

National Risk Management Feasibility Program for Aquaculture - Examining the Feasibility of Aquaculture Insurance

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Abstract: The National Risk Management Feasibility Program for Aquaculture (NRMFPA) began in 2001 as a partnership between the USDA Risk Management Agency (RMA) and Mississippi State University. The purpose of the program is to generate information to help RMA policymakers analyze, evaluate, and determine the feasibility of developing policies for aquaculture crop insurance and related risk management tools for catfish, salmon, trout, and baitfish aquaculture. The NRMFPA funded an array of multidisciplinary projects to supplement research being conducted by the NRMFPA Principal Investigators and core Program team. The Program identified gaps in aquaculture data as they relate to risk management and risk reduction through conducting stakeholder and expert meetings for each aquaculture industry. The NRMFPA then solicited project proposals that would provide this missing information, which resulted in innovative, cutting-edge research and approaches to aquaculture risk management. The NRMFPA relied on highly-regarded investigators and consultants from throughout the U.S. and abroad to examine specific aspects of risk management within an aquaculture framework. Projects were divided into several topic areas, including: industry reports, production verification projects, fish disease and health, bird depredation, policy and premium development, loss enumeration, and risk shifting and futures trading. A brief overview of select projects is provided from several of the research initiatives. The project website can be accessed for much more detail, <http://www.agecon.msstate.edu/Aquaculture/index.php>.

Background

The National Risk Management Feasibility Program for Aquaculture (NRMFPA) was formed in October 2001 as a result of a partnership agreement between the Risk Management Agency (RMA) and Mississippi State University (MSU). Aquaculture producers are included among the underserved producers targeted by the Agricultural Risk Protection Act (ARPA) of 2000 that provided funds for this investigation.

RMA began focusing on aquaculture in 1998 by funding a preliminary study conducted by the Economic Research Service on the feasibility of providing multi-peril crop insurance for aquaculture. In 2000, RMA introduced a pilot program project for cultivated clams which continues to operate. In response to the legislative mandates of ARPA, the NRMFPA was created in 2001 to provide RMA with the necessary information to evaluate providing risk management tools for aquaculture producers. MSU became the partner organization in the program because of the unique nature of aquaculture and its associated risks and the institution's history of research in aquaculture. MSU in turn has collaborated with a number of individuals, academic institutions, and other organizations to collect the information necessary to effectively evaluate the viability of developing new risk management tools for the aquaculture industry.

Aquaculture continues to be a growing component of agricultural production in the United States. In 2005, U.S. sales value of the four species groups investigated by the program—catfish, baitfish, trout, and salmon—was just over \$620 million and represented 57 percent of the value of aquaculture products sold in the U.S. (NASS, Census of Aquaculture 2005). These four species groups were selected for investigation in 2001 because they represented the four highest-valued species groups produced in U.S. aquaculture and also because they provided a representation of the major types of production systems in finfish aquaculture.

Scope of Project

At the outset of the project, RMA and Mississippi State University researchers developed a set of objectives for the life of the partnership agreement. These objectives include:

1. Conduct a feasibility study of four species: catfish, farmed salmon, trout, and baitfish;
2. Conduct listening sessions in the major production areas to determine interest level;
3. Collect data regarding the risks associated with aquaculture production;
4. Determine if existing information is sufficient to develop insurance programs or if other data are needed;
5. Collect or design data collection needs for insurance product development;
6. Assess the potential of various risk management tools and insurance designs; and
7. Provide a feasibility report that will provide information to assess the viability of alternative risk management designs.

Each of these objectives is addressed by one or multiple sections in the following report.

Select Projects Funded by the NRMFPA

The NRMFPA funded an array of multidisciplinary projects to supplement research conducted by the NRMFPA Principal Investigators and core staff, Table 1. The NRMFPA identified gaps in data or knowledge for obtaining risk-related information in the catfish, trout, salmon, and baitfish aquaculture industries by conducting stakeholder meetings and consulting with experts in each aquaculture industry. The program then solicited project proposals to provide this information. Many of the approaches, methods, and areas of research were innovative, cutting-edge work. The NRMFPA relied on highly esteemed investigators and consultants to conduct research and studies on specific aspects of risk management and the aquaculture industries. Projects were divided into several topic areas including: industry reports, production verification projects, fish disease and health, bird depredation, policy and

premium development, loss enumeration, and risk shifting and futures trading. In this paper, a brief overview of select projects is provided from several of the research initiatives.

Table 1. National Risk Management Feasibility Program for Aquaculture summary by the numbers.

- 20 funded projects and commissioned reports
 - 14 states involved with at least one project
 - 18 participating institutions/agencies/consulting firms
 - 44 farms/feed mills contributing to research effort
 - 2111 producers in 29 states included in the producer survey
 - 50+ individuals directly working on projects
 - 30 advisory committee members provide input to the program
 - Multidisciplinary representation including:
 - Agricultural Economics
 - Agricultural Engineering
 - Crop Insurance
 - Epidemiology
 - Extension
 - Aquaculture
 - Veterinary Science
 - Wildlife Science
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Industry Reports

The catfish, salmon, trout, and baitfish industry reports provided in-depth information related to the respective industries' development, unique characteristics, market, production systems and management practices, risks, and losses. These reports were authored by producers and researchers who are considered to be industry experts by a number of aquaculture producers and stakeholders. To view these reports go to the project website at: <http://www.agecon.msstate.edu/Aquaculture/fundedprojects.php>. The reports provided a foundation to understand each industry and the perils of greatest concern for rearing each species. It was an important early step in developing the direction of the program and areas of focus.

Production Verification Projects

The NRMFPA funded production verification projects for catfish, trout, and baitfish. The NRMFPA examined the feasibility of also funding a salmon verification project but was unable to do so due to lack of facilities and available researchers. The purpose of these verification projects was to gather baseline production and loss data on a commercial-scale farm setting. The verification projects implemented and examined fish production using research-based extension recommendations. In these projects cooperators (fish producers) followed specific protocols related to water quality, aeration, stocking density, feed, fish health, and other factors. These protocols were developed by university aquaculture researchers and extension personnel and are considered the best guidelines for rearing fish in a commercial setting. Producers and researchers collected fish production, growth, feed, and loss data while the verification projects were underway. The study provided a sample of the magnitude and frequency of losses that producers face, which were incorporated into premium rate setting, policy applications, and recommended risk-reducing management practices. In addition, the findings from this work helped producers maintain better records, better understand risks, and design strategies and management practices to reduce their chances of loss.

Diseases and Fish Health

During stakeholder meetings and workshops participants indicated the risk of greatest economic concern to aquaculture producers—across all four species—is fish disease (see the project workshop report for details at http://www.agecon.msstate.edu/Aquaculture/workshop_1/report01.pdf). Several projects were funded in order to address this area of concern and explore the feasibility of providing risk management products to cover fish diseases. Some of the projects stemmed from the fish disease workshop discussed earlier in this paper, while other projects developed as industry needs were identified and understood.

The fish disease projects were divided into two components, innovative research projects and internet web-based projects. The first research project involved validating best management practices for catfish operations via a system to recognize risk factors for infectious catfish diseases. This project developed better criteria to assess disease risk based on management practices; analyzed whether recommendations by researchers reduced losses from diseases; and helped the industry determine appropriate management practices to decrease producers' risk of losses from disease. This information will be provided to producers and will enable them to decrease their risk of losses from disease. In addition, it can be utilized for risk classification purposes.

The second fish disease research project examined the feasibility of creating disease spread models based on epidemiological models as a risk management tool for developing aquaculture insurance. This project assessed the potential of using computer disease simulation models as a risk management tool for aquatic animal production; developed a tool for estimating losses from fish disease outbreaks; enabled researchers to characterize diseases and their potential for causing losses; and identified knowledge gaps of specific fish diseases so that fish disease experts could begin to address these areas. This work presented an alternative method to estimate and predict losses when loss data is unknown or not available. Since historical loss data do not exist for the aquaculture industries, modeling was one method to incorporate known risk factors, practices, and disease characteristics to estimate the frequency and magnitude of losses an individual producer or an agriculture sector could experience. The models can improve and become more rigorous as more information becomes known and can also be modified for use in other agriculture and non-agriculture sectors.

The web-based fish health and disease projects included three projects that are still accessible on the web today. The first was the development of an aquaculture risk database that identifies recent outbreaks of disease and other perils impacting aquaculture production and provides up-to-date information on regional and species specific losses, risks, and other factors that will be useful for government and private insurance. This project also established a database of losses and perils useful to private insurers. The website developer plans on continuing this site and building the database as more loss events are contributed to the site.

The second web-based project is a veterinary fish health certification program for veterinarians and other allied aquatic animal health professionals. USDA/APHIS has expressed great interest in this project and is working with the developers of the web course to examine ways to incorporate the certification program into a nationwide training/certification program that APHIS has begun. The certification program provides a better informed workforce to correctly identify and treat fish diseases with the goal of reducing fish losses and insurance claims and expanding expertise through teaching a cadre of people around the country.

Finally, the third project created a publicly available online database that links aquaculture producers with contact information of fish health experts and diagnostic labs throughout the U.S. Prior to this project there was no centralized source of information that producers could access to find veterinarians or diagnostic labs with expertise in aquatic animal health.

Bird Depredation

Bird depredation was identified as the peril with the second-greatest economic concern during NRMFPA catfish and baitfish stakeholder meetings (Miller et. al., 2002). In addition, almost 10 percent of all trout losses in the U.S. were attributed to predation in 2004 (West Virginia Agricultural Statistics, 2004). In order to examine this peril the NRMFPA funded one project that focused on the baitfish industry since baitfish, as opposed to catfish and trout, are susceptible to predation throughout their entire life on the farm. The NRMFPA collaborated with USDA APHIS-Wildlife Services to examine the use of fish-eating birds on baitfish production in Arkansas. Although anecdotal information existed on the impact of bird predation on baitfish production, few scientific facts were known about the actual impact of birds on this industry. Project researchers visited over 30 farms on a bi-monthly basis to assess fish loss and disease transmission from birds' use of baitfish production facilities. The project provided assessments of losses and potential losses from the peril.

Policy and Premium Development

As expressed earlier, great challenges exist in developing appropriate and fair policies and premiums for an agriculture sector that does not have historical production data available. In order to address the deficiency in available production data several projects were funded by the NRMFPA.

Two projects involved participation with a worldwide aquaculture insurance expert. He developed a report on the current availability of aquaculture insurance at a market level and at the farm level in the U.S. The full report is found at: <http://www.agecon.msstate.edu/Aquaculture/pubs/Availability.pdf>. In addition, he assisted NRMFPA in developing underwriting and draft policy language for the catfish, trout, salmon, and baitfish policies found in a later section of this report.

The next project was a nationwide producer survey that collected historical and future loss, production, perceived risk, and willingness-to-pay data from catfish, trout, and baitfish operations throughout the U.S. The NRMFPA subcontracted with NASS to survey all known trout and baitfish producers and a sub-sample of catfish producers in the U.S. The results of this work serve as the foundation used to develop premium rates and estimate frequency and magnitude of losses. The survey is presented in another section of this report.

Finally, a project was funded that focused on the optimal updating of premium rates in the presence of tail events with an emphasis on aquaculture. This project derived the optimum updating of aquaculture insurance premium rates while considering temporal and spatial factors; used information on existing theoretical models to estimate and calibrate an appropriate model for inputting aquaculture data and insurance; provided an improved mechanism for determining when to adjust premiums for aquaculture and other crop insurance programs; and developed a method to improve premium rating for underserved crops once rating information is known. This work was designed with an emphasis on aquaculture but could also be easily adapted to other commodities.

Loss Enumeration

One of the unique challenges of developing aquaculture insurance for species reared in ponds is the difficulty in enumerating losses since estimating the number of dead fish that have sunk to the bottom of the pond is difficult, as is counting the number of fish floating on the surface during large losses. In addition, the catfish industry also indicated a need exists for better methods to estimate losses for farm management and planning purposes. The NRMFPA worked with agricultural engineers and fish scientists to develop a system to estimate large-scale catfish losses. The project evaluated the feasibility of using image processing to quantify dead fish and explored methodologies for estimating the number of fish lost

from a peril. This project allowed for enumeration of losses and improved actuarial estimation of lost crops after a peril impacts a farm.

Risk Shifting and Futures Trading

In addition to exploring the feasibility of reducing risk through insurance products, the NRMFPA also investigated other risk management options such as risk shifting and transfer. The first project examined the potential for futures trading in the catfish and salmon markets. The results indicate neither of the markets can support a successful futures market at present due to insufficient trading volume, lack of product homogeneity, limited price transparency, the presence of numerous types of products and weight groups, small markets, and fish sold in a fresh form, (for more detail on this particular project see the project website at: http://www.agecon.msstate.edu/Aquaculture/pubs/Futures_Report.pdf). The second project studied the interactions between producer/processor contracts, price transmission, and feed hedging as methods for catfish producers to shift risk.

Conclusion

While the above outlines many of the data gathering and analytical portions of the NRMFPA project much work remains to complete this project. Future research and analyses remaining to be completed include estimation of aquaculture insurance premium rates for catfish and trout, determining the willingness to pay for insurance by these producers, development of a producer risk classification system, and analysis of risk reducing management practices. Once completely analyzed the aquaculture producer risk survey results will be published and distributed to producer groups and a final report document will be prepared and presented to the RMA for review and evaluation in 2007.

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