# Report II

# Next Steps for Further Study of the Coastal and Marine Economies of Massachusetts

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## Massachusetts Office of Coastal Zone Management (CZM)


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## OVERVIEW

The study team tracked methodological challenges and limitations as they arose in order to a) document the challenges and b) propose effective solutions. The first part of this document defines and discusses challenges involved in developing the economic impact method and challenges to measuring the coastal and marine economies in general. The sections that follow discuss challenges associated with measuring each of the major sectors of the marine economy. Next steps for further analysis are discussed throughout this report. These include suggested approaches, methodologies and / or supplemental studies to be used in future studies.

## COASTAL AND MARINE ECONOMY ANALYSIS: METHODOLOGICAL AND DATA LIMITATIONS

This section covers methodological limitations faced while developing the economic impact model to measure the coastal and marine economies in general. Italicized headings describe the specific issue or limitation and in the discussion that follows we explain the problem and propose solutions or essential next steps.

*Direct collaboration with Mass. Division of Unemployment Assistance (DUA) will continue to be essential to access detailed covered employment data:* Due to close collaboration with the Massachusetts Division of Unemployment Assistance (DUA) and their ongoing hands-on assistance, the team was able to access 6-digit NAICS code data comprising the marine industry. Without this type of close collaboration, however, access to this level of data would be impossible as online access is made available only through the 4-digit NAICS code level at the geographic levels we needed to measure. Future

studies using 6-digit NAICS codes will require the same close and supportive cooperation of the source agency the Massachusetts DUA.

*Confidentiality restrictions limited access to some covered employment data:* We were able to obtain almost all of the 6-digit codes to build the model of the marine economy at the state level. Confidentiality restrictions limited access to only a few of the codes we requested. In these cases, the DUA noted the confidential codes and aggregated establishment, employment and payroll data within the category "Other." Without this type of customized access to the data, it would have been impossible to itemize these employment and payroll impacts of this sector would have been impossible. This type of assistance will be essential for any follow up studies involving ES-202 data.

*The covered employment series (ES-202 series) is difficult to obtain in a time series:* Time constraints and breaks in the data series due to industry recoding did not permit us to do a time series analysis of the ES-202 data within the available time frame. Due to variations in the way public data has been collected–including the shift from the SIC system to the NAICS system and subsequent revisions of NAICS system codes between 1997 and 2002–it was impossible to obtain a comparable set of data between 1997 and 2004 at the level of detail we needed for this study. As a consequence, we chose to measure impacts of the most current data available rather than measuring impacts in comparative years. Nevertheless, it will be useful and interesting to apply the study method to new sets of ES-202 data in the future as new annual series become available.

*Allocation formulas based on 2005 company profiles will have to be revisited if used in the future:* In some allocation formulas, we used employment data from a marine

technology business list created in 2005[1] to determine marine-industry related employment. At some point in the future, these market research lists will no longer be current and will need to be updated before being used to determine allocation formulas. We estimate that, due to the fast pace of change in this technology sector, probably five years after the lists were compiled they will run the risk of containing significant inaccuracies. A possible next step in this area is for the team to obtain additional funding to update the master lists of marine science and technology companies in Massachusetts in order to update the related allocation formulas.

[1] *The Marine Science and Technology Industry in New England* (Barrow, Loveland, Terkla, 2005).

## MARINE ECONOMY SECTORS: METHODOLOGICAL AND DATA LIMITATIONS

This section covers methodological and data limitations faced while measuring major marine sectors using the input output methodology developed for this study. The discussions identify issues caused by methodological and / or data limitations and propose solutions and possible next steps.

### *Commercial Seafood*

*Overview*

Because of the limitations or lack of existing data, commercial and recreational fisheries data collection should be a priority area for future funding. Currently, there are programs in place (such as dealer reporting) and other programs planned to improve not only landings data (from dealers), but also catch and effort data (from fishermen), by catch, and biological sampling data. If funding can be made available for the collection of more accurate fisheries data, it should be funneled into existing or planned programs.

*Limitations of the Methodology Used in the Analysis*

Much of the primary data collected on the Massachusetts Commercial Seafood Industry probably underestimates its true value. Part-time employment in the commercial fishing industry, especially in harvesting shellfish, is substantial and usually not included in any measure of the industry.

Because this sector is known to have a high level of self-employed individuals, we supplemented covered employment numbers with employment and revenue figures

from the nonemployer series available from the U.S. Bureau of the Census. This series provides business activity data for individual proprietor businesses and other firms without unemployment-assistance covered employees. We also added employment inputs in this sector based on aquaculture license data from the Massachusetts Division of Marine Fisheries (DMF), Shellfish Sanitation and Management Program. We cross-checked our final numbers with commercial license data from DMF, from field observations at major Massachusetts ports and also with market research data from private sources. This type of careful cross checking across data sets will continue to be essential to future measurements of employment in the sector.

In Massachusetts, cities and towns require permits for commercial shell fishing and employ full-time and part-time staff to enforce state and local shellfish regulations, but estimating their catch and income is not easy. The Massachusetts Division of Marine Fisheries database of commercial permit holders is a database of DMF commercial permit holders by type. Time did not permit a full analysis of this commercial permit data set. Unfortunately, it is very complicated for the unfamiliar user to discern and measure distinct types of fishing activity as multiple types of allowances can be applied to the base permit held by each commercial fishing operation. For example, lobster permits can have multiple additional endorsements (gill netting, fish pots etc.). This makes it very difficult to separate counts of commercial fishermen with counts of commercial lobstermen.

For this study, we worked with the data manager at DMF directly to obtain a count of commercially permitted fishermen and found it comparable to our count based on ES-202 and non-employer statistics. With time and expertise, this data set could be

properly analyzed and findings could be identified and adequately described. Further, our experience leads us to conclude that there is a need for a consolidated, accessible database of shellfishing permits—recreational, senior citizen, and commercial.

To estimate lobster fishery statistics we referred to the DMF Technical report summarizing lobster fishery statistics in 2003. This report, Massachusetts Division of Marine Fisheries Technical Report TR-23: 2003 Massachusetts Lobster Fishery Statistics, by Micah J. Dean, Kimberly A. Lundy, and Thomas B. Hoopes (released March 2005) is available at http://www.mass.gov/dfwele/dmf/publications/lobster_report_2003_tr23.pdf Unfortunately, this type of detailed analysis does not appear to take place annually.

Missing data is probably more of a problem for processors and wholesalers. They report employment to the Massachusetts Division of Unemployment Assistance, but these data are probably under-reported because many employees in this sector are temporary or contract employees rather than permanent employees. There is no reliable measure of production from this sector.

Aside from missing data, there is little information on linkages between the Commercial Seafood Industries and the other sectors of the Massachusetts Marine Economy, which muddies the effects of public policy on Massachusetts' fisheries. Current federal management plans, for example, are required to estimate the effects of regulations on fishing communities, but do little to estimate either the direct effects or the indirect effects of regulations due to missing data and missing information on linkages to other sectors.

*Next Steps for Further Study*

Up until now, DMF has relied on local officers to collect information on commercial shellfish landings. The Shellfish Sanitation and Management Program collects all information available at the town level into a data set (shellfish catch reports by town and annual shellfish landed values). But this is incomplete as some towns do not report data. It was suggested that future collaboration with the Massachusetts Shellfish Officers Association (MSOA) to obtain consolidated information might be valuable. However, at present, the MSOA does not have a database available online.

In 2005, the Fisheries Statistics Program of the Massachusetts Division of Marine Fisheries began requiring all primary buyers in Massachusetts to report their purchases of any marine species (including those intended for bait purposes) from fishermen. This data set will be extremely beneficial in supplementing fishery employment data, providing more accurate state landings data, and allowing for a more accurate determination of full-time and part-time employment in the industry. DMF believes that NMFS estimates of the value of commercial landings probably underestimates the actual value of landings by 30 to 40 percent using preliminary data from the 2005 dealer reporting program, because NMFS focuses on landings of species from offshore or federal waters[2]. Analysis of the full data set, once implemented, should be considered an important 'next step' to fully measuring the commercial fishing industries sector.

[2] Personal communication with MIS & Fisheries Statistics project staff at Mass. Division of Marine Fisheries, Spring 2006.

***Marine Transportation***

*Limitations of the Methodology Used in the Analysis*

The level of detail available in the six digit NAICS codes is probably more comprehensive for Marine Transportation than for other sectors. This sector has been part of the economy for a long time and has established traditional and definable NAICS codes. For such components as commercial transportation equipment rentals, an allocation formula was applied to ensure that only marine-related establishments and employment are counted.

Scenic and sightseeing transportation already has two separate NAICS codes; one for land-based transportation and one for water-based transportation. Since there are separate codes, an allocation formula is not needed to separate the different components. However, while the water-based component may already be easily distinguished, it is not as easy to assign it to a sector. Water-based scenic and sightseeing transportation is currently included in the Marine Transportation sector, although it seems that it could just as easily, and maybe more appropriately, fall under the tourism and recreation sector of marine industry.

Although scenic and sightseeing transportation is obviously a form of transportation, the scenic and sightseeing portion of the definition seems dominant. Transportation just describes what type of sightseeing is happening. For example, whale watching would appear to fall under water-based scenic and sightseeing transportation. Tourism and recreation will be undervalued in the state's economy if numbers from water-based scenic and sightseeing transportation are not included in the totals for that sector. However, if it was included in both sectors it would be double-counted in the

state's total. In the future, this issue should be reconsidered and, possibly, a note should be included in the Coastal Tourism and Recreation discussion indicating the presence of this NAICS code in the Marine Transportation sector.

### *Coastal Tourism and Recreation*

*Limitations of the Methodology Used in the Analysis*

The economic impacts of tourism in general are particularly difficult to calculate as NAICS categories do not specifically identify jobs in the coastal tourism industry. This makes state employment data difficult to use for estimating the economic effects of tourism. Consequently, we developed and applied a methodology using NAICS codes combined with a specific geographic screen. We consider tourism activities within the coastal zone a proxy for marine industry-related tourism. It must be noted that a significant proportion of entertainment, and food and lodging in the coastal zone is not necessarily related to the sea nor uses inputs of production from the sea. However, we made an effort to develop a defensible method to estimate coastal tourism numbers. First, we conducted a literature review to confirm NAICS codes relevant to the tourism industry.[3]. We collected employment and payroll in the identified NAICS codes for coastal communities of Massachusetts as defined by the Massachusetts CZM regions. We used average annual employment and payroll data, so covered seasonal and part-time employment is included as a part of the analysis.

In addition to the impacts based on employment and payroll, we used additional data sets to help quantify economic impacts related to spending by coastal tourists. These

[3] For references see Appendix 5—Key Data Sets for Measuring Massachusetts Marine Sectors

methods are discussed within the report and the method is explained in detail in *Appendix 3—Methodology: Supplemental Spending Analysis*.

Unfortunately, we found that Mass. Office of Travel and Tourism (MOTT) data for the state of Massachusetts was not detailed enough to cover coastal tourism activities per se: Massachusetts traveler statistics released by MOTT in its reports tend to provide general and aggregate statistics related to visitors to the state.[4] We requested more detailed information from MOTT but little more data were available. The MA Office of Travel and Tourism does provide base data on number of person trips related to beach activities and water sports / boating.

An additional limitation was that spending data was not available for these specific types of visitors. We were forced to use spending estimates measuring other states to approximate spending estimates in Massachusetts. For example, the 2001 Economic Impact of Connecticut's Travel and Tourism Industry[5] provides traveler expenditures patterns by type of activity and category of expenditure. Unfortunately the types of activity used in the case studies didn't always match categories of MA domestic tourists in the available data sets; however, we made our best approximations using data from studies done in other states. The most ideal solution for future studies of this sector would be to obtain data for Massachusetts focused on areas specific to coastal-tourism and recreation. For example, it would be very useful to have data for major coastal tourism and recreation activities in the following areas: visitor activity preferences, numbers of visitors for each activity; visitor demographics, trip lengths, and spending

[4] *Massachusetts Domestic Visitor Profile, Calendar Year 2004*, Massachusetts Office of Travel and Tourism, April 29, 2005.

[5] See Appendix 6—References for full citation.

patterns within each activity. This might be possible through coordination with groups like MOTT to insure that coastal tourism activities are adequately measured.

Related to measuring coastal recreation activities, Recreational lobstering statistics and recreational shellfishing data were also difficult to access. In order to pull together recreational lobstering statistics, according to a Massachusetts Division of Marine Fisheries technical report[6], the collection process is cumbersome: "recreational fishermen are asked to report on their permit renewal application form the number of lobsters taken during the previous year, hours dived and the maximum number of traps fished. Project personnel sort, edit tabulate and interpret data from all reports received." Recreational shellfishing data are collected at the town level along with commercial shellfishing data using the same decentralized and inconsistent collection process.

*Next Steps for Further Study*

One key aspect of the Coastal Tourism and Recreation sector that requires further study is the economic impact of the marine trades associated with recreational boating. While the Massachusetts Marine Trades Association continues to undertake surveys to gauge the status of the industry, there is little hard economic data available. There is a clear feeling within the industry that there is significant room for growth but that this potential is being hampered by a lack of skilled technicians. If this issue were to be resolved, any potential growth in the industry could result in a significant increase in indirect and induced employment and economic output impact.

[6] *Massachusetts Lobster Fishery Statistics*, by Micah J. Dean, Kimberly A. Lundy, and Thomas B. Hoopes (released March 2005). Division of Marine Fisheries MIS and Fisheries Statistics Project.
Web Address: < http://www.mass.gov/dfwele/dmf/publications/lobster_report_2003_tr23.pdf.>

### *Marine Science and Technology*

*Limitations of the Methodology Used in the Analysis*

As briefly noted earlier, ES202 data, even at the six-digit NAICS level, is unable to fully capture the Commonwealth's Marine Science and Technology Industry. This is because many of the firms in this sector are quite new and have developed marine applications of their products that were initially designed for non-marine markets. As a result, many firms that have some involvement in the Marine Science and Technology sector still have NAICS classifications that apply to non-marine areas or more generic high technology applications. This is a particular problem with the instrument and equipment sub-sector. In addition to this problem of fully identifying all marine related activity, as noted previously, it is not possible using six-digit NAICS classifications to identify marine research and education activity carried out within universities or other research institutions.

Therefore, the only way to develop a comprehensive view of this sector is to conduct a separate industry study, such as was recently completed by the Donahue Institute (Barrow, Loveland, and Terkla, 2005). Such a study involved developing a comprehensive list of all firms in a variety of sectors that had some aspect of their production related to Marine Science and Technology. This required the use of a proprietary database that enabled eight-digit industry designations. Even then, this study was forced to categorize firms by their relative intensity of involvement in the Marine Science and Technology sector based on interviews, examination of web pages, and other primary sources, in order to weight the overall employment figures to reflect a more accurate count of employment involved in marine activities. Thus, firms were divided

into those with greater than 50 percent of marine related activity, those with 50 to 25 percent of their businesses devoted to marine activity, and those with less than 25 percent of their businesses involved in marine-related production.

The end result was an estimate of Massachusetts employment in the Marine Science and Technology sector of 8,863 persons. Note that this is approximately 61 percent above the more conservative estimates used in this study from available ES-202 data and almost 40 percent greater than the estimate used in this study for the input-output analysis combined with the marine research and education sector estimate. Therefore, the estimates of the impact this industry on the state's economy developed here are very conservative and considerably below the more comprehensive estimates of 22,396 jobs and $2.9 billion in annual output developed in the Donahue Institute study (Barrow, Loveland, and Terkla, 2005).[7]

### *Marine-Related Construction and Infrastructure*

*Limitations of the Methodology Used in the Analysis*

One limitation is that there is not enough detail in the six-digit NAICS codes to accurately differentiate between marine-related and other categories of heavy construction. In some cases, like the All Other Heavy Construction and Administration of Management Program categories, allocation formulas were used to calculate the proportions that are marine-related. However, in categories like All Other Heavy

[7] The firms measured in the 2005 study could not have been separately identified within existing NAICS classifications. The methodology in that study relied heavily on customized work to identify businesses in the cluster through industry and marketing databases not just through the use of industry code-based research.

Construction, it may be useful in the future to determine even more detail, for example, the proportion specifically related to shore protection.

A second limitation is that the origination of employment is not known. This would be important in looking at the economic output from the Marine-Related Construction and Infrastructure sector. It is likely that at least a measurable amount of the employment generated by construction and engineering in coastal communities sustains commuters from inland communities. When the direct economic output from construction employees is used in the IMPLAN model for coastal Massachusetts, the economic output may be overestimated.

*Next Steps for Further Study*

Acquiring information regarding the differentiation between marine-related and other areas of heavy construction as well the origination of employment related to marine construction and infrastructure is potentially important. In addition, given that the location and patterns of coastal development impact the marine-related construction and infrastructure sector of the State's coastal economy, this relationship may be a useful area for further study.

The new information would help to explain distinct changes in the status or trends of the coastal economy. Also, learning about the relationship of the location and patterns of development with the coastal economy would help planners make improved decisions that consider the marine-related economy as well as the coastal and marine environments. Storm damage and the subsequent reconstruction and construction of shoreline armoring as well as expanded infrastructure and time until build out potential is met are a few examples of how the location and pattern of coastal development can have an effect.

Moreover, other marine-related sectors of the Massachusetts coastal economy are also affected, especially coastal tourism and recreation.