horse-drawn operation; monorail, scenic and sightseeing, operation; railroad transportation, scenic and sightseeing; railroad, scenic and sightseeing , operation; railway transportation, scenic and sightseeing; scenic and sightseeing excursions, land; sightseeing bus operation; sightseeing operation, human-drawn vehicle; steam train excursions; tour bus, scenic and sightseeing operation; tracked vehicle sightseeing operation; trolley scenic and sightseeing, operation; airboat (i.e., swamp buggy) operation; boat, fishing charter, operation; charter fishing boat operation; dinner cruises; excursion boat operation; fishing boat charter operation; harbor sightseeing tours; hovercraft sightseeing operation; scenic and sightseeing excursions, water; sightseeing boat operation; swamp buggy operation; whale watching excursions; aerial cable car, scenic and sightseeing, operation; aerial tramway, scenic and sightseeing, operation; glider excursions; helicopter ride, scenic and sightseeing, operation; hot air balloon ride, scenic and sightseeing, operation; scenic and sightseeing excursions, aerial; tramway, aerial, scenic and sightseeing operation; support activities for transportation; support activities for air transportation; airport operations; air traffic control services (except military); aircraft hangar rental; aircraft parking service; airport baggage handling services; airport cargo handling services; airport operators (e.g., civil, international, national); airport runway maintenance services; airports, civil, operation and maintenance; aviation clubs, primarily providing flying field services to the general public; flying field operators; hangar rental, aircraft maintenance services, runway; other airport operations; parking services, aircraft; runway maintenance services; vacuuming of airport runways; fixed base operators; aircraft ferrying services; aircraft inspection services; aircraft maintenance and repair services (except factory conversion, factory overhaul, factory rebuilding); aircraft testing services; fueling aircraft on a contract or fee basis; independent pilot, air (except owner-operators); inspection services, aircraft; maintenance and repair services, aircraft (except factory conversion, factory overhaul, factory rebuilding); other support activities for air transportation; testing services, aircraft; freight car cleaning services; grain leveling and trimming in railroad cars; loading and unloading services at rail terminals; locomotive and rail car repair (except factory conversion, factory overhaul, factory rebuilding); maintenance of rights -of-way and structures, railway; railroad switching</p>

APPENDIX

Sector	Description
<p>Scenic and sightseeing transportation & Support activities for transportation</p>	<p>services; railroad terminals, independent operation; railway terminals, independent operation; shunting trailers in rail terminals; support activities for rail transportation; switching services, railroad; support activities for water transportation; canal maintenance services (except dredging); canal operation; docking facility operations; harbor maintenance services (except dredging); harbor operation; lighthouse operation; maintenance services, waterfront terminal (except dredging); port facility operation; seaway operation; waterfront terminal operation (e.g., docks, piers, wharves); wharf operation; loading and unloading services at ports and harbors; longshoremen services; marine cargo handling services; ship hold cleaning services; stevedoring services; cargo salvaging , marine; docking and undocking marine vessel services; harbor tugboat services; marine salvaging services; marine vessel traffic reporting services; navigational services to shipping; piloting services, water transportation; radio beacon (i.e., ship navigation) services; tugboat services, harbor operation; cargo checkers, marine; cargo surveyors, marine; drydocks, floating (i.e., routine repair and maintenance of ships); marine cargo checkers and surveyors; other support activities for water transportation; ship dismantling at floating drydock; ship scaling services not done at a shipyard; vessel supply services; support activities for road transportation; emergency road services (i.e., tow service); motor vehicle towing services; tow truck services; towing services, motor vehicle; wrecker services (i.e., towing services), motor vehicle; bridge, tunnel, and highway operations; bus terminal operation, independent; cargo surveyors, truck transportation; driving services (e.g., automobile, truck delivery); independent truck driver (except owner-operators); inspection or weighing services, truck transportation); loading and unloading at truck terminals; other support activities for road transportation; pilot car services (i.e., wide load warning services); shunting of trailers in truck terminals; snow clearing, highways and bridges, road transportation; snow removal, highway; street cleaning services; truck weighing station operation; trucking terminals, independently operated; agents, shipping; customs brokers; freight forwarding; marine shipping agency; shipping agents (freight forwarding); other support activities for transportation; crating goods for shipping; packing and preparing goods for shipping; preparing goods for transportation (i.e., crating, packing); arrangement of car pools and vanpools; car pools, arrangement of pipe line terminal facilities, independently operated; stockyards (i.e., not for fattening or selling livestock), transportation; arrangement of Country clubs;</p>

APPENDIX

Sector	Description
<p>Other amusement and recreation industries</p>	<p>golf and country clubs; golf courses (except miniature, pitch-n-putt); alpine skiing facilities without accommodations; cross country skiing facilities without accommodations; downhill skiing facilities without accommodations; four season ski resorts without accommodations; ski lift and tow operators; ski resorts without accommodations; skiing facilities, cross country, without accommodations; skiing facilities, downhill, without accommodations; boating clubs with marinas; marinas; marine basins, operation of; sailing clubs with marinas; yacht basins; yacht clubs with marinas; amateur sports teams, recreational; amusement device (except gambling); concession operators (i.e., supplying and servicing in others facilities); amusement ride concession operators (i.e., supplying and servicing in others facilities); archery ranges; athletic clubs (i.e., sports teams) not operating sports facilities, recreational; aviation clubs, recreational; ballrooms; baseball clubs, recreational; basketball clubs, recreational; bathing beaches; beach clubs, recreational; beaches, bathing; billiard parlors; billiard rooms; boating clubs without marinas; bocce ball courts; bowling leagues or teams, recreational; boxing clubs, recreational; boys day camps (except instructional); bridge clubs; recreational; camps (except instructional, day); canoeing, recreational; carnival ride concession operators (i.e., supplying and servicing in others facilities); coin-operated nongambling amusement device concession operators (i.e., supplying and servicing in others facilities); concession operators, amusement device, (except gambling) and ride; curling facilities; dance halls; discotheques (except those serving alcoholic beverages); driving ranges, golf; fireworks display services; fishing clubs, recreational; fishing guide services; fishing piers; flying clubs, recreational; football clubs, recreational; galleries, shooting; girls day camps (except instructional); gocart raceways (i.e., amusement rides); gocart tracks (i.e., amusement rides); golf courses (miniature); golf courses, pitch-n-putt; golf driving ranges; golf practice ranges; guide services (i.e., fishing, hunting, tourist); guide services, fishing; guide services, hunting; guide services, tourists; gun clubs, recreational; hockey clubs, recreational; hockey teams, recreational; horse rental services, recreational saddle; horseback riding, recreational; hunting clubs, recreational; hunting guide services; ice hockey clubs, recreational; jukebox concession operators (i.e., supplying servicing in others facilities); kayaking recreational; lawn bowling clubs; miniature golf courses; mountain hiking, recreational; nightclubs without alcoholic beverages; observation towers; outdoor adventure operations (e.g., whitewater rafting) without accommodations; pack trains (i.e., trail riding), recreational; para sailing, recreational; picnic</p>

APPENDIX

Sector	Description
Other amusement and recreation industries	grounds; pinball machine concession operators (i.e., supplying and servicing in others facilities); ping pong parlors; pool halls; pool parlors; pool rooms; racetracks, slot car (i.e., amusement devices); raceways, gocart (i.e., amusement rides); recreational camps without accommodations; recreational day camps(except instructional); recreational sports clubs (i.e. sports teams) not operating sports facilities; recreational sports teams and leagues; riding clubs, recreational; riding stables; rifle clubs, recreational; river rafting, recreational; rowing clubs, recreational; saddle horse rental services, recreational; sailing clubs without marinas; sea kayaking, recreational; shooting clubs, recreational; shooting galleries; shooting ranges; skeet shooting facilities; slot car racetracks (i.e., amusement devices); snowmobiling, recreational; soccer clubs, recreational; sports clubs (i.e., sports teams) not operating sports facilities, recreational; sports teams and leagues, recreational or youth; stables, riding; summer day camps; tourist guide services; trail riding, recreational; trampoline facilities, recreational; trapshooting facilities, recreational; waterslides (i.e., amusement rides); white water rafting, recreational; yacht clubs without marinas; youth sports leagues or teams



VALUING THE COAST: Economic Impacts of Connecticut's Maritime Industry

