

ECONOMICS/MARKETING^{1[2]}

Project Termination Report for the Period
September 1, 1999 to August 31, 2003

NCRAC FUNDING LEVEL: \$47,916 (September 1, 1999 to August 31, 2003)

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REASON FOR TERMINATION

The project objectives were completed.

PROJECT OBJECTIVE

Evaluate the potential "supply" and "market" for hybrid walleye (female walleye ♀ male sauger) and sunfish (female green sunfish ♀ male bluegill) fillets relative to comparable fish.

Sub-objectives:

- (1) To analyze information on the consumption and "supply" of comparable fish in the U.S. and the North Central Region (NCR).
 - (2) To provide a technical comparison of the qualities and attributes of hybrid walleye (female walleye ♀ male sauger) and sunfish (female green sunfish ♀ male bluegill) fillets with those of substitute fish.
 - (3) Assess consumer (supermarket/consumers and restaurant/consumers) perceptions and likelihood of purchasing hybrid sunfish and walleye fillets relative to substitute fish.
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- (4) Evaluate the likelihood (and conditions, e.g., supply available, fillet sizes, price) that wholesaler, institutional buyers, and major fish retailers will add hybrid walleye and sunfish to their product lines.
- (5) Assess the potential interest and perceived barriers to the commercial production of hybrid sunfish and walleye.
- (6) Estimate the Asupply” and Ademand” for hybrid walleye and sunfish fillets.

PRINCIPAL ACCOMPLISHMENTS

SUB-OBJECTIVE 1

Data and information on the U.S. fish industry was gathered by North Dakota State University (NDSU). This was accomplished by searching public and private sources of information and statistics, i.e., government statistics, professional aquaculture association Web pages, commercial aquaculture Web pages, and a literature review of journals, other media, and conference proceedings.

U.S. consumption of fish and seafood products has been relatively steady over the last decade at about 15 lb/capita. The fish industry lacks a strong national promotion group due partially to its fragmentation into specific species organizations. In order to increase per capita consumption, the industry needs to work together. Expenditures for fish products in the NCR are substantially lower than in other regions of the United States and the major types of fish consumed are not produced or caught in the region. Again, these facts lead to the need for a strong regional organization.

SUB-OBJECTIVE 2

A preliminary consumer blind taste-testing of wild-caught walleye and sunfish was conducted at the annual meeting of the Minnesota Aquaculture Association in February 2000. Based upon preliminary surveys of behavior and taste-testing, walleye exhibits great potential demand. Walleye is a preferred species in the region and possesses characteristics demanded by fish consumers. Sunfish, although a sought after fish by anglers, was not received favorably by consumers in the taste-testing experiments. Farm raised hybrid walleye was also rated high in taste tests at the Hybrid Walleye Workshops in Cadillac, Michigan (February 2002) and Cape Girardeau, Missouri (March 2003).

SUB-OBJECTIVE 3

A preliminary general consumer survey was conducted at five sites: the Minnesota Aquaculture Association in February 2000 (51 surveys completed); the Wisconsin Aquaculture Association in March 2000 (46 surveys completed); the Indoor Aquaculture Field Day, Vandalia, Illinois in March 2000 (22 surveys completed); a Hazard Analysis Critical Control Point training program conducted by Kinnunen in East Lansing, Michigan in August 2000 (20 surveys completed); and the Hybrid Walleye Workshop,

Cape Girardeau, Missouri in March 2003 (16 surveys completed). A total of 155 surveys were completed in 2000 and 2003. There was substantial difference in consumer behavior within the region with Indiana and Michigan being similar and Minnesota and Wisconsin consumers having similar patterns of consumption behavior. Missouri is definitely catfish country as there was a high preference for that species in that region of the country.

Walleye was the clearly preferred fish in consumer perceptions, scoring the highest in comparison to orange roughy, cod, and sunfish in each category of appearance, flavor, mouthfeel, and overall. Sunfish scored last in the same comparison, similar to tilapia in an earlier study. These consumer sensory tests, along with supplier opinions and market information, provide strong rationale for continued research on production of walleye and for expansion of farm-raised walleye. Given the difficulty of competing with low cost imports, the region needs to focus on “high-end” species. Sunfish, with only one exception, was rated low as to commercial potential. The widespread familiarity with sunfish as the most commonly caught fish did not result in strong market potential and work completed in Indiana and Michigan supported the common knowledge in food markets, i.e., consistent quality, taste, and appearance are the most important attributes in marketing fish products.

SUB-OBJECTIVE 4

During Year 1 of the study Michigan State University (MSU) took the lead in regard to the wholesaler and buyer analysis. MSU completed a literature review of previous studies that collected information from seafood wholesalers and buyers. This included obtaining survey instruments used to collect information from these and similar businesses. The literature review provided a conceptual basis for development of a draft survey instrument to be used to collect information from “Aseafood” brokers and distributors, institutional buyers, and major fish retailers in the seafood business.

The draft survey collected information on: (1) gross fish purchases, (2) cost of all fish bought/brokered, (3) species of fish bought or sold, (4) percentage of fish they buy or sell that are wild-harvested saltwater fish, wild-harvested freshwater fish, and farm-raised fish, (5) percentage of fish that they buy or sell that are fresh whole, fresh fillet/steaked, frozen whole, frozen fillet/steaked, and live, (6) the importance of different attributes in deciding whether or not to buy or carry a particular finfish product, (7) whether they purchase/sell or have purchased/sold wild-harvested walleye, farm-raised walleye, wild-harvested sunfish, or farm-raised sunfish, (8) for which fish species would farm-raised walleye and sunfish be a substitute, and (9) what, if any, are the potential barriers to introducing farm-raised walleye and sunfish into their markets. The survey instrument collected information about the seafood brokers and distributors, institutional buyers, and major fish retailers and will have uses beyond the objectives of this study including regular monitoring of these businesses as it relates to purchase and sale of aquaculturally-raised fish.

MSU also evaluated different approaches for collecting information from businesses including food processors. The review of different methods (e.g., mail survey, fax surveys, telephone surveys, and personal interviews) resulted in a decision to utilize a mail/fax-telephone approach. Brokers and distributors, institutional buyers, and major fish retailers were mailed and faxed a questionnaire and given the option of completing it and returning it by fax or mail or through a telephone interview. A telephone interview was used to assess and correct for possible biases introduced by non-response. Non-response bias could be a major concern in studies such as these.

The draft survey was circulated by MSU to cooperators from Illinois State University (ISU) and NDSU for comment and recommended changes.

MSU developed a list of seafood brokers and distributors, institutional buyers, and major fish retailers. The list was developed by combining a list previously developed by NDSU, businesses listed in the yellow pages, and in a National Fisheries Institute publication. MSU collected telephone and fax numbers, and the names of key contact persons for 88 seafood brokers and distributors, seven major grocery retail chains, and 20 institutional buyers who had been identified. These lists were utilized as a sampling frame for the survey of brokers and distributors, institutional buyers, and major fish retailers in the seafood business questionnaires and also to later conduct product testing.

A fax and telephone survey was administered by MSU to fish wholesalers, fish retailers, and institutional buyers. The survey collected data about the types of fish (species, wild, aquacultured) sold and/or purchased, source (suppliers) of fish, attributes important in deciding what fish to handle, and their potential interest in purchasing and/or selling hybrid walleye. A total of 31 of 46 firms that brokered or bought fish in Michigan returned questionnaires. This represents a response rate of 67%. Non-respondents were contacted and were either closed, no longer in business, or declined involvement in the study. Seventeen large wholesalers of fish were identified. For the purpose of this study, firms were either categorized as large wholesalers (15 firms), small wholesalers (21 firms), retailers (5 firms), or institutions (5 organizations). In terms of who responded, 15 completed surveys were received from larger wholesalers (66%), 14 surveys from small wholesalers (66%), 4 surveys from retailers (80%), and 3 from institutions (60%).

The overall response rate for large and small wholesalers, retailers, and institutional buyers was 68%. Results indicate a very strong interest in fish that have the same attributes as hybrid walleye. Wholesalers and retailers exhibit no concern regarding their ability to market a new fish. Wholesalers and retailers indicate that there is strong consumer demand for fish with similar size and attributes as hybrid walleye. They indicate that they increasingly encounter problems acquiring enough similar fish to meet this demand. A number of the wholesalers indicated that they were eager to sample

hybrid walleye. The only potential concern would be the price that wholesalers would be willing to pay aquaculture operators for the hybrid walleye.

In regards to the types of fish that these firms have bought or sold, 86% of the sample had bought or sold wild harvested saltwater fish. Sales of these types of fish represent 36.7% of total sales for those firms. Furthermore, 96.4% had bought or sold wild harvested freshwater fish. Sales of these types of fish represent 48.0% of total sales for those firms. Finally, 89.2% had bought or sold farm-raised fish. This represented 24.8% of total sales.

In regards to the types of farm-raised fish bought or sold in 2000, salmon, catfish, trout, and tilapia were the predominant species purchased or sold. Each of these types of fish were carried by more than half of the organizations surveyed

In regards to walleye, 28 respondents had bought or sold wild harvested walleye. The average length of time that they have bought or sold wild harvested walleye was 24.61 years. Furthermore, they rated their experience with wild-harvested walleye very highly (a mean of 8.96 on a ten-point scale with 10 being excellent). In regards to farm raised walleye, only 3 respondents had ever bought or sold this type of fish. The average length of time was 6.33 years and they rated their experience very high (mean of 9.67).

In regards to sunfish, 15 respondents had bought or sold wild harvested sunfish. The average length of time that they have bought or sold wild harvested sunfish was 17.57 years. Furthermore, they rated their experience with wild-harvested sunfish highly (a mean of 7.93). In regards to farm raised sunfish, only 1 respondent had ever bought or sold this type of fish. They only started carrying the fish during the past year but rated their satisfaction with the fish as excellent (a score of 10).

Forty-eight firms that bought or brokered fish in Illinois returned questionnaires that were distributed by ISU. A large number of questionnaires were returned unopened due to changes of address or an undeliverable address, indicating that several firms had ceased operations or moved out of the state. There was no attempt to determine if these firms had been replaced by newly established businesses. Among the 48 respondents, 9 firms reported that they brokered fish, 25 firms reported that they carried out wholesaler/distributor operations, and 26 firms or individuals reported that they bought fish for retail establishments. The gross fish purchases of the firms in the year 2000 were \$9,324,406 ± \$6,241,016 (mean ± S.E; $N = 32$). For those firms that brokered fish or carried out wholesaler/distributor operations, 35.3 ± 8.1% of their business was conducted with wholesalers/distributors; 8.0 ± 4.7% was conducted with institutional buyers; 32.3 ± 7.3% was conducted with restaurants; 12.7 ± 4.4% was conducted with retailers other than restaurants; 11.2 ± 5.7% was conducted with consumers; and 0.3 ± 0.3% was conducted with other unspecified types of businesses. Of those firms that

reported buying for retailers or institutions, 14 were buyers for restaurants, 16 were buyers for retailers other than restaurants, and four were institutional buyers.

ISU researchers found that with regard to the types of fish handled or brokered, the firms reported that $42.3 \pm 4.8\%$ of their transactions were related to wild-harvested saltwater fish, $26.7 \pm 4.4\%$ of their transactions were related to wild-harvested freshwater fish, and $32.4 \pm 4.4\%$ of their transactions were related to farm-raised fish. The following figures reflect the number of firms that handled or brokered various species of farm-raised fish: catfish, 36; salmon, 30; tilapia, 30; trout, 25; striped bass, 14; walleye, 8; yellow perch, 5; sunfishes, 3; and other unspecified species, 2. The firms reported the following distribution of farm-raised fish sales: salmon, $34.1 \pm 5.4\%$; catfish, $31.7 \pm 5.7\%$; tilapia, $20.8 \pm 5.1\%$; trout, $7.2 \pm 1.7\%$; striped bass, $2.1 \pm 0.7\%$; yellow perch, $1.7 \pm 0.9\%$; walleye, $1.6 \pm 0.9\%$; sunfishes, $0.5 \pm 0.3\%$; and other unspecified species, $0.3 \pm 0.3\%$.

The ISU questionnaire revealed 29 firms reporting transactions involving wild harvested walleye over the past 22.4 ± 3.8 years. They rated their overall experience with wild-harvested walleye at 8.0 ± 0.4 (0 = unacceptable, 10 = positive). Nine firms reported transactions involving wild-harvested sunfishes over the past 30.7 ± 8.8 years. They rated their overall experience with wild-harvested sunfishes at 6.9 ± 0.5 (0 = unacceptable, 10 = positive). Transactions involving farm-raised walleye were reported by four firms, and transactions involving farm-raised sunfishes were reported by one firm. Twelve firms rated the food quality of farm-raised walleye, based upon experience, perception, or both at 7.8 ± 0.5 (0 = unacceptable, 10 = positive). Six firms rated the food quality of farm-raised sunfishes, based upon experience, perception, or both, at 8.2 ± 0.5 (0 = unacceptable, 10 = positive). Respondents were asked to rate 15 attributes that could potentially influence whether they would buy or sell a particular finfish product. The highest rating was assigned to "Inconsistent quality of supplied fish" (9.6 ± 0.1), and the lowest rating was assigned to "Low price" (6.7 ± 0.4). Respondents were also asked to provide information about the various forms of fish that they purchased or brokered.

SUB-OBJECTIVE 5

This objective was jointly completed by ISU and MSU. Clearly, lack of marketing support and lack of product quality are the two most important potential barriers for the successful introduction of farm-raised walleye and sunfish. Furthermore, these farm-raised fish will have to directly compete with wild walleye and sunfish.

The information collected indicates there are potential markets for farm-raised walleye and sunfishes, although the support for walleye appears to be stronger than the support for sunfishes. Walleye, and to a limited degree, sunfishes are possible substitutes for a number of saltwater and freshwater species. Keys to successful market development appear to be consistent high quality with emphasis on taste and appearance, guaranteed year-round supplies, competitive pricing, and strategically placed product promotion.

Product forms most commonly used by fish buyers include fresh whole, fresh fillet, and frozen fillet.

Based upon surveys of behavior and taste-testing as well as market analysis, walleye and hybrid walleye exhibits the greatest current and potential demand. It is a preferred species in the region and possesses characteristics demanded by fish consumers as verified by its market price and responses by the industry. It appears that reduction of production problems and costs are the only limiting factor to a substantial increase in walleye production and sales.

Sunfish, although a sought after fish by anglers, was not received favorably by consumers in the taste-testing experiments. It also was not one of the favored species in the survey of consumption behavior. Based upon current information, sunfish will sell at a much lower price than walleye and will need to be produced at much lower cost per pound to be profitable. Although sunfish has name recognition, it appears that it would compete at a level with tilapia fillets based on its similarity in consumer response to taste and appearance tests.

SUB-OBJECTIVE 6

Results indicate that walleye and hybrid walleye are preferred fish in the region. Both consumer reaction and the industry responses clearly indicate expansion possibilities for increased walleye production without a high probability of negative price effects.

IMPACTS

Based upon the surveys of behavior and taste-testing, walleye exhibits great potential demand. It is a preferred species in the region and possesses characteristics demanded by fish consumers. It appears that production problems and costs are the only limiting factors to a substantial increase in walleye production and sales.

Sunfish, although a sought after fish by anglers, was not received favorably by consumers in the taste-testing experiments. It also was not one of the favored species in the survey of consumption behavior. Additional analysis of the hybrid sunfish needs to be undertaken prior to any firm conclusions or recommendations, however, based upon current information, sunfish will sell at a much lower price than walleye and will need to be produced at much lower cost per pound to be profitable.

The preliminary survey of wholesalers, retailers, and institutional buyers reveals that there is significant interest in hybrid walleye. Wholesalers and retailers are unable to acquire sufficient Asimilar” fish to meet current consumer demand. Wholesalers and retailers do not believe that Anewness” would be a barrier to marketing the fish because walleye has significant positive name recognition. The process of conducting the survey created awareness and interest concerning hybrid walleye. A number of the wholesalers

and retailers were interested in receiving more information including suppliers. Others expressed interest in taste and market testing of hybrid walleye. This implies that marketing the fish would not be difficult or costly.

RECOMMENDED FOLLOW-UP ACTIVITIES

The completed project strongly indicated that a market exists for walleye in the NCR, now refinement of production techniques subject to cost limits appear to be the next step toward a successful walleye aquaculture industry in the NCR. The follow-up activities that could help in a future walleye aquaculture industry in the region include in sequential order:

- Identify very clearly why a market hasn't developed so far,
- Address those issues through research, and, if successful, conduct a complete revenue/cost analysis from the producer's perspective. If profitable, provide extension materials and "hands-on" management assistance to producers.
- Conduct a marketing test of those fish in upscale or white tablecloth restaurants, and
- Analyze the potential for a regional promotion program which would include farm-raised walleye.

PUBLICATIONS, MANUSCRIPTS, OR PAPERS PRESENTED

See the Appendix for a cumulative output for all NCRAC-funded Economics/Marketing activities.

SUPPORT

YEAR	NCRAC- USDA FUNDING	OTHER SUPPORT				TOTAL	TOTAL SUPPORT
		UNIVER- SITY	INDUSTRY	OTHER FEDERAL	OTHER		
1999-00	\$27,822	\$53,777				\$53,777	\$81,599
2000-01	\$20,094	\$55,910				\$55,910	\$76,004
TOTAL	\$47,916	\$53,777				\$109,687	\$157,603