

# Genetic Identification of Commercially Sold Seafood in Fairbanks' Sushi Restaurants

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## Background

- Seafood fraud is rampant worldwide.
- From 1987–1998, 37% of fish species sold in the USA were mislabeled<sup>1</sup>.
- The use of common names that could encompass several species (e.g., tuna) creates confusion.
- Seafood fraud has implications for human health (e.g., mercury content, parasites, forced labor) and consumer trust.
- Seafood mislabeling is also detrimental to the management and conservation of wild fish stocks.
- DNA barcoding is a useful tool for species identification and fraud detection.

## Methods

- We sequenced 48 samples of sashimi from seven restaurants in Fairbanks, AK during 2022–2023.
- We used Sanger sequencing to target the mitochondrial DNA cytochrome oxidase I (COI) gene, AKA the "barcoding gene."
- Sequences were processed and quality checked using Geneious Prime v.11.0.18.
- We used the Basic Local Alignment Search Tool (BLAST) in Geneious to find regions of similarity between our sequences and the NCBI database to determine species identification.
- Species with a match  $\geq 99\%$  are reported.

## Results

- Genetic identifications matched 9 out of 11 sushi samples indicated by restaurants.
- Two types of sushi (red snapper and bass) were identified 100% of the time as Nile tilapia (*Oreochromis niloticus*).

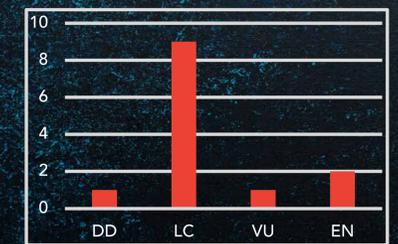


Figure 1. IUCN status of 13 sushi species identified in this study. DD: data deficient; LC: least concern; NT: near threatened; VU: vulnerable; EN: endangered

## Implications

- Consumer trust is important to restaurant patrons, and most sushi samples were labeled correctly.
- Some species (e.g., red snapper) are either consistently mislabeled, or the common name represents several species (e.g., tuna, flying fish roe).
- Consumers also have a role to play in educating themselves on threatened and endangered fish species.
- White tuna (ono) often refers to albacore tuna or escolar, but is not a legally approved FDA name. Escolar can cause gastrointestinal pain, which highlights the importance of both labeling and consumer awareness.
- This study is a starting point to engage with Fairbanks' sushi restaurants and to inform consumers.

- Ikura salmon roe**: 100% Chum salmon (*Onchorhynchus keta*)
- Sake salmon**: 100% Atlantic salmon (*Salmo salar*)
- Maguro tuna**: 40% Yellowfin (*Thunnus albacares*), 20% Bigeye (*Thunnus obesus*), 40% Atlantic bluefin (*Thunnus thynnus*)
- Ono white tuna**: 100% Escolar (*Lepidocybium flavobrunneum*)
- Hamachi yellowtail**: 100% Japanese yellowtail (*Seriola quinqueradiata*)
- Tobiko flying fish roe**: 50% Flying fish (*Hirundichthys sp.*), 50% Cheilopogon sp.
- Unagi eel**: 83% American eel (*Anguilla rostrata*), 17% Japanese eel (*Anguilla japonica*)
- Saba mackerel**: 100% Atlantic mackerel (*Scomber scombrus*)
- Suzuki striped bass**: 100% mislabeled Nile tilapia (*Oreochromis niloticus*)
- Izumidai red snapper**: 100% mislabeled Nile tilapia (*Oreochromis niloticus*)

82% (9/11) of fishes were correctly labeled

27% (3/11) of common names represented >1 species

69% (9/13) of species detected are listed by IUCN as Least Concern (Figure 1)



<sup>1</sup>Buck, Eugene H. Seafood Marketing: Combating Fraud and Deception, Congressional Research Service Report, April 11, 2007; Washington D.C.. We thank NSF Alaska EPSCoR and Kent Robinson for supporting this research.

Download the Monterey Bay Aquarium's Seafood Watch sushi wallet card to stay informed about sustainable species!