

**Title: Fishy business: Economically motivated adulteration of fish in Minnesota retail markets**

**Principal Investigator:** Nicholas Phelps, University of Minnesota-Twin Cities

**Center of Excellence:** Food Protection and Defense Institute (FPDI) (Emeritus)

**COE Lead/Co-Lead Institution:** University of Minnesota

**Project Start Date:** 07/2014

**Project Completion Date:** 08/2015

**Project Status:** Complete

**Research Theme:** Supply Chains

**Participating State(s):** Minnesota

**Amount Awarded to Date:** \$132,123

**Award Number:** 2010-ST-061-FD0001

**Abstract:** Economically motivated adulteration (EMA) or food fraud involving seafood (often called "fish fraud") is of significant and widespread concern. Numerous reports have cited the rate of fraud, specifically for species substitution, in the United States ranges between 25-50% of products sold in retail markets. This activity results in the loss of supply chain transparency and security, diminishes consumer confidence, manipulates economic markets, increases public health threats, and undermines sustainability efforts. It is critical to the defense of our food system to improve the understanding of EMA of fish products in the retail market to inform evidence-based regulatory policymaking, as well as protect the health of consumers. To that end, this project conducted a comprehensive assessment of fish fraud in Minnesota. This was achieved by 1) Documenting the supply chain for high value and frequently mislabeled fish species at retail outlets in Minnesota; 2) Determining the prevalence of mislabeling of these fish species in the Minnesota retail market; and 3) Performing a qualitative assessment of regulatory, retail, and consumer knowledge and opinions of fish fraud in Minnesota retail markets and identifying the greatest opportunities for fraud in the supply chain. The immediate and long-term impacts of this project will be wide reaching and involve stakeholders at all levels of regulatory management and the supply chain. The information provided within this report will offer regulatory agencies with justification for evidence-based policy and management strategies and inform risk assessment. In addition, understanding the current prevalence of fraud in the retail market and stakeholder expectations will contribute to efforts to develop education and outreach initiatives, as well as third party product certification.

**Project Type:** Research

**End User Engagement:**

- DHS U.S. Customs and Border Protection
- Food and Drug Administration
- State and Local Regulatory Agencies

**Executive Summary (2015):** Economically motivated adulteration (EMA) of seafood products, also known as fish fraud, is a subject of growing concern. This activity results in the loss of supply chain transparency and security, diminishes consumer confidence, manipulates economic markets, increases public health threats, and undermines sustainability efforts. It is critical to the defense of our food system to improve the understanding of fish fraud in the retail market to inform evidence-based regulatory policymaking, as well as protect the health of consumers. To that end, this project completed a comprehensive assessment of fish fraud in Minnesota. Supply Chain Documentation – Visual and narrative description of the food supply chain for four fish species (walleye, tuna, halibut and salmon) collected at grocery stores and restaurants in Minnesota were developed. When available, this included

documentation of country-of-origin, intermediary stakeholders, and processing prior to arrival at the retail location. Data was collected from product packaging or interactions with retail personnel. Of the samples collected as part of the project, the source country was provided for 66% of the samples, while supplier information was provided for 41% of samples. Information on both the source country and the supplier was provided for only 33% of samples. There was very little publicly available information on intermediate stakeholders. The lack of supply chain transparency is a critical gap in managing EMA.

**Prevalence of Mislabeling** – Samples of walleye, halibut, tuna, and salmon were collected from more than 100 grocery and restaurant locations in Minnesota. Samples were collected during unannounced consumer visits and species authenticity confirmed by DNA-barcoding performed at the University of Minnesota Veterinary Diagnostic Laboratory. At restaurants, fish species were accurately labeled: walleye-98.7%, halibut-83.3%, tuna-80.4%, and salmon-71.4%. At grocery stores, fish species were accurately labeled: walleye-96.4%, halibut-88.4%, tuna-86.1%, and salmon-100%. While rates of species substitution were less than previous reports, the results demonstrate fish fraud is still occurring in Minnesota.

**Stakeholder Knowledge and Opinions** – To assess awareness and perception of seafood fraud among regulators, wholesalers, retailers and consumers, in-depth one-on-one interviews with a cross-section of industry representatives, consumer focus groups, and online listening were conducted. Awareness of seafood species substitution is growing, accelerated by increased seafood consumption and interest in sustainability. Despite the obvious public health threats, seafood species substitution is largely perceived to be an economic issue versus a food safety concern by supply chain stakeholders. It was clear through stakeholder interactions that addressing the issue through proactive and regulatory means is needed and will take a cooperative effort. Lastly, it is important to note that keeping the issue of seafood fraud in context is critical not to undermine the efforts of wild caught seafood sustainability and the rapidly growing aquaculture industry. This project provides a localized view of the landscape, by offering a comprehensive assessment of not only the prevalence of fish fraud in Minnesota, but also an understanding of the supply chain and stakeholder expectations that could be applied broadly. It was designed to provide valuable information for strategic decision-making and, ultimately, the reduction of seafood fraud.

## Contact Information:

Food Protection and Defense Institute  
University of Minnesota - Twin Cities  
R285 LES Bldg  
St. Paul, MN 55108  
612-624-2458  
[fpdi@umn.edu](mailto:fpdi@umn.edu)