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MEASURING THE IMPACT OF THE MARINE AND FISHERIES
INDUSTRY ON THE NEW ENGLAND ECONOMY

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Measuring the impact of marine economic activity and fisheries on the region presents few problems that one does not confront in measuring the impact of agriculture on the region. We in New England have all been called upon at one time or another to try to provide convincing evidence of the importance of agriculture. Such numbers, such as "gross sales," "value added," and "business generated by" have been used as measures of the importance of agriculture. Occasionally the whole food processing and distribution industry has been added in order to increase the magnitude of the dollar values used. We shudder a bit when such numbers are presented to the public to justify additional budgets for Federal spending, additional research expenditures by colleges or agriculture, or to defend against cuts in budgets for various programs in our region.

There are some special problems, however, presented by marine-oriented economic activity. The major one being that we have no useful sources of data compiled by an agency of the Federal Government responsible for something called "marine economic activity." Thus, there is no really ready source of information from which to develop estimates relating to the importance of marine activity in the region. The second major problem, not unrelated to the first, is the diversity and heterogeneity generally of marine economic activity. We have small marines, boat yards and large ship yards. We have the occasional lobster fisherman, and the deepsea lobsterman. We have the small skiffs for quahogging, and two-hundred foot vessels dragging off George's Bank and the various canyons along the continental shelf. Defining what we mean by marine-oriented activity is, in fact, a problem in itself.

However, before launching into a description of our approach to the problem of assaying marine activity, one should perhaps make very clear what the purpose was of these measurements. The purpose was to develop, in a reasonable context, information that would be useful to communities and states and government agencies in planning development and in assessing the relative usefulness to the community of different kinds of enterprises.

We have seen, altogether too often, a large enterprise established, apparently attractive, which does little but add to community costs and does little to add to community revenues. We have seen enter-

prises encouraged to establish themselves in communities largely because they were able to suggest large sales. This enterprise might well have deliterious effects on the environment of the community, the policing of the community, and, in fact, create costs which the community had not anticipated. Thus, our primary purpose in initiating our investigations was to obtain information that would give us some notion by a variety of measurements of the general economic utility of different kinds of marine-oriented enterprises in the region. I hasten to add that, while we had substantial aspirations, we were less than successful in achieving all of them.

Beucase of a commitment to the proposition that information should be useful in the planning process, we sought at the very outset to engage planning competence. The theory underlying this move was that we would constantly work with a planner in developing information and testing our information in the context of the planning process. We had expected, after having completed the study, to select from a number of different areas in the region some relatively underdeveloped shoreline areas, some city areas, and some largely recreational areas -- Martha's Vineyard being a very good example -- for which to review community plans. It was here that we were most optimistic. We found in the very short period we had in which to complete the study that we were not able to develop effective and indestructable rapport with the planner. We discovered that despite extensive, lengthy meetings in which we thought we had reached agreement, not only on matters of fact, but on matters of principle, that when apart this rapport disintegrated. The planner essentially planned in the way in which he had always proceeded, ignoring largely any information made available to him. I should point out, however, that the planner was not malicious in his intent. It was simply that he was unable to grasp whatever significance the information has and could see no role in the planning process for it. This, of course, was a grievous disappointment to us. But so much for this tale of woe.

What was in fact done was this. A closed input-output model for marine economic activity for the southern New England marine region was developed. In order to obtain information suitable to this study, it was necessary to interview about four hundred and twenty firms in the region. We were spared the problem of interviewing every fishing vessel, because we had earlier done sufficient work relative to the cost structure, labor requirements, capital requirements, and other matters so that we could construct a fairly effective fish-catching sector. We divided the economy into sixteen sectors.

1. Fish catching
2. Fish, frozen processing
3. Fish, fresh processing
4. Fish, wholesale and jobbing
5. Ship and boat building

6. Marinas and boatyard
7. Marine wholesale and retail
8. Marine manufacturing
9. Construction telling agents and brokers
10. Research and education
11. Marine Military
12. Charter fishing
13. Other marine
14. Other economic activities
15. Households
16. State and local government

Our final demand sectors were: (1) the Federal Government, (2) the rest of New England, (3) the rest of the world.

The region with which we were concerned included eastern Connecticut, all of Rhode Island, and southeastern Massachusetts, including the off-shore islands. More than 1,600,000 people live in the region and have personal incomes of approximately \$4,700,000,000 (1965). The marine-oriented firms in the area employed over 40,000 people. An additional 45,000 are military personnel. The total annual output of marine-oriented firms was \$772,000,000, and this activity generated \$1,360,000,000 in transactions, of which over \$520,000,000 was received as personal income. Approximately 12.9 percent of all transactions in the region and 11.1 percent of personal income in the region are attributable directly or indirectly to marine industry. It is also estimated that summer visitors spend approximately \$156,000,000 in non-marine businesses. However, this could not be adequately traced through our input-output model.

Eight measures of economic impact were calculated for the thirteen marine-oriented sectors. These are shown in Table I. Notice first the total sales volume, ship and boat building looms very large.

The principle locus of this activity is of course New London. However, there is a substantial pleasure boat building industry in the Narragansett Bay area as well. The next most significant single activity is, of course, the military. This activity takes place largely in Rhode Island at the Quonset Naval Air Station and at the Newport Naval Base, and in New London, Connecticut. Research and education, while substantially smaller than the military and shipbuilding, is quite large relative to many other activities. The focus of this activity is at the University of Rhode Island, at New London, Newport and Middletown.

A review of local value added the picture changes slightly. Notice now that marine military is the largest single sector, followed by ship building, marine manufacturing and then research and education.

TABLE 1
SUMMARY OF MEASURES
OF REGIONAL ECONOMIC IMPACT

	Total Sales	Local Value Added	Net Exports	Bus. Gen. by Export Demands	Pers. Inc. Gen. by Ex. Demand	General Multi- pliers	Pers. Inc. Mult.	Non Marine Multi.
	\$1,000	\$1,000	\$1,000	\$1,000	\$1,000			
1. Fish catching	25,484	17,000				2.96	1.18	0.46
2. Fish process.	11,742	3,019	8,012	27,542	8,509	3.32	1.07	0.41
3. Fish froz. processing	11,288	1,330	10,720	36,762	10,909	3.74	1.16	0.48
4. Fish Whsl & job	14,544	3,719	4,375	17,171	5,267	3.41	1.09	0.47
5. Ship & boat building	318,290	161,127	174,755	552,610	192,634	1.99	0.71	0.22
6. Marine & yards	13,622	6,104	-507	4,935	1,625	2.76	0.94	0.43
7. Marine whsl & ret.	23,529	7,081	2,234	19,845	6,063	2.75	0.87	0.42
8. Marine manufact.	56,645	36,845	38,040	106,437	42,544	2.37	0.95	0.32
9. Constr., towing, agt.	7,943	3,175	-2,615	2,250	705	1.97	0.64	0.27
10. Research & educa.	66,097	25,177	32,568	114,594	35,114	1.95	0.62	0.28
11. Marine military	213,443	179,660	197,541	479,114	216,153	2.73	1.22	0.41
12. Charter fishing	340	206	-296	794	297	3.07	1.17	0.47
13. Other marine	10,082	4,876	-1,295	1,483	521	2.68	0.96	0.50
Total or ave.	773,049	449,319	463,532	1,363,537	520,341	2.75	0.97	0.40

The next three columns, net exports, business generated by export demand, and personal income generated by export demand gives one some notion of the dependence of the economy in the region on exports through the various marine sectors. In fish catching there are no exports and hence no business generated by the exports. This stems from the fact that the fish catching sector is an input into other sectors, (either fresh fish processing, or wholesaling and jobbing).

The last three columns are the result of the input-output analysis and there are some notable shifts in emphasis. Particularly the very high multipliers in the fisheries section relative to those in other sectors. While the industry is not large relative to say ship and boat building the impact of a dollar of sales or output from these sectors is much greater than that of a dollar of sales in the ship and boat building sector. This reflects the fact that the inputs into these sectors are local. The fish are captured by local labor, a substantial number of the vessels are built in local yards, repairs are made in local boatyards, machinery and equipment is purchased from local manufacturers, the labor lives in the community, and spends its money in the community. In ship and boat building, however, substantial parts of the important inputs must be imported. Obviously all of the steel plate used in making submarines comes from outside the region. All of the resin and glass fiber used in the construction of sailboats comes from outside the region. The numbers then reflect to a considerable extent the labor input and its relative importance in the total product.

As part of the research and education complex, we were a bit upset and surprised to discover the rather modest multiplier for this sector. Upon reflection, however, we recognize that most of the people in this sector were engineers, natural scientists and the amount of equipment required to gainfully employ an engineer or natural scientist is relatively great. Most of this also comes from outside the region.

In reviewing the personal income multipliers, which is to say the impact on incomes of people within the region, we find very much the same kind of distribution as we found in the general multipliers. The fishing industry sectors and the marine military sector again have high multipliers. This is not surprising, since a very high proportion of the expenditures in marine military are payments to individuals most of whom contribute considerably to the economic activity within the region.

The last column of Table I gives us some insight into the relationship of marine sector and non-marine sectors. For many of the reasons mentioned earlier, the multipliers again are rather high for the fish catching or fishery related sectors. A brief rundown on the averages in these columns perhaps would put things in perspective. For the general multipliers, we have 2.75 which indicates that for every

dollar of output from the thirteen sectors above, approximately, \$2.75 of economic activity are generated within the region. Every dollar of output also results in about 97 cents of personal income and about 40 cents of non-marine activity.

Table II presents a different aspect of the information in Table I. If, for each of the measures shown in Table I, the sectors are ranked from one (being the worst) to thirteen (being the best) and these rankings are averaged, we get the numbers shown in Table II. The number 7.7 in the first row, first column of the table is the average ranking for the fish catching sector for total sales value added and net exports. The higher the number the better the performance. We conclude from Table II that the fish related sectors rank highest in their multiplier effects. The Navy based industries clearly important in their sales, value added in exports, and the business generated by export demands. Recreation based sectors are only middling with respect to all three groups of measures. The first column makes clear the relatively small size of the sectors, the second column suggests that their multipliers are relatively modest and the third suggests that the activity is substantially internal.

Earlier the notion of environmental quality was mentioned as an important consideration in the planning process. Having gained some insight from the in-out analysis into the characteristics of marine oriented enterprises. These have to be judged in the context of the environment.

It is obviously extremely difficult to measure such elusive concepts as quality but we did attempt to gain some information concerning the characteristics of shore towns. We found that shore towns are, in general, richer, and cost more to maintain than non-shore towns. This is true whether or not cities are included in the comparisons. The per capita valuations are about 1.7 times as great for shore towns as for towns removed from the shore. Summer housing accounts, of course, for some of the time. The policing costs in shore towns are about 3.6 times as great per capita. Public welfare costs are 2.6 times as great, and fire protection 3.1 times as great as for non-shore. Thus for example, we might evaluate recreational industries as follows: It is not unlikely that substantial parts of high shore community costs are associated with recreational activity. Some of the part time people employed in recreation subsequently find themselves on the welfare rolls for part of the year. The policing costs are required to protect unoccupied property and required to maintain law and order with literally tens of thousands of people crowding together. If these points are correct and if we examine Table II again and discover the rather average performance in all areas of recreational activity one could conclude that the emphasis in many of the areas in the region on enhancing marine recreational activity may well be misplaced.

Table II

AVERAGE RANKINGS OF SELECTED MEASURES OF
ECONOMIC IMPACT BY SECTORS AND GROUPS,
SOUTHERN NEW ENGLAND MARINE REGION

1965

	Total sales value added & net exports	Multi- pliers	Business generated by exports
Group A Fish-Based Sectors			
Fish catching	7.7	10.0	1.0
Fresh fish processing	5.3	8.0	8.0
Froz. fish processing	5.0	11.7	9.0
Fish whsl & job.	6.3	10.7	6.0
Charter fishing	<u>2.0</u>	<u>10.3</u>	<u>2.0</u>
Average for Group A	5.26	10.14	5.20
Group B Navy-Based Industries			
Ship & boat bldg.	10.3	2.3	12.5
Marine manufactur.	10.7	4.7	10.5
Research & educa.	10.3	1.7	10.5
Marine military	<u>12.7</u>	<u>8.3</u>	<u>12.5</u>
Average for Group B	11.50	4.25	11.50
Group C General and Recreation Based Sectors			
Marinas & yards	5.3	7.0	5.0
Marine whsl & ret.	7.3	6.0	7.0
Constr., towing, agts.	2.3	2.0	4.0
Other marine	<u>3.7</u>	<u>8.3</u>	<u>3.0</u>
Average for Group C	4.65	5.82	4.75

In summary then: Marine economic activity results from a complex of interactions between the sea and the land. It is desirable for industry and pleasant for people. The development of this land-sea interface is important not only to us now but just as important to the future we commit by our acts. It is therefore critical that we as economists have some insight into the relation of marine economic activity to other economic activity within the region. To this end we have attempted to describe the environment and to analyze the system using input-output analysis. We have been able to evaluate the impact on the community in various ways for each of the sectors. We find that this information can be used by decision makers in this area. They are being increasingly used at state and federal levels although not by communities. We hope that with an extension program to be launched this year we can give shore communities some view into the prospect and promise of various kinds of economic development processes.