



Labovitz School

OF BUSINESS AND ECONOMICS

Bureau of Business and
Economic Research

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To: Steve Dahl, North Shore Commercial Fishing Association, and
Dick Martin, Lake Superior Fish Company
Jeff Gunderson, Minnesota Sea Grant
Cree Bradley, Lake Superior Sustainable Farming Association
Don Schreiner, DNR area fisheries supervisor
Harley Toftey, Dockside Fish Market

Re: Economic Impact of Commercial Fishing Harvested in the Minnesota Waters of
Lake Superior REVISED

From: Jim Skurla, Director, Bureau of Business and Economic Research (BBER),
Labovitz School of Business and Economics, University of Minnesota Duluth

This is a pro bono response from the BBER to a question from the commercial fishing sector asking that BBER provide some background on the economics and possible impact of commercial fishing activity in the Minnesota waters of the North Shore of Lake Superior. Without doing a full impact study and without the survey data needed to provide the optimal adjustments to the IMPLAN model, the BBER offers the following observations.

Note: The original inputs to our model have been revised, subsequent to a discussion of modeling assumptions with stakeholders. The following revised economic impact summary presented here includes a short explanation of how assumptions for this model were derived, as well as the impact tables that follow.

Input assumptions

The inputs to the model were derived from a discussion with industry representatives, regulatory, public service, and research entities close to commercial fishing on Lake Superior. The IMPLAN model allows impacts to be generated by output or employment assumptions. These two possible approaches to modeling inputs were discussed, for example, what is the dollar estimate value of commercial fishing in

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the Minnesota Waters of Lake Superior? Or what is the FTE employment in IMPLAN sectors 17 and 61 for commercial fishing in the Minnesota Waters of Lake Superior? The differentiation of retail from wholesale employment and sales activity was discussed, and retail activity was roughly estimated. Segments of the market (roe, herring), and various processing options (fillets, round, etc.) were discussed, although an accurate estimate of value in these terms was not forthcoming. To get a true picture of these aspects of the industry a survey should be funded and data collected specific to the geography and industries involved. The possibility of fishermen (in some cases) performing both harvesting and processing (preparation, trimming) was discussed but not estimated.

The linkage between Minnesota fish harvesting and Iowa fish processing was described and the employment breakout between Minnesota and Iowa for this sector was estimated. Average hours worked by commercial fishermen was estimated to provide FTE inputs to modeling. It was noted that North Shore commercial fishing and Lake Superior fish are directly linked to impacts in the state of Iowa because of a dedicated fish processing supplier directly linked to the North Shore. Although standard impact methodology does not generate impact results for effects outside the study area (as defined by the county or state-level data files involved), BBER was willing to suggest what that impact might be, and to estimate what those jobs might be if they were in Minnesota.

The FTE estimate input for modeling used by the BBER was 8 fish processing jobs in Iowa, 10 commercial fish harvesting jobs in Minnesota, and 17 fish processing jobs in Minnesota.

Important areas of concern beyond the scope of this project include: items a survey would capture before the model could be adjusted include cost of the product (or the value of the production) and pricing of various fish species.

Study Area

This economic impact estimates the economic impact of fishing and fish processing on the State of Minnesota and on the Arrowhead Region (seven counties in northeastern Minnesota).

Impact Procedures

Minnesota IMPLAN Group, Inc. (MIG) is the corporation that is responsible for the production of IMPLAN (IMpact analysis for PLANning) data and software. Using classic input-output analysis in combination with regional specific Social Accounting Matrices and Multiplier Models, IMPLAN provides a highly accurate and adaptable model for its users. The IMPLAN database contains county, state, zip code, and federal economic statistics which are specialized by region, not estimated from national averages and can be used to measure the effect on a regional or local economy of a given change or event in the economy's activity.¹

IMPLAN's Social Accounting System describes transactions that occur between producers, and intermediate and final consumers using a Social Accounting Matrix. One of the important aspects of

1 For further information on input output modeling, BBER recommends to readers the following two sources: 1) Maki, Wilbur; Richard Lichty (2000). *Urban Regional Economics*. Iowa State University Press., and 2) the IMPLAN Web site at <http://implan.com/V3/index.php>.

Social Accounts is that they also examine non-market transactions, such as transfer payments between institutions. Other examples of these types of transactions would include: government to household transfers in the form of unemployment benefits, or household to government transfers in the form of taxes. Because Social Accounting Systems examine all the aspects of a local economy, they provide a more complete and accurate “snapshot” of the economy and its spending patterns.

Regional data for the impact models for value added, employment, and output measures were supplied by IMPLAN for this impact

There are two components to the IMPLAN system, the software and databases. The databases provide all information to create regional IMPLAN models. The software performs the calculations and provides an interface for the user to make final demand changes. IMPLAN software version 3 was used in this analysis. Comprehensive and detailed data coverage of the IMPLAN study areas by county, and the ability to incorporate user-supplied data at each stage of the model building process, provides a high degree of flexibility both in terms of geographic coverage and model formulation.

Data

IMPLAN data files use federal government data sources IMPLAN data files consist of the following components: employment, industry output, value added, institutional demands, national structural matrices and inter-institutional transfers.

Industry Definitions

IMPLAN models for this study used the following industry sectors to define fishing and fish processing activities.

Table 1. Industry Definition for Impacting Sectors

| <i>IMPLAN Sector</i> | <i>Description</i> | <i>NAICS Equivalent</i> |
|----------------------|---|-------------------------|
| 17 | Commercial Fishing | 114110 |
| 61 | Seafood product preparation and packaging | 311700 |

11411 Fishing: This industry comprises establishments primarily engaged in the commercial catching or taking of finfish, shellfish, or miscellaneous marine products from a natural habitat, such as the catching of bluefish, eels, salmon, tuna, clams, crabs, lobsters, mussels, oysters, shrimp, frogs, sea urchins, and turtles.

31171 Seafood Product Preparation and Packaging: This industry comprises establishments primarily engaged in one or more of the following: (1) canning seafood (including soup); (2) smoking, salting, and drying seafood; (3) eviscerating fresh fish by removing heads, fins, scales, bones, and entrails; (4) shucking and packing fresh shellfish; (5) processing marine fats and oils; and (6) freezing seafood. Establishments known as "floating factory ships" that are engaged in the gathering and processing of seafood into canned seafood products are included in this industry.

311711 Seafood Canning: This U.S. industry comprises establishments primarily engaged in (1) canning seafood (including soup) and marine fats and oils and/or (2) smoking, salting, and drying seafood.

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Establishments known as "floating factory ships" that are engaged in the gathering and processing of seafood into canned seafood products are included in this industry.

Impact Findings

The economic impact measures include:

Value Added – A measure of the impacting industry’s contribution to the local community; it includes wages, rents, interest and profits.

Output–Represents the value of local production required to sustain activities.

Employment – Estimates are in terms of jobs, not in terms of full-time equivalent employees. Hence, these may be temporary, part time or short term jobs.

The three impact effects calculated for the three economic measures include:

Direct effect – Initial spending in the study area resulting from the project

Indirect effect – The additional inter-industry spending from the direct impact

Induced effect – The impact of additional household expenditure resulting from the direct and indirect impact.

The following measures of impact do not include jobs or production in Iowa.

Table 2. The Economic Impact of North Shore Lake Superior Fish Harvesting and Processing on the State of Minnesota, 2011

| Source: IMPLAN | <i>Direct</i> | <i>Indirect</i> | <i>Induced</i> | <i>Total</i> |
|----------------|---------------|-----------------|----------------|--------------|
| Employment | 27 | 17 | 13 | 57 |
| Value Added | \$1,019,294 | \$1,516,140 | \$931,846 | \$3,467,280 |
| Output | \$5,738,448 | \$2,785,336 | \$1,589,312 | \$10,113,096 |

Table 3. The Economic Impact of North Shore Lake Superior Fish Harvesting and Processing on the Arrowhead Region of Minnesota, 2011

| Source: IMPLAN | <i>Direct</i> | <i>Indirect</i> | <i>Induced</i> | <i>Total</i> |
|----------------|---------------|-----------------|----------------|--------------|
| Employment | 27 | 22 | 8 | 57 |
| Value Added | \$1,136,744 | \$742,938 | \$487,530 | \$2,367,212 |
| Output | \$5,889,264 | \$1,394,156 | \$818,000 | \$8,101,420 |

The model provides further detail on indirect effects. The following table shows the top twenty-five industry sector jobs (or fractions of jobs) that are dependent on the direct commercial fishing sector jobs. Twenty-seven jobs primarily engaged in commercial catching or taking of finfish, generate other related jobs in such sectors as food services, wholesale business, and other retail and professional service providers.

Table 4. Top Twenty-five Jobs Sectors Dependent on North Shore Lake Superior Fish Harvesting and Processing in the State of Minnesota, 2011

| Employment Description | <i>Direct</i> | <i>Indirect</i> | <i>Induced</i> | <i>Total</i> |
|---|---------------|-----------------|----------------|--------------|
| Total | 27.0 | 17.4 | 12.6 | 57.0 |
| Seafood product preparation and packaging | 17.0 | 0.4 | 0.0 | 17.4 |
| Commercial Fishing | 10.0 | 0.1 | 0.0 | 10.1 |
| Animal production- except cattle and poultry | 0.0 | 3.4 | 0.0 | 3.4 |
| Wholesale trade businesses | 0.0 | 2.7 | 0.4 | 3.1 |
| Food services and drinking places | 0.0 | 0.5 | 1.4 | 1.9 |
| Real estate establishments | 0.0 | 0.7 | 0.6 | 1.2 |
| Management of companies and enterprises | 0.0 | 1.0 | 0.1 | 1.1 |
| Transport by truck | 0.0 | 0.9 | 0.1 | 1.0 |
| Services to buildings and dwellings | 0.0 | 0.6 | 0.2 | 0.8 |
| Private hospitals | 0.0 | 0.0 | 0.7 | 0.7 |
| Offices of physicians- dentists- and other he | 0.0 | 0.0 | 0.6 | 0.6 |
| Architectural- engineering- and related servi | 0.0 | 0.6 | 0.0 | 0.6 |
| Employment services | 0.0 | 0.4 | 0.2 | 0.5 |
| Nursing and residential care facilities | 0.0 | 0.0 | 0.5 | 0.5 |
| Retail Stores - General merchandise | 0.0 | 0.0 | 0.4 | 0.5 |
| Private junior colleges- colleges- universiti | 0.0 | 0.3 | 0.2 | 0.5 |
| Retail Stores - Food and beverage | 0.0 | 0.0 | 0.4 | 0.5 |
| Civic- social- professional- and similar orga | 0.0 | 0.2 | 0.2 | 0.4 |
| Automotive repair and maintenance- except car | 0.0 | 0.3 | 0.1 | 0.4 |
| Maint & repair construct of nonresident struc | 0.0 | 0.3 | 0.0 | 0.4 |
| Accounting- tax preparation- bookkeeping- and | 0.0 | 0.3 | 0.1 | 0.4 |
| Advertising and related services | 0.0 | 0.3 | 0.1 | 0.4 |
| Monetary authorities and depository credit in | 0.0 | 0.2 | 0.1 | 0.3 |
| Retail Nonstores - Direct and electronic sale | 0.0 | 0.0 | 0.3 | 0.3 |
| Legal services | 0.0 | 0.2 | 0.1 | 0.3 |
| | | | | 47.2 |

And another 9.8 jobs in various other sectors of the economy of the State.

What if the additional processing jobs currently located in Iowa were in Minnesota? The following table shows an estimation of measures of impact for additional jobs and production related to Minnesota's North Shore Lake Superior Fish Harvesting and Processing. (These jobs are currently in the state of Iowa but are modeled here as if they were in Minnesota.)

Table 5. An Estimate of the Economic Impact of Additional Jobs and Production Related to North Shore Lake Superior Fish Harvesting and Processing, State of Minnesota, 2011

| Source: IMPLAN | <i>Direct</i> | <i>Indirect</i> | <i>Induced</i> | <i>Total</i> |
|----------------|---------------|-----------------|----------------|--------------|
| Employment | 8 | 8 | 6 | 22 |
| Value Added | \$435,044 | \$691,212 | \$415,308 | \$1,541,564 |
| Output | \$2,586,256 | \$1,248,524 | \$708,420 | \$4,543,200 |

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Table 6. An Estimate of the Economic Impact of Additional Jobs and Production Related to North Shore Lake Superior Fish Harvesting and Processing, Arrowhead Region, 2011

| Source: IMPLAN | <i>Direct</i> | <i>Indirect</i> | <i>Induced</i> | <i>Total</i> |
|----------------|---------------|-----------------|----------------|--------------|
| Employment | 8 | 10 | 3 | 21 |
| Value Added | \$455,786 | \$337,719 | \$208,138 | \$1,001,643 |
| Output | \$2,607,528 | \$632,598 | \$349,226 | \$3,589,352 |

Table 7. Top Twenty-five Sector Jobs Dependent on Additional North Shore Lake Superior Fish Harvesting and Processing 2011

| Employment Description | <i>Direct</i> | <i>Indirect</i> | <i>Induced</i> | <i>Total</i> |
|---|---------------|-----------------|----------------|--------------|
| Total | 8.0 | 10.0 | 3.4 | 21.5 |
| Seafood product preparation and packaging | 8.0 | 0.1 | 0.0 | 8.1 |
| Animal production- except cattle and poultry | 0.0 | 6.0 | 0.0 | 6.0 |
| Wholesale trade businesses | 0.0 | 0.8 | 0.1 | 0.9 |
| Food services and drinking places | 0.0 | 0.2 | 0.4 | 0.6 |
| Management of companies and enterprises | 0.0 | 0.3 | 0.0 | 0.3 |
| Private hospitals | 0.0 | 0.0 | 0.2 | 0.2 |
| Services to buildings and dwellings | 0.0 | 0.2 | 0.0 | 0.2 |
| Architectural- engineering- and related servi | 0.0 | 0.2 | 0.0 | 0.2 |
| Offices of physicians- dentists- and other he | 0.0 | 0.0 | 0.2 | 0.2 |
| Transport by truck | 0.0 | 0.2 | 0.0 | 0.2 |
| Real estate establishments | 0.0 | 0.1 | 0.1 | 0.2 |
| Automotive repair and maintenance- except car | 0.0 | 0.1 | 0.0 | 0.2 |
| Nursing and residential care facilities | 0.0 | 0.0 | 0.2 | 0.2 |
| Civic- social- professional- and similar orga | 0.0 | 0.1 | 0.1 | 0.2 |
| Monetary authorities and depository credit in | 0.0 | 0.1 | 0.0 | 0.1 |
| Retail Stores - General merchandise | 0.0 | 0.0 | 0.1 | 0.1 |
| Retail Stores - Food and beverage | 0.0 | 0.0 | 0.1 | 0.1 |
| Maint & repair construct of nonresident struc | 0.0 | 0.1 | 0.0 | 0.1 |
| Retail Nonstores - Direct and electronic sale | 0.0 | 0.0 | 0.1 | 0.1 |
| Advertising and related services | 0.0 | 0.1 | 0.0 | 0.1 |
| Retail Stores - Motor vehicle and parts | 0.0 | 0.0 | 0.1 | 0.1 |
| Accounting- tax preparation- bookkeeping- and | 0.0 | 0.1 | 0.0 | 0.1 |
| Individual and family services | 0.0 | 0.0 | 0.1 | 0.1 |
| Hotels and motels- including casino hotels | 0.0 | 0.1 | 0.0 | 0.1 |
| Retail Stores - Miscellaneous | 0.0 | 0.0 | 0.1 | 0.1 |
| | | | | 18.8 |

And another 2.7 jobs in various other sectors of the economy of the State.

For readers interested in following this topic, BBER suggests the following books and Web site which have contributed to this analysis:

Dahl, Stephen, *Knife Island: Circling a Year in a Herring Skiff* (Paperback), Nodin Press, 07/01/2009.

Maki, Wilbur R., and Richard W. Lichty. *Urban Regional Economics: Concepts, Tools, Applications*. February 2000. Iowa State Press.

Miernyk, William. *Elements of Input Output Analysis*, New York, Random House, 1966.

Miller, Ronald E., and Peter D. Blair. *Input-output Analysis: Foundations and Extensions*, Englewood Cliffs, N.J. PrenticeHall, 1985 (out of print).

Olson, Doug and Scott Lindall, "IMPLAN Professional Software, Analysis, and Data Guide," Minnesota IMPLAN Group, Inc., 1725 Tower Drive, West, Suite 140, Stillwater, MN 55082, www.implan.com.

Sea Grants' News & Events article on "Commercial Fishing: The Life, the Limits, the Lore," by Nancy Hoene, at www.seagrant.umn.edu/newsletter/2010/07/commercial_fishing_the_life_the_limits_the_lore_.html.

