



Oceana Study Reveals Seafood Fraud Nationwide

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Executive Summary

Americans are routinely urged to include more seafood in their diets as part of a healthy lifestyle. Yet consumers are often given inadequate, confusing or misleading information about the seafood they purchase. The dishonest and illegal practice of substituting one seafood species for another, or seafood fraud, has been uncovered both in the United States and abroad at levels ranging from 25 to more than 70 percent for commonly swapped species such as red snapper, wild salmon and Atlantic cod.

From 2010 to 2012, Oceana conducted one of the largest seafood fraud investigations in the world to date, collecting more than 1,200 seafood samples from 674 retail outlets in 21 states to determine if they were honestly labeled. DNA testing found that one-third (33 percent) of the 1,215 samples analyzed nationwide were mislabeled, according to U.S. Food and Drug Administration (FDA) guidelines.

Of the most commonly collected fish types, samples sold as snapper and tuna had the highest mislabeling rates (87 and 59 percent, respectively), with the majority of the samples identified by DNA analysis as something other than what was found on the label. In fact, only seven of the 120 samples of red snapper purchased nationwide were actually red snapper. The other 113 samples were another fish. Halibut, grouper, cod and Chilean seabass were also mislabeled between 19 and 38 percent of the time, while salmon was mislabeled 7 percent of the time.

Forty-four percent of all the retail outlets visited sold mislabeled fish. Restaurants, grocery stores and sushi venues all sold mislabeled fish and chances of being swindled varied greatly depending on where the seafood was purchased. Our study identified strong national trends in seafood mislabeling levels among retail types, with sushi venues ranking the highest (74 percent), followed by restaurants (38 percent) and then grocery stores (18 percent). These same trends among retail outlets were generally observed at the regional level.

Seafood substitutions included species carrying health advisories (e.g. king mackerel sold as grouper; escolar sold as white tuna), cheaper farmed fish sold as wild (e.g. tilapia sold as red snapper), and overfished, imperiled or vulnerable species sold as more sustainable catch (e.g. Atlantic halibut sold as Pacific halibut). Our testing also turned up species not included among the more than 1,700 seafood species the federal government recognizes as sold or likely to be sold in the U.S. As our results demonstrate, a high level of mislabeling nationwide indicates that seafood fraud harms not only the consumer's pocket book, but also every honest vendor or fisherman along the supply chain. These fraudulent practices also carry potentially serious concerns for the health of consumers, and for the health of our oceans and vulnerable fish populations.

Because our study was restricted to seafood sold in retail outlets, we cannot say exactly where the fraudulent activity occurred. The global seafood supply chain is increasingly complex and obscure. With lagging federal oversight and minimal government inspection despite rising fish imports, and without sampling along the supply chain, it is difficult to determine if fraud is occurring at the boat, during processing, at the wholesale level, at the retail counter or somewhere else along the way.

Our findings demonstrate that a comprehensive and transparent traceability system – one that tracks fish from boat to plate – must be established at the national level. At the same time, increased inspection and testing of our seafood, specifically for mislabeling, and stronger federal and state enforcement of existing laws combatting fraud are needed to reverse these disturbing trends. Our government has a responsibility to provide more information about the fish sold in the U.S., as seafood fraud harms not only consumers' wallets, but also every honest vendor and fisherman cheated in the process--to say nothing of the health of our oceans.

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Part 1: National Study

Introduction

Today, seafood is a popular and healthy food choice for many Americans, making the U.S. the second (only behind China) largest seafood consumer worldwide.¹ The American Heart Association and new dietary guidelines from the U.S. government both recommend eating eight ounces, or two seafood meals, a week.^{2,3} However, seafood consumers are often given insufficient, confusing or misleading information about the fish they purchase.⁴

Seafood fraud encompasses any illegal activity that misrepresents the fish you purchase, including mislabeling or substituting one species for another. Previous studies suggest that seafood fraud is more widespread than generally thought, both in the U.S. and around the world. Broad retail market surveys of seafood mislabeling by both government agencies and academic researchers in North America have uncovered mislabeling rates ranging from 25 to 40 percent.^{5,6,7} Outside the U.S., mislabeling rates as high as 50 percent have been found in broad surveys.^{8,9,10,11} Surveys of one kind of fish have found mislabeling rates of 25 to more than 70 percent for commonly swapped species such as red snapper, wild salmon and Atlantic cod.^{12,13,14}

Due to an increasingly complex supply chain, it is often unclear where and when seafood fraud actually takes place. Seafood is a global commodity and is one of the most commonly traded food items in the world.¹⁵ When more than 90 percent of the seafood consumed in the U.S. is imported,¹⁶ and less than 1 percent is inspected by the government specifically for fraud,¹⁷ the opportunities for dishonest and illegal practices abound. With more than 1,700 different species of seafood now available for sale in the U.S.,¹⁸ it is unrealistic to expect the American consumer to be able to independently and accurately determine what fish is really being served. When considering that most seafood purchased is in fillet form or already prepared in sauce, it can become even more difficult to distinguish between species.

Some mislabeling may result from human error in identifying fish or their origin. More often, it is driven by economic gain, as when a cheaper or more readily available species is substituted for one that is more expensive, desirable or in limited supply. This type of fraud not only cheats the consumer, but it also hurts honest fishermen and seafood suppliers who play by the rules. Mislabeling can also provide cover and profit for illegal or unregulated seafood. Illegal fishing harms our oceans when threatened, overfished or undersized species are caught using restricted or banned fishing gear that destroys essential fish habitat and prevents species or stocks from recovering and thriving. Lastly, seafood fraud can have serious health consequences when mislabeled seafood masks undeclared allergens, contaminants or toxins.^{19,20}

Methods

From 2010 to 2012, Oceana staff and supporters purchased 1,247 seafood samples from 674 retail outlets in major metropolitan areas in 21 states. More than 350 Oceana supporters volunteered to purchase seafood items in select cities. Supporters were encouraged to purchase targeted fish of interest, such as fish species that had been found to be mislabeled in other studies and those with regional significance. All samples submitted, including targeted and non-targeted fish, were analyzed using DNA methods.

The 674 retail outlets consisted of restaurants, sushi venues, grocery stores and seafood markets. More than one seafood sample was obtained from many of the retail outlets visited, resulting in numerical

differences in the number of outlets visited and samples collected. Staff selected many of the restaurants and sushi venues visited by searching menus of retail outlets listed in Zagat and Yelp for the fish types of interest. Grocery stores and markets were selected mostly at random or based on convenience of staff and supporters.

Most of the seafood samples were analyzed at the University of Guelph's Canadian Centre for DNA Barcoding in Ontario, Canada.²¹ The University uses DNA barcoding, a genetic technique they pioneered, to identify the true species of each sample. This technique involves obtaining a short DNA sequence from a mitochondrial gene found in all animals, which is then compared to a catalogue of sequences from more than 8,000 fish species that have been barcoded as part of the Fish Barcode of Life initiative.²² Select samples were submitted to other commercial labs for identity verification using different DNA methods. Genetic identities were confirmed or excluded for 1,215 out of the 1,247 samples (97 percent) tested. In some instances, samples could be identified to the genus, but not species level, but often this was sufficient to determine if the fish was mislabeled.

Oceana considered a fish sample to be mislabeled if seafood substitution occurred or if retailers were not following the Food and Drug Administration (FDA) Seafood List, a tool used to guide seafood labeling that lists the acceptable market names, scientific names and common names for the roughly 1,700 species potentially or commonly sold in the U.S.²³ For example, it is acceptable to label a fish as "snapper" if it is one of 47 different snapper species on the FDA's list. However, only one specific species of snapper can be labeled as "red snapper." The Seafood List has been updated annually since 2009, to reflect changes in market or scientific names as well as to add new species that are now being sold in interstate commerce. These changes prompted reclassification of some fish species identified in previous Oceana reports as "mislabeled."

Labeling seafood with something other than the acceptable market name is mislabeling. The FDA Seafood List also includes "vernacular," or informal or regional, names for some seafood species, which are those that may be widely known locally, but not used or recognized as the same species elsewhere. The FDA's general policy on vernacular names is that they are unacceptable market names for seafood.

Results and Discussion

The genetic identity was determined for 1,215 of the 1,247 seafood samples (97 percent) collected from 674 retail outlets in 21 states.²⁴ The samples came from more than a dozen metropolitan areas or regions, including Seattle, WA, Portland, OR, Los Angeles and surrounding cities in Southern California, San Francisco and other cities in Northern California, Denver, CO, Austin and Houston, TX, Kansas City, MO/KS, Chicago, IL, Washington, D.C., Boston, MA, New York, NY and Miami and South Florida, FL, plus a few additional samples from Atlanta, GA, Pittsburgh, PA, Milwaukee, WI and Santa Fe, NM (Figure 1-map).

A total of 46 different types of fish were sampled for this study, with more than 80 percent consisting of various types of salmon, snapper, cod, tuna, sole, halibut and grouper (Figure 2). At least one instance of mislabeling was found in 27 out of the 46 fish types of collected.

Overall, one-third (33 percent) of the fish samples genetically analyzed were mislabeled (401 out of 1,215). However, mislabeling rates varied greatly depending on the type of fish purchased (Figure 3). Of the most commonly sampled fish, snapper and tuna had the highest mislabeling rates (87 and 59 percent, respectively), with the majority of the samples identified as something other than what was purchased. Halibut, grouper, cod and Chilean seabass were mislabeled between 19 and 38 percent of the time, while lower levels of mislabeling were noted among salmon (7 percent) and sole (9 percent).

Fish samples were purchased from three types of retail outlets: grocery stores (including a few seafood markets), restaurants and sushi venues. Forty-four percent of the 674 retail outlets visited sold mislabeled fish. Roughly three times as many samples were purchased from grocery stores (731) as from either restaurants (243) or sushi venues (241) (Figure 4). The testing results showed strong national trends in seafood mislabeling among retail outlets, with sushi venues having the highest fraud levels (74 percent), followed by restaurants (38 percent) and then grocery stores (18 percent). These same trends were mirrored regionally in places where sufficient numbers of samples were purchased from each of the three retail types (See Figure 5 and Part II).

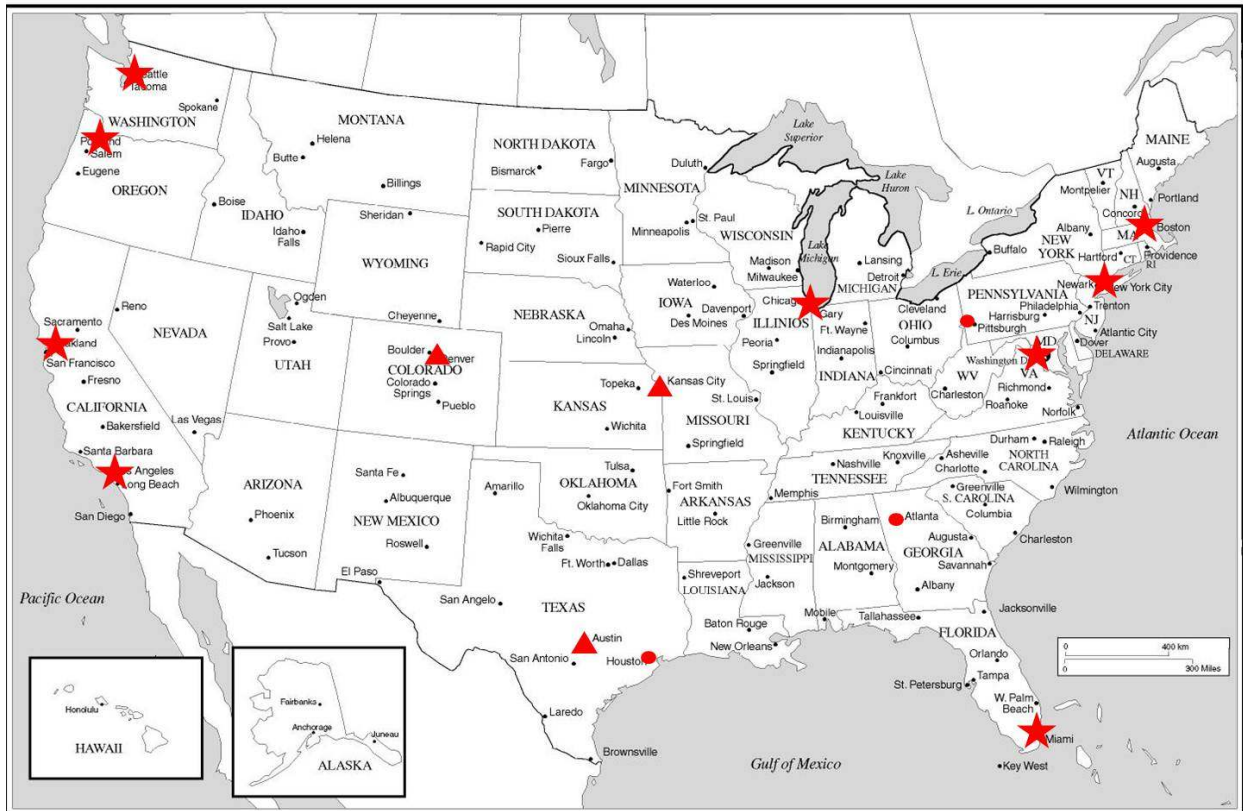


Figure 1. Metropolitan areas surveyed. Stars are locations with ~90 or more samples. Triangles are locations with ~40 samples, while circles are locations with ~15 or fewer samples.

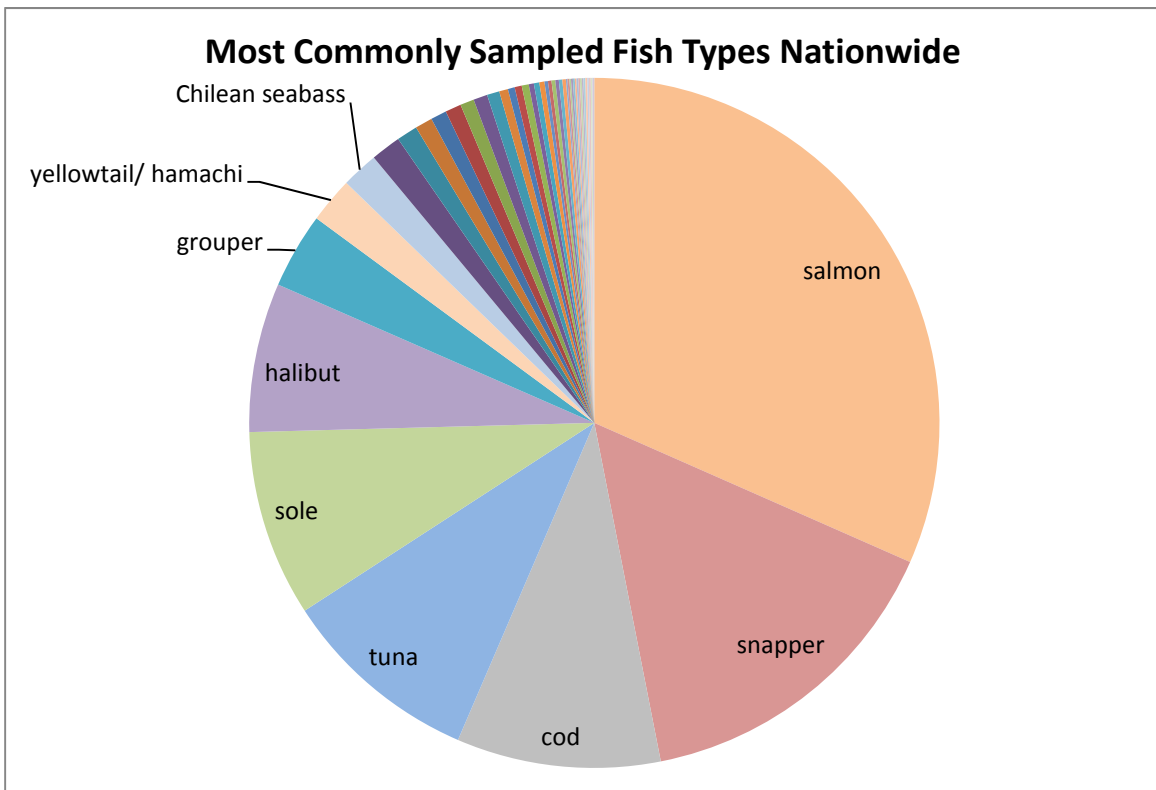


Figure 2. The most frequently sampled fish of the 46 types collected.

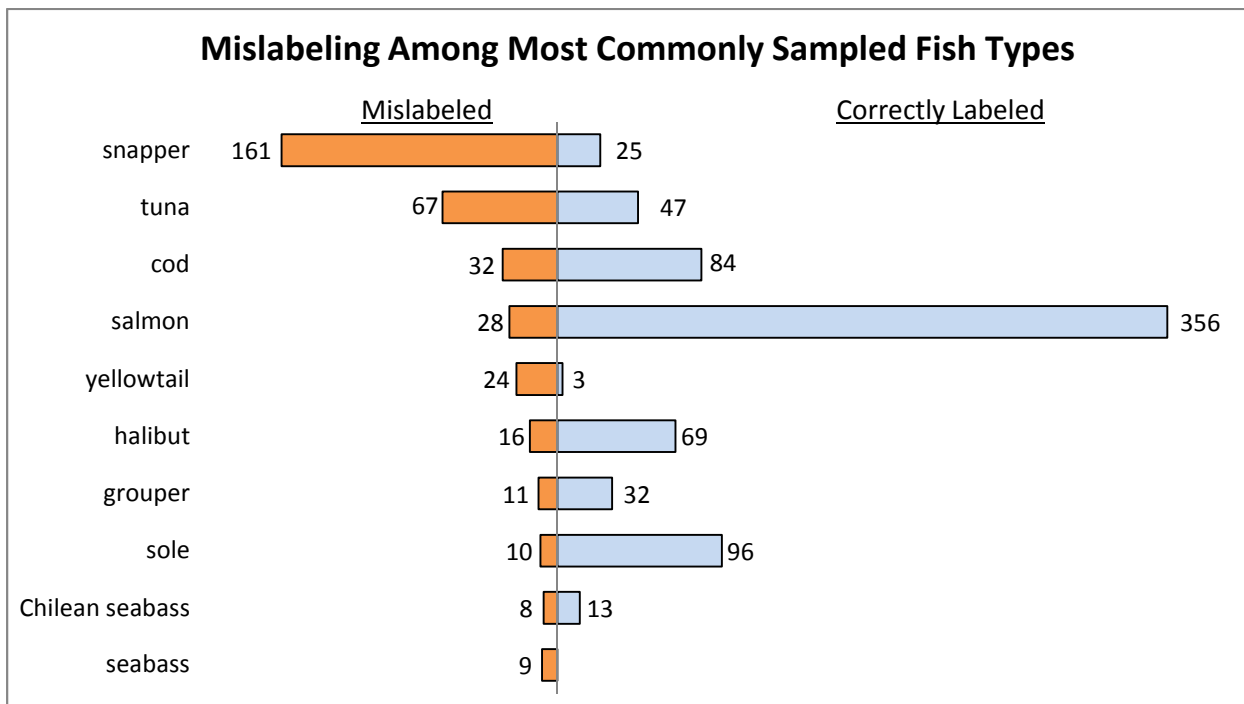


Figure 3.

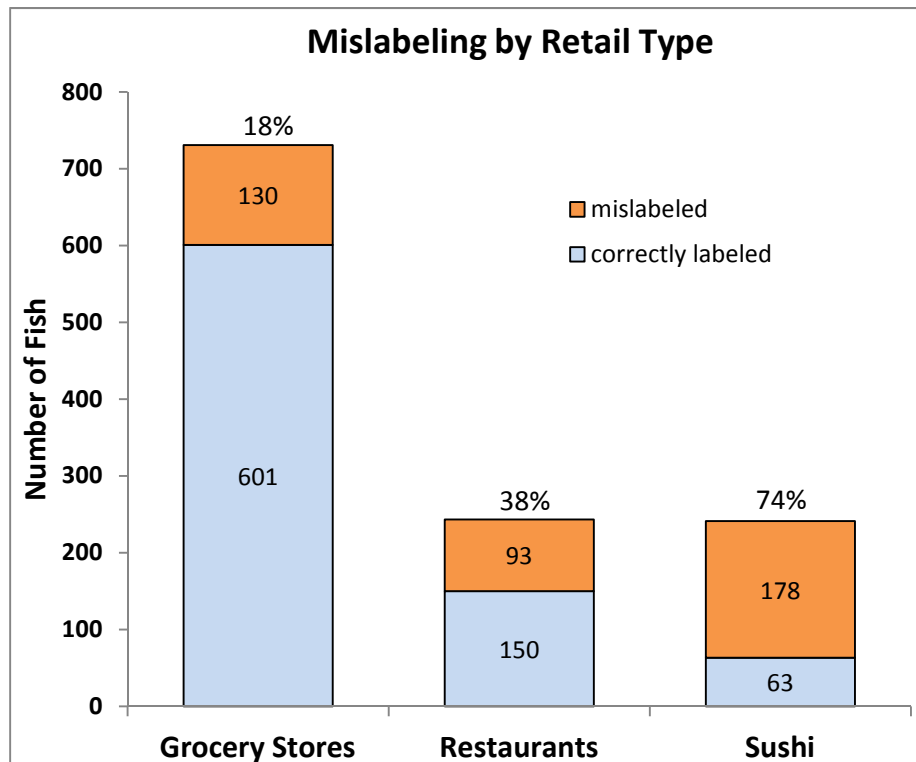


Figure 4. Fish mislabeling levels among retail types visited nationwide. “Grocery Stores” includes samples collected from a few seafood markets. The overall mislabeling percentage for each retail type is indicated above bars.

Sushi Venues

Of the 23 types of sushi collected from 118 sushi venues, the majority of the samples were of tuna (93) and snapper (59), followed by yellowtail/hamachi (23) and salmon (22). Of the most frequently collected fish types, the highest levels of mislabeling were found in sushi sold as snapper (92 percent) and tuna (71 percent). All of the yellowtail/hamachi samples were mislabeled according to federal guidelines and is discussed separately below. Mislabeling was also found in four out of 22 salmon samples (18 percent) and two out of nine mackerel samples (22 percent). While only a few samples were tested, all eight samples of halibut were mislabeled, as were both samples of ono and cod.

Of the 118 sushi venues visited, 95 percent sold mislabeled seafood.

Grocery Stores

Of the 28 types of fish collected from 408 grocery stores and seafood markets, the most frequently sampled were, in descending order, salmon (321), cod (92), sole (86) and snapper (79). The highest levels of mislabeling were found in fish sold as snapper (89 percent), grouper (23 percent) and cod (18 percent). The fish types with the lowest levels of mislabeling were halibut (4 percent), salmon (5 percent) and sole (7 percent).

Of the 408 grocery stores and seafood markets visited, 27 percent sold mislabeled seafood.

Restaurants

Of the 32 types of fish sampled from 148 restaurants, snapper was the most frequently sampled (48), followed by salmon (41), halibut (28), cod (22), sole (20), grouper (16) and Chilean seabass (11). As with other retail outlets, snapper was found to have the highest level of mislabeling (77 percent). Other species with high levels of mislabeling included: cod (59 percent), Chilean seabass (36 percent) and grouper (31 percent). One in five of each of the halibut, sole and salmon meals ordered were not the fish stated on the menu.

Of the 148 restaurants visited, more than half (52 percent) sold mislabeled seafood.

Regional Differences in Seafood Mislabeling

The overall mislabeling rates for the various metropolitan areas or regions across the country (Figure 5) were dependent on the total number of samples purchased from each retail category (Figure 6) as well as the kinds of fish purchased (Figure 3). In general, those regions with a large proportion of grocery store samples relative to other retail categories tended to display lower levels of mislabeling than those with a larger proportion of sushi samples. More than 90 seafood samples from the three retail types were collected in each of eight metropolitan areas. These larger-scale studies were mainly conducted in coastal and metropolitan areas where seafood consumption rates and selections tend to be higher: Seattle, WA, Portland, OR, Northern California, Southern California, Chicago, IL, Washington, D.C., New York, NY and South Florida. Although 88 samples were collected from Boston, MA, all of them were from grocery stores, where mislabeling levels are typically lower.

Mid-size surveys, comprised of a total of approximately 40 samples from the three retail categories combined, were carried out in Denver, CO, Austin/Houston, TX and Kansas City, KS/MO (Figures 5 and 6). Of the 16 samples collected in Atlanta, GA, 14 were from grocery stores. A handful of the remaining samples were collected in places like Santa Fe, NM (4) and Pittsburgh, PA (8) as outlined in the regional summaries (see Part II).

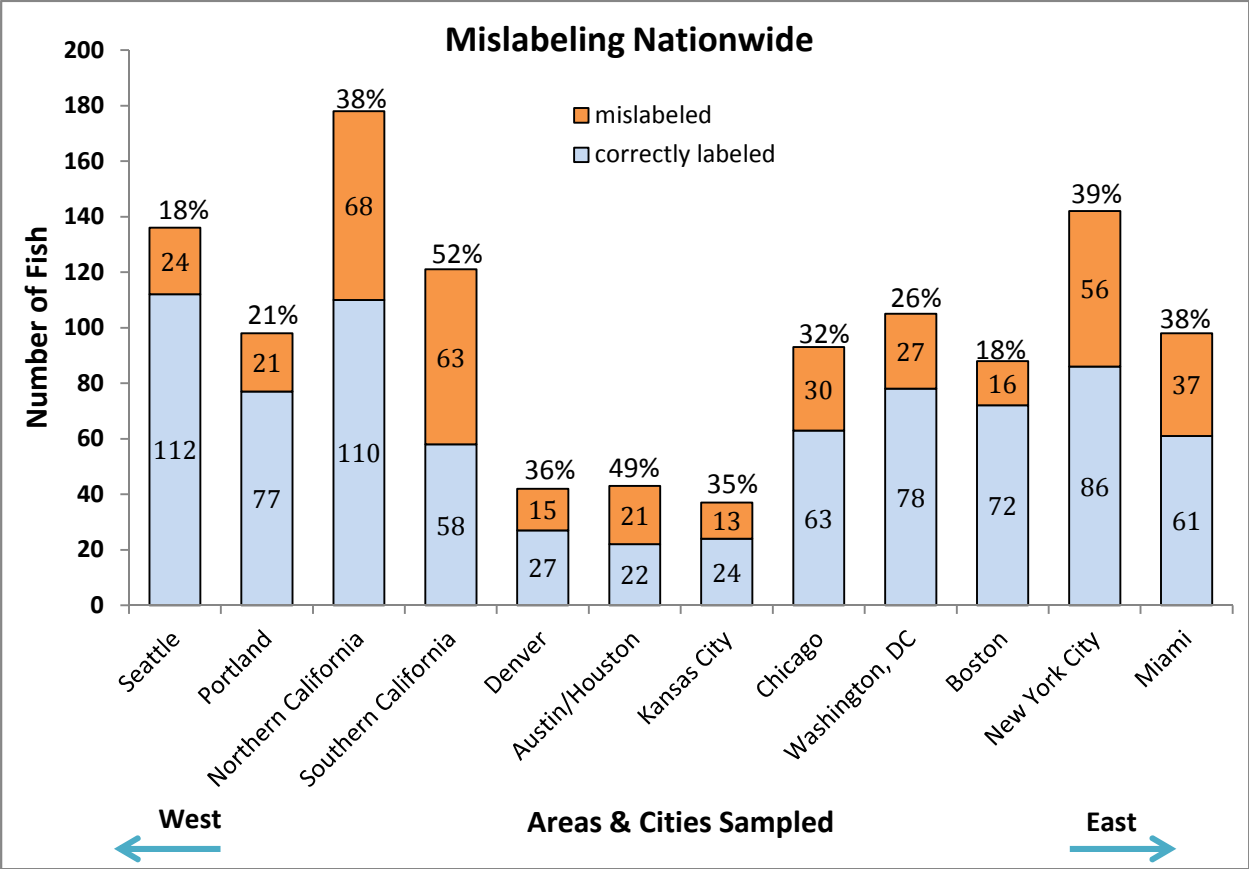


Figure 5: Mislabeling levels for combined retail types in the major regions tested.

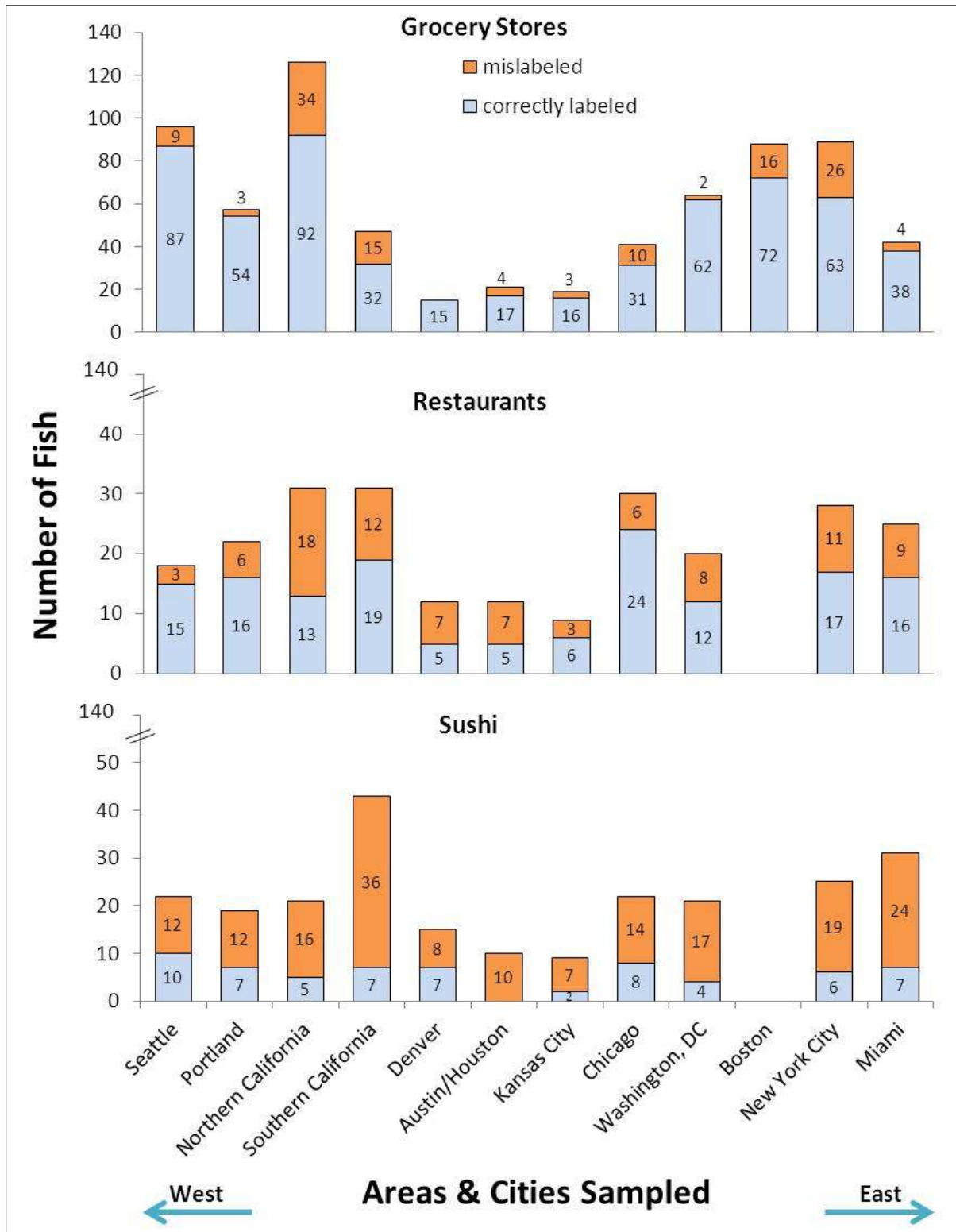


Figure 6: Mislabeling levels in each retail category in the major U.S. regions tested.

National Trends in Misabeled Fish

SNAPPER

Snapper was the most commonly mislabeled of the top fish types collected (161 out of 186 or 87 percent) and the second most frequently collected fish. Mislabeled snappers were found in every geographic location tested, sometimes when as few as one or two samples were purchased. South Florida, closest to where many true snappers are fished, had the lowest level of snapper mislabeling (38 percent) (Figure 7). In many locations, such as Seattle, Portland and throughout California, all of the snapper samples were mislabeled according to federal guidelines.

Even though 47 different species may be marketed as snapper in the U.S., snapper was the most mislabeled type of fish in each of the three retail categories. More than nine out of every 10 snappers sold in sushi venues were mislabeled (92 percent). Eighty-nine percent of the snappers sampled from grocery stores were found to be mislabeled as were 77 percent from restaurants.

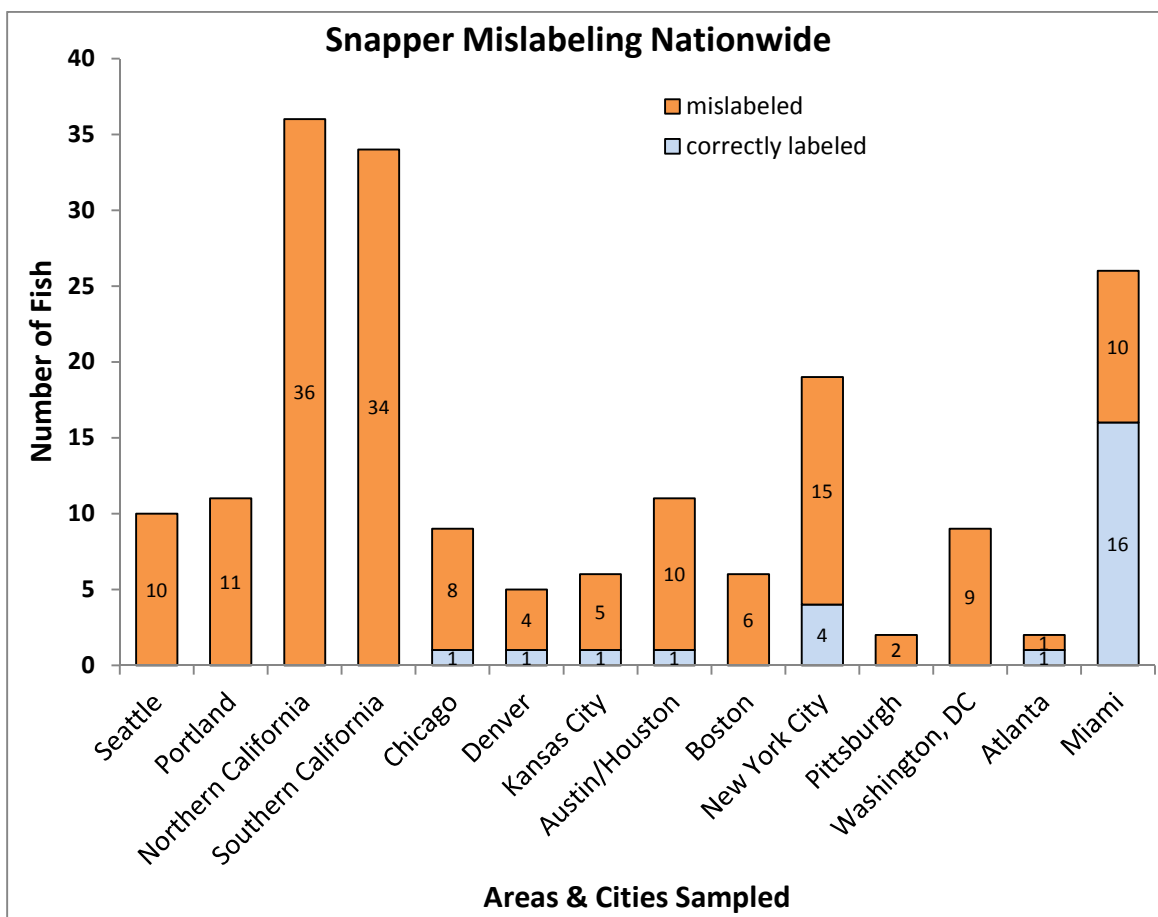


Figure 7.

Snapper Substitutions

Snapper had the largest variety and number of species substitutions of the types of fish tested. Thirty-three different species were substituted for the snapper sold, including substitutions of one snapper species for the specific one sold (e.g. lane snapper sold as red snapper) (Figure 8). More than three-quarters of the species substituted for snapper are not in the snapper family (Lutjanidae), with the majority consisting of either rockfish or tilapia. Most of the rockfish substitutions came from snapper purchased in grocery stores on the West Coast, while the majority of the tilapia substitutions came from sushi venues across the country.

Overall, rockfish were sold as snapper 59 times in this survey. Most of these samples were purchased on the West Coast, where outdated state laws and regulations allow certain species of rockfish to be sold as Pacific red snapper in California²⁵ and by other misleading vernacular snapper names in Oregon,²⁶ all of which conflict with federal guidelines. Even following these state rules, 55 samples were still found to be mislabeled because they were either the wrong rockfish species, or retail outlets sold them as a vernacular name not sanctioned by state law.

Approximately 20 percent of the snapper mislabeling consisted of one species of snapper being substituted for another. Among the specific snapper species purchased, mislabeling rates varied greatly depending on the species advertised. For example, yellowtail snapper had the lowest rate of mislabeling for any of the snapper species (11 percent), whereas six out of seven vermilion snappers were another snapper species.

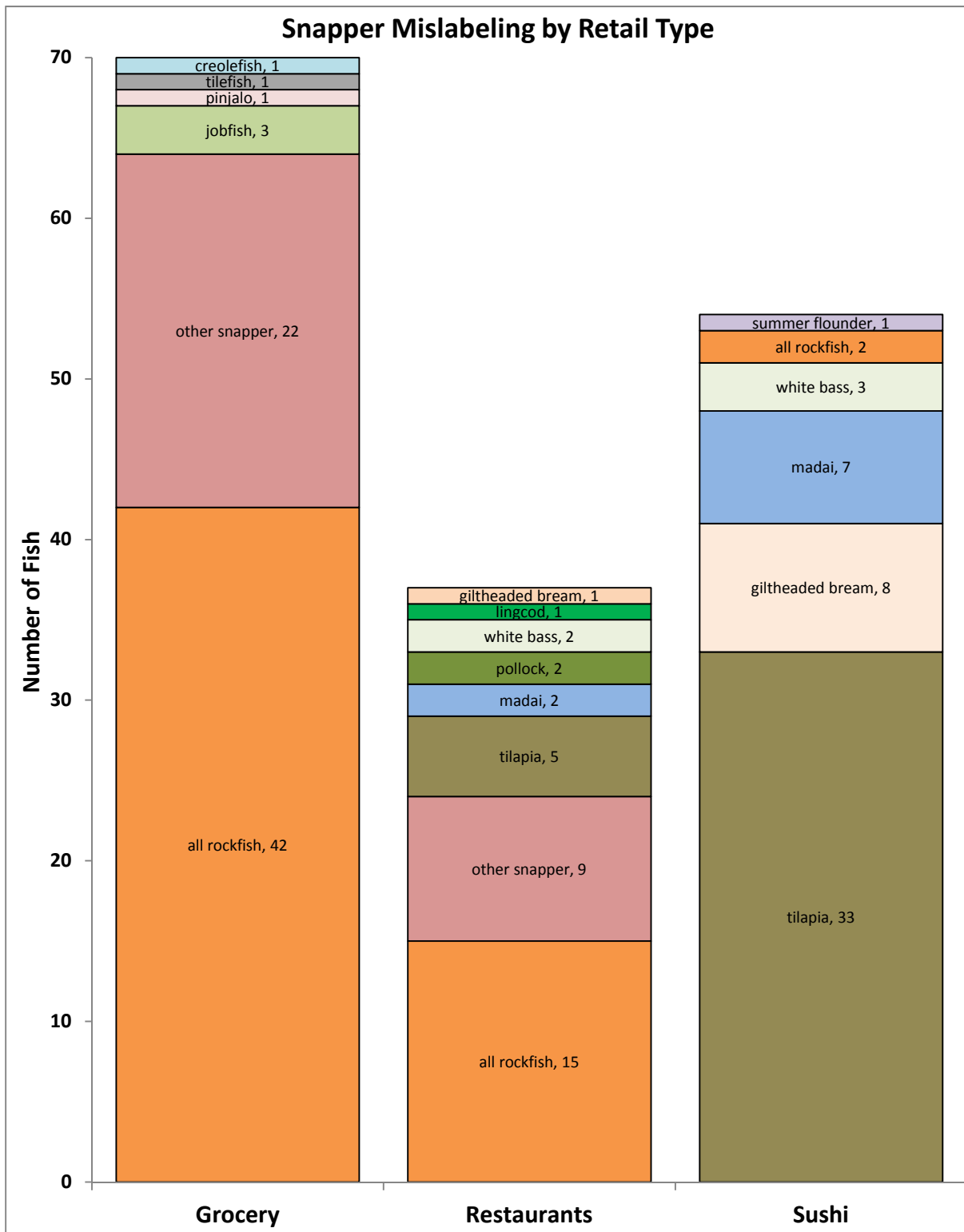


Figure 8.

Red Snapper

The highest rate of mislabeling for snapper was found in those labeled red snapper (93 percent of the 120 samples). Twenty-eight different species were substituted for red snapper, 17 of which were not in the snapper family at all (Figure 9).

Apart from the tilapia and rockfish substitutions, one of the most egregious swaps found in this study was tilefish labeled as red snapper in New York City. Tilefish is one of the four kinds of fish the federal government advises sensitive groups to avoid due to high mercury levels. Other frequent substitutions for red snapper included: pollock, bream, flounder and freshwater white bass. In one case slender pinjalo was substituted for red snapper, a species so unfamiliar that it is not even listed among the 1,700 seafood species sold or likely to be sold on the FDA Seafood List. This Indo-Pacific fish is in the snapper family, but not one of the 47 allowed to be marketed as snapper in the U.S.

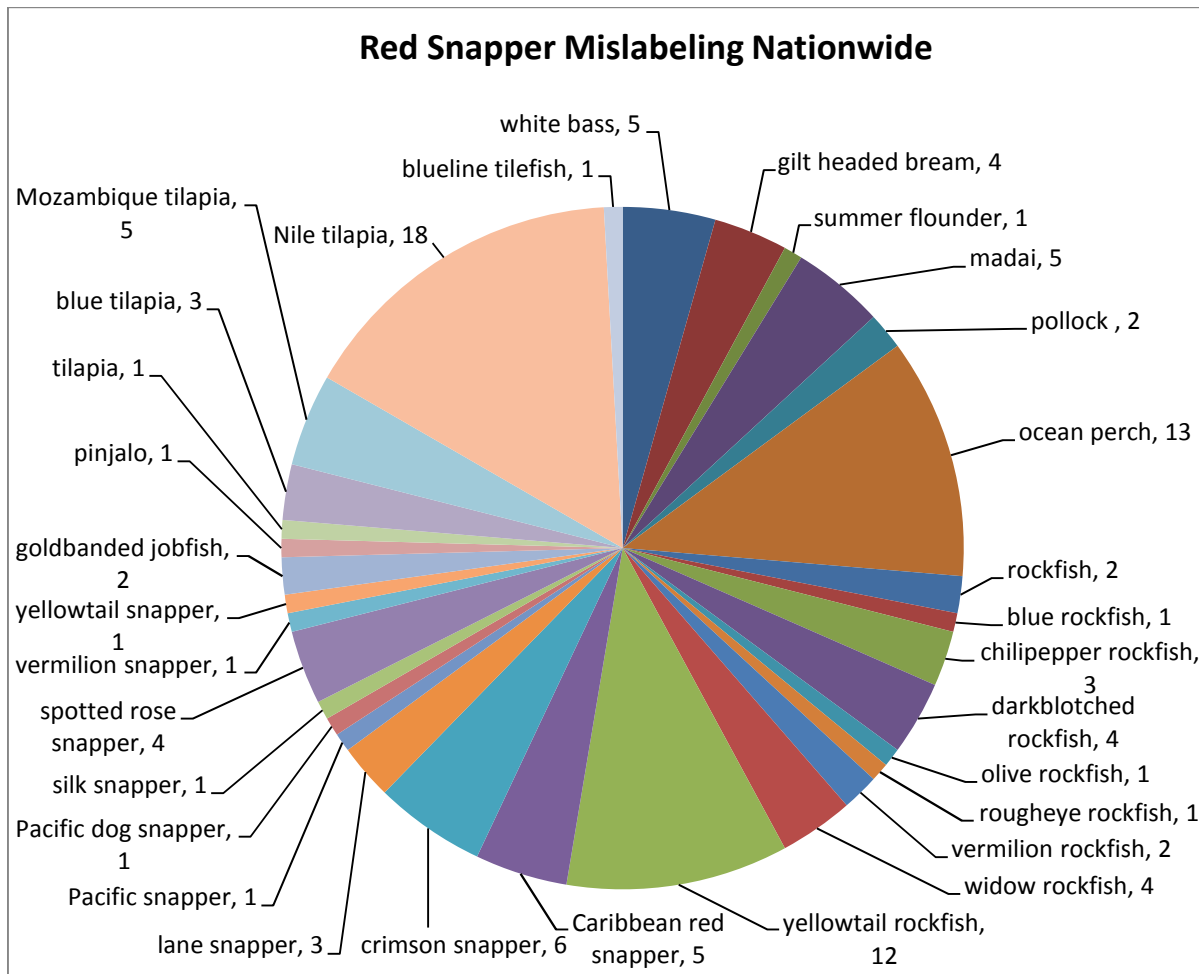


Figure 9. Fish substituted for red snapper in this survey.

Where was true red snapper found?

Only 11 true red snappers (*Lutjanus campechanus*) turned up in our testing, four of which were mislabeled as vermilion snapper in a Boston-area grocery store chain. Of the seven honestly labeled red snapper sold in our nationwide survey, four were purchased in New York City and one each in South Florida, Kansas City and Atlanta.

Our study is not the first report to discover astoundingly high levels of snapper fraud. In fact, snapper and red snapper mislabeling rates of 70 to 77 percent have been noted since at least 1995, shortly after the grossly overfished red snapper came under stricter fisheries management in the U.S.^{27,28,29} Prior to the 1980s, during the peak of red snapper overfishing, true red snapper was likely more readily available in the marketplace and the name may have become widely known as a desirable fish selection. Since that time, with restrictions on catch and limited availability in the market place, it appears that only the fish name is still always available and it is anyone's guess as to what is really being served. When red snapper frequently appears on menus and in grocery stores today, consumers are given a false sense that the species is doing well, while in reality, it is in relatively short supply and on a long road to recovery in the U.S. and Caribbean.

TUNA

Sixty-seven out of the 114 tuna samples purchased for this study were found to be mislabeled (59 percent). The largest amount of fraud was found in the 93 samples from sushi venues (71 percent). All 16 grocery store samples were labeled correctly, while one of the five restaurant samples was mislabeled.

White Tuna

The majority of the tuna samples in this study were labeled as "white tuna." Of the 66 white tuna samples, 62 were mislabeled (94 percent). Eighty-four percent of the white tuna samples were actually escolar (52 of the 62) (Figure 10). The remaining white tuna mislabeling (16 percent) came from the substitution of one type of tuna for another or the use of a non-acceptable market name. A fish product referred to as "white tuna" is only acceptable as a market name when sold in a can.³⁰ Otherwise, "albacore tuna" or "tuna" is the acceptable market name for that same fish, *Thunnus alalunga*, when sold outside the can, fresh or frozen.

Swapping escolar for white tuna is not only illegal, but it can also cause serious health problems. Escolar, or oilfish (*Lepidocybium flavobrunneum*), is not actually a tuna species at all, but is instead a snake mackerel that contains a naturally occurring toxin, gempylotoxin. This toxin can cause mild to severe gastrointestinal problems even for some who eat only a few ounces of the fish. Because of the health problems associated with escolar, Italy and Japan have banned it, several other countries have issued health advisories for it³¹ and the FDA advises against the sale of it in the U.S.³²

The reason why so many sushi venues label escolar as white tuna in the U.S., particularly since it is banned in Japan, remains a mystery, as does when the practice actually started. Researchers documented five such cases of escolar being sold as white tuna in New York and Denver in 2008,³³ while white tuna fraud turned up in Florida state government testing as early as 2006.³⁴ More recent investigations have also found high levels of white tuna fraud in New York City.³⁵

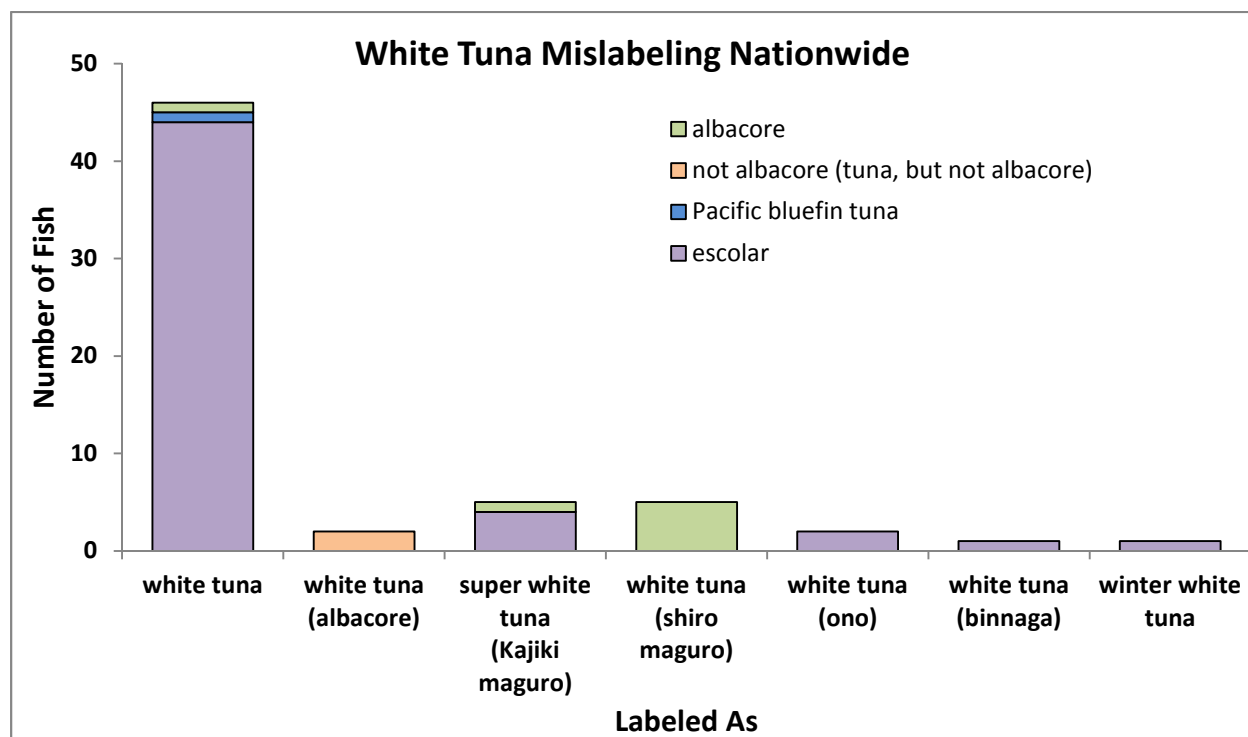


Figure 10.

Other tuna

For the rest of the tuna sampled in this study, 10 percent of the “non-white” tunas were mislabeled by substituting one type of tuna for another (five out of 48). Mislabeling rates were likely low among the real tunas because the FDA allows all species of tuna to be marketed as just “tuna,” even though the different species vary greatly in the health of their populations and their mercury levels. For example, of the three species of bluefin tuna identified in this study, both the Southern bluefin (*Thunnus maccoyii*) and Atlantic bluefin tuna (*T. thynnus*), listed as critically endangered and endangered, respectively, on the International Union for Conservation of Nature and Natural Resources (IUCN) Red List, were sold simply as bluefin tuna, while the less threatened Pacific bluefin (*Thunnus orientalis*) was sold as yellowfin tuna.³⁶ The Pacific bluefin is not even listed as one of the 14 tuna species or as one of the 1,700 species sold or potentially sold in the U.S. on the FDA Seafood List.

As for mercury concerns, some species, such as skipjack and yellowfin, often have lower mercury levels than other tuna species, such as bigeye and bluefin, particularly those caught in certain ocean basins as opposed to others.^{37,38} Knowing what tuna species are being served or purchased and where these tuna are caught is critical to minimizing the health concerns of mercury exposure.

SALMON

Salmon, the second most-consumed fish in the U.S., was also the most frequently sampled type of fish in our study. Salmon comprised nearly one-third of all fish samples collected (384 out of 1,215), the majority of which were purchased from grocery stores or small markets (84 percent). Seven percent of the salmon samples (28/348) were found to be mislabeled overall, but mislabeling was up to four times more prevalent in restaurants (20 percent) and sushi venues (18 percent) than in grocery stores or seafood markets (5 percent).

The highest levels of salmon fraud were found in New York City (20 percent), followed by South Florida (19 percent) and then Southern California (14 percent). While there were only four mislabeled salmon samples out of the 22 purchased in sushi venues nationwide, three out of those four were sold in Portland.

Roughly half of the salmon samples purchased were labeled as sockeye, which had lower levels of fraud (3 percent) when compared to other types of wild salmon. Oceana supporters and staff purchasing salmon labeled simply as “wild” had the highest chance of being duped (27 percent), followed by salmon labeled as “king” or “chinook” (13 percent) and then “coho” (9 percent) (Figure 11). Five percent of the salmon samples were labeled as “salmon,” “farmed salmon” or “Atlantic,” and none of those were mislabeled.

We have assumed that all Pacific salmon species identified by DNA testing were wild and that all Atlantic salmon species were farmed. However, a small amount of Pacific coho and king salmon are now being farmed and a very limited amount of wild Atlantic salmon are harvested in Europe. Nevertheless, over the course of this study only 0.2 percent (net) of Atlantic salmon imported into the U.S. was wild and only 1 percent of all salmon imported was farmed Pacific salmon.³⁹

Most of the salmon mislabeling found in this study was Atlantic farmed salmon labeled as wild-caught salmon (64 percent), and about one-third of the mislabeling was the result of substituting one type of wild salmon for another. It is possible that higher fraud levels for certain salmon species versus others could be an indication of fisheries economics and availability. For example, Alaskan sockeye salmon had a robust fishing season in 2012, while the U.S. government declared a disaster for the king salmon fishery,^{40,41} facts which may contribute to higher fraud rates seen for salmon labeled as “king” versus “sockeye.”

While the substitution of farmed Atlantic salmon for wild salmon has been the subject of several publications and stories in the past,^{42,43} we found a relatively low level of overall salmon mislabeling in this study. This discrepancy could in part be due to the high availability of wild sockeye in 2012, and the fact that many of these samples were purchased in grocery stores during salmon season or in a frozen or previously frozen form, which extends the availability of wild salmon.

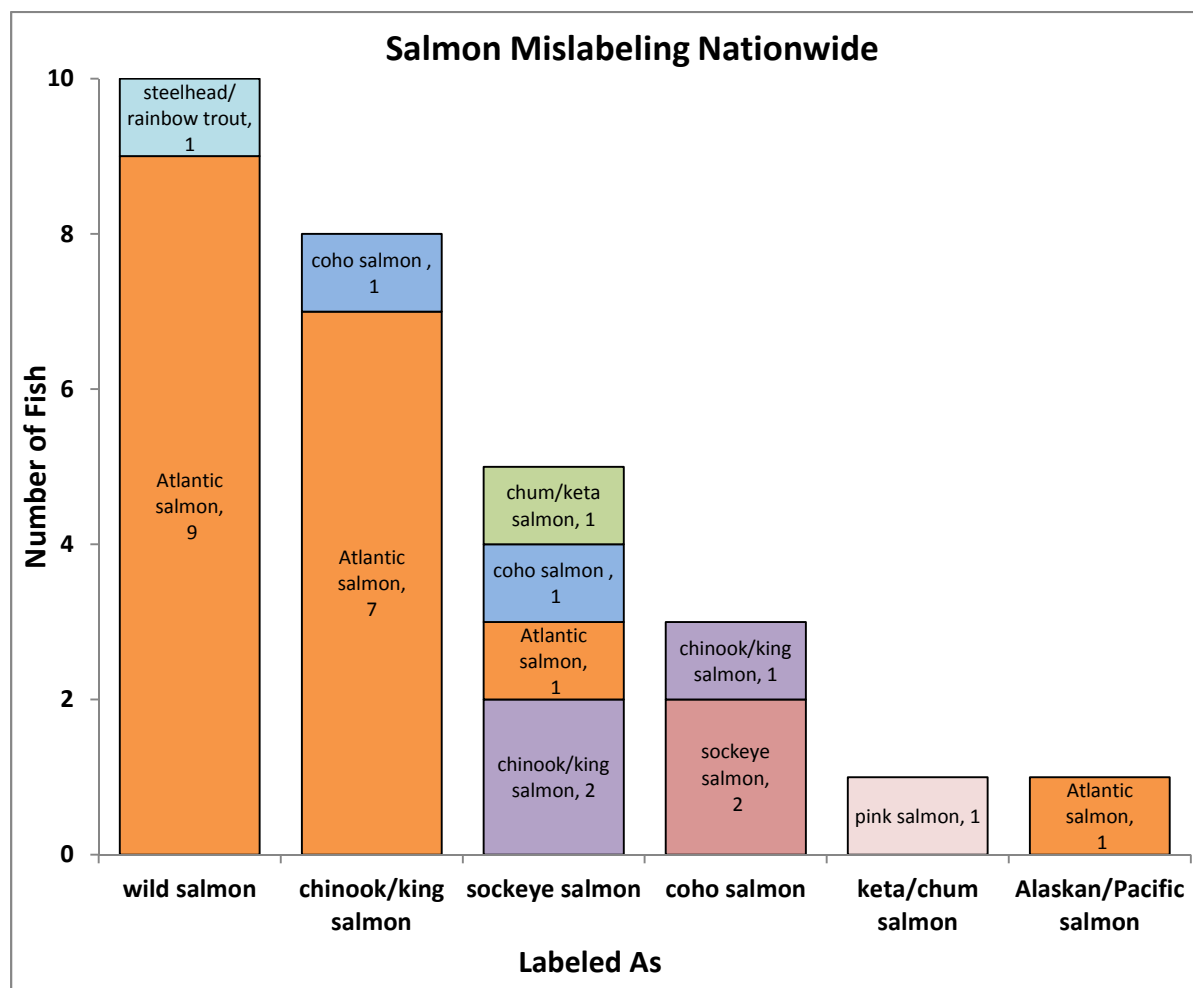


Figure 11.

COD

More than one in four of the cod samples we tested, the third most-sampled fish, were mislabeled (32 out of 116 or 28 percent). Four times as much cod was sampled from grocery stores (92) than from restaurants (22). Only two samples were purchased from sushi venues and both were mislabeled. Grocery stores had the lowest levels of mislabeled cod (18 percent), while restaurants sold mislabeled cod 59 percent of the time. The highest number of cod samples was obtained from East Coast cities, including Boston, New York City and Washington, D.C., where mislabeling rates ranged from 31 percent (Boston) to 10 percent (D.C.).

The most common type of mislabeling among the cod samples was substitutions of one cod species for another such as Pacific cod labeled as Atlantic or scrod cod (11) and Atlantic cod labeled as Pacific cod (4) (Figure 12). Samples labeled as Atlantic cod were the most mislabeled, and most of them came from grocery stores in the Boston-area. One surprising find was the substitution of threadfin slickhead (*Talismania bifurcata*) for Alaskan cod in a large grocery store chain in Chicago, IL, as it is yet another species not listed on the FDA's list of fish sold in the U.S. It is a deep water species that is often taken as by-catch, or accidental catch.

Our study found 15 other species mislabeled as cod, the largest variety of which came from restaurants. Restaurant substitutes ranged from farmed tilapia and striped pangasius, to species like white hake, red drum and haddock. All three of the mislabeled black cod samples came from restaurants, and all were actually sablefish. Although some individuals might be aware that black cod is a common vernacular name for this highly prized fish, it is not actually a true cod and is not an acceptable FDA market name.

With the decline in Atlantic cod numbers, it is not surprising that what was once the sixth most-consumed type of fish in the U.S. has now fallen to ninth place, behind farmed tilapia and Pangasius. Atlantic cod was once extremely abundant and an important food source for early colonists in North America, but the species was subsequently so overfished that commercial stocks nearly collapsed by the 1990s.⁴⁴ As of 2011, U.S.-managed stocks are still seriously overfished and are not rebuilding as fast as expected. Atlantic cod remains listed as a species to avoid on many conservation wallet cards, with the better-managed Pacific cod listed as a more sustainable choice. Without better labeling and traceability, many conservation-minded consumers are being denied the right to make informed decisions about their seafood purchases.

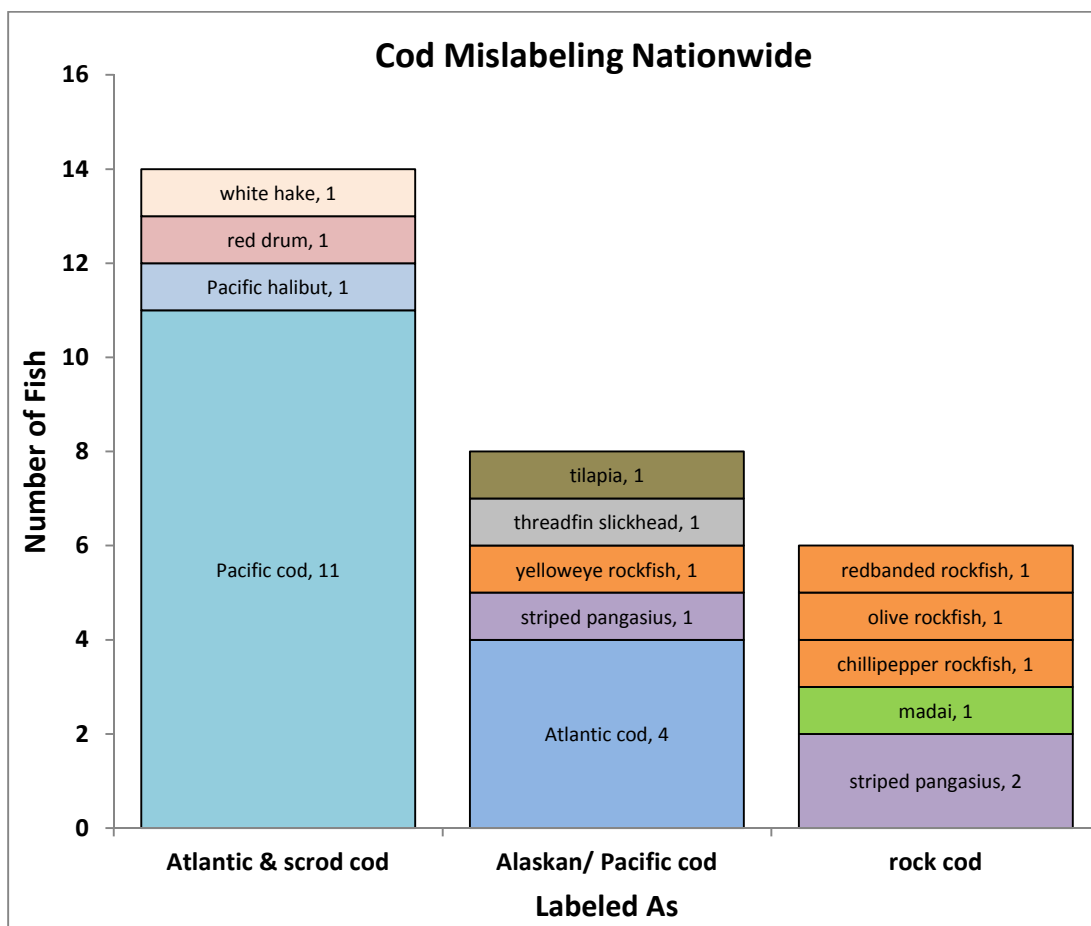


Figure 12.

GROUPEL

One in four grouper samples was mislabeled (11 out of 43 or 26 percent). All but three of the 43 grouper samples collected nationwide were from the eastern U.S. and Gulf states, closer to where many species of grouper are fished and are a local favorite. Most of the grouper samples were purchased in grocery

stores (26), of which 23 percent were mislabeled. Nearly one in three grouper samples from restaurants were also mislabeled (five out of 16).

While mislabeling was not as high in grouper as in other types of fish surveyed, there is a disconcerting number of fish masquerading under its name. Perhaps the most disturbing example was king mackerel, one of four high-mercury fish that the federal government advises sensitive groups to avoid, which was sold as grouper in a South Florida grocery store.⁴⁵ Other substitutes included farmed Asian “catfish” (Pangasius), freshwater perch, weakfish, bream and several species of grouper that are different from what was purchased (Figure 13). In some cases, the substituted grouper were species found on the IUCN Red List as endangered (e.g. Gulf grouper, *Mycteroperca jordani*)⁴⁶ or critically endangered (e.g. speckled hind, *Epinephelus drummondhayi*).⁴⁷

Groupers comprise many species of tropical and semi-tropical reef fish, all of which are slow to mature and reproduce, making them particularly vulnerable to overfishing.⁴⁸ The FDA lists 58 species that can be legally sold under the name of grouper in the U.S. Many grouper species are overfished, while others lack sufficient data to determine the health of their stocks. Conservation-minded consumers may want to purchase red or black grouper from the Gulf of Mexico, where stocks are healthier, than those fished elsewhere. Even when not duped into buying at-risk species, such as Gulf grouper and speckled hind, without a full traceability system that identifies where the fish was caught, consumers wanting to choose the Gulf of Mexico black and red groupers may be unintentionally eating the overfished Atlantic stocks. While consumers rely on honest labeling to avoid certain species due to health or conservation concerns, our study shows that current requirements are not enough.

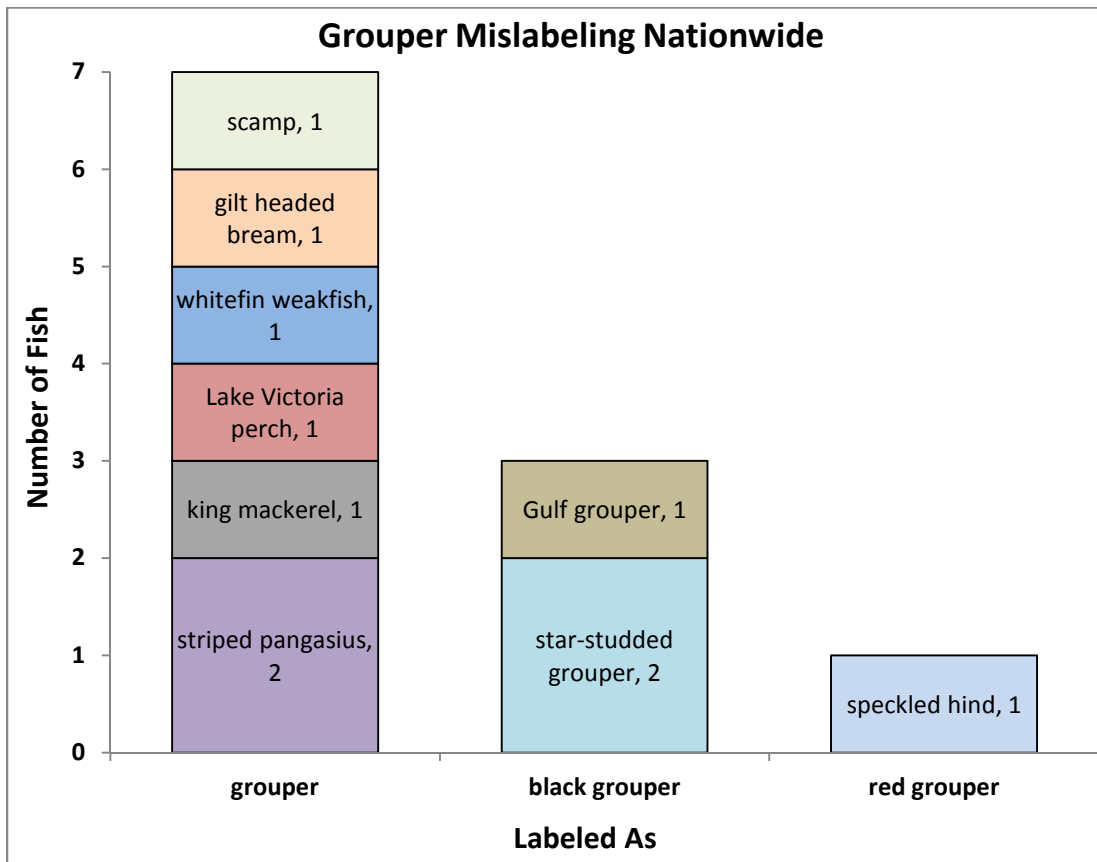


Figure 13.

CHILEAN SEABASS

The highly prized and storied fish marketed as Chilean seabass was one of the fish types with higher rates of mislabeling identified in this study (eight out of 21 samples or 38 percent overall). The mislabeling level for Chilean seabass was slightly higher in grocery stores than in restaurants (42 percent and 36 percent, respectively). Chicago (three out of six samples) and Washington, D.C. (two out of two samples) had the highest levels of mislabeling out of the eight cities where it was purchased, while no mislabeling was found in the four samples from South Florida.

All of the fish substituted for Chilean seabass were Antarctic toothfish. Chilean seabass is not really a seabass at all, but actually the Patagonian toothfish, a species with an image and name that could perhaps intimidate and discourage many consumers. After decades of trying to market this unknown, oily, slow-growing species from the deep frigid waters near the South Pole, the Patagonian toothfish eventually won favor with chefs when sold under different vernacular market names such as Chilean seabass. In fact, this species became so popular and profitable that the fishery was decimated by rampant illegal fishing by the early 2000s.⁴⁹ The governing body for Antarctic waters now estimates the majority of illegal toothfish fishing is for the Antarctic toothfish rather than the Patagonian toothfish (aka Chilean seabass).⁵⁰ Recently, the veracity of the eco-certification claims for some of the better-managed toothfish populations has come under scientific scrutiny, which unfortunately makes it harder for consumers to trust if some Patagonian toothfish populations are truly as sustainable as promised.⁵¹ The FDA finally allowed the Patagonian toothfish, and only the Patagonian toothfish species, to be marketed as “Chilean seabass” in 1994.⁵² The FDA acceptable market name for the other toothfish species remains “Antarctic toothfish” or just “toothfish.”

SEABASS

A problem with allowing one unrelated toothfish species to be marketed as a seabass is that some retailers or vendors drop the “Chilean” part and start calling all toothfish simply “seabass.” Not one of our nine fish samples purchased as seabass were any one of the 11 different fish species allowed to be marketed as either “seabass” or “sea bass” in the U.S. Five of the nine mislabeled “seabass” were toothfish; one was an Antarctic cutlerfish and the remaining three were white bass.

HALIBUT

Almost one in five of the halibut samples purchased were mislabeled (16 out of 85 or 19 percent). Most of the samples were collected from West Coast cities, where mislabeling levels ranged from 50 percent in Southern California (three in six), to 5 percent in Seattle (one in 19). Chicago was the only city where all of the halibut purchased (seven out of seven) was honestly labeled.

All eight halibut samples purchased from sushi venues were not true halibut, while restaurants substituted other types of halibut for the one ordered 21 percent of the time. Grocery stores had the least amount of halibut mislabeling (two out of 49 samples or 4 percent), but also had one of the most egregious examples: the substitution of tilefish, one of the four fish the federal government warns sensitive groups to avoid due to high mercury levels,⁵³ for Alaska halibut in a New York market.

Halibut labeling in the U.S. is governed by specific regulation, which says that only two species may be labeled as halibut: the Atlantic halibut (*Hippoglossus hippoglossus*) and the Pacific halibut (*Hippoglossus stenolepis*).⁵⁴ However, this regulation appears to leave species with the common name of “California halibut” or “California flounder” (*Paralichthys californicus*) without an approved market name in the FDA Seafood List. The California halibut (or flounder) inhabits the west coast of Baja California and the U.S., and it turned up mislabeled as Pacific halibut four times in our Northern California testing.

Atlantic halibut (*H. hippoglossus*), listed on the IUCN's Red List as endangered,⁵⁵ turned up three times during our testing, once in New York City and twice in Washington, D.C. Two of these Atlantic halibut were labeled legally and simply as "halibut," but in one instance, one was mislabeled as Alaska halibut at an expensive restaurant in the nation's capital. Two supposed Atlantic halibut were purchased (sold as "Eastern" in Kansas City and "Norwegian" in Austin), but both turned out to be the better-managed Pacific halibut (*Hippoglossus stenolepis*).

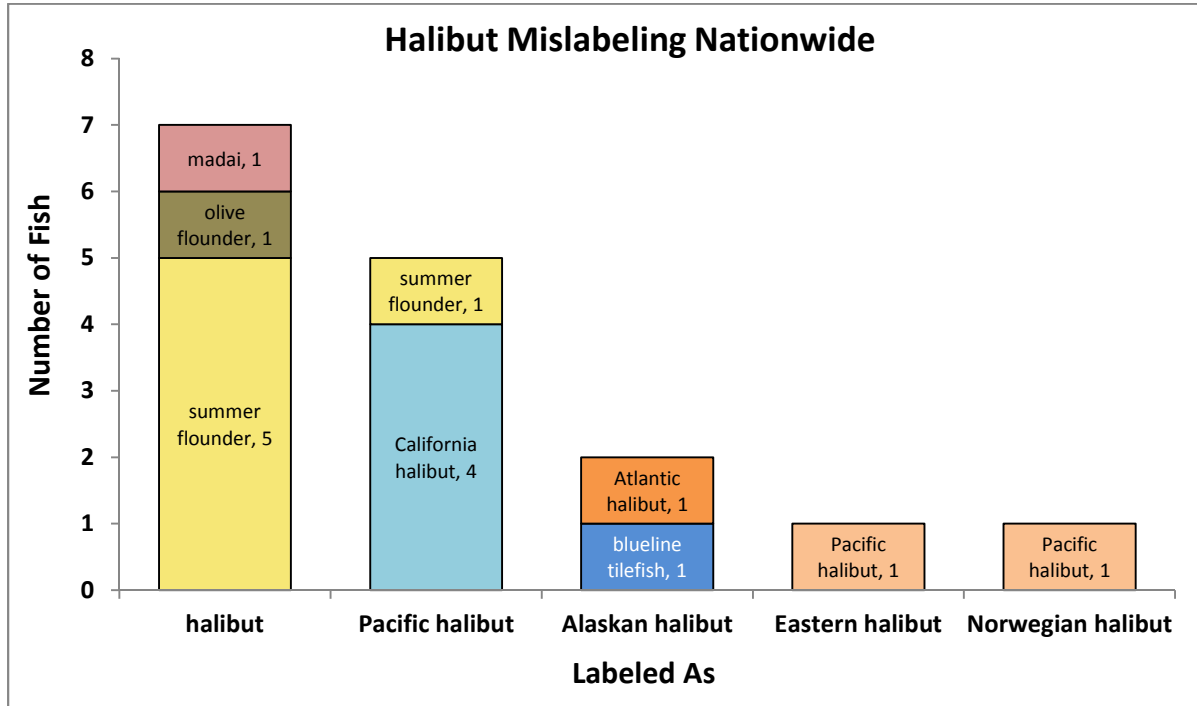


Figure 14.

SOLE

Nine percent of the sole sampled in this study was found to be mislabeled (10 out of 106). Sole samples were collected from three-quarters of the cities investigated and were the fifth most-sampled fish (106). Most of the mislabeled soles were sold as lemon sole (six out of ten), and all six of these were another fish altogether. Half of the mislabeled lemon sole were purchased in New York City and the other mislabeled lemon sole were from Chicago and Denver. Lemon sole is found mainly in northern European waters and in the Atlantic Ocean off Iceland, but this study and another suggest that it is apparently very difficult to find properly labeled lemon sole in the U.S. market. The consumer watchdog magazine *Consumer Reports* purchased ten samples labeled as lemon sole from New York, New Jersey and Connecticut, and all of those samples were also mislabeled.⁵⁶

On the other hand, Dover sole was the most frequently purchased of the soles (60 percent), but only one sample was mislabeled. Most of the Dover sole was purchased from grocery stores in the west coast cities of Los Angeles, Portland and Seattle, where one of the Dover sole species is fished from local waters.

Two species of fish are marketed as Dover sole in this country, the Pacific Dover sole, *Microstomus pacificus*, which hails from the west coast of North America, and the European Dover sole (or common sole), *Solea solea*, which is found in the Atlantic and Mediterranean. The majority of the European Dover

sole was purchased at restaurants and after a recent (2012) update to the FDA Seafood List, was all properly labeled.⁵⁷

One possible reason why we found low rates of sole mislabeling is that 32 different species can be marketed as sole according to federal guidelines. Similarly, all 11 samples of flounder tested were properly labeled, which may not come as a surprise as the FDA allows 61 different species to be marketed as flounder in its Seafood List.

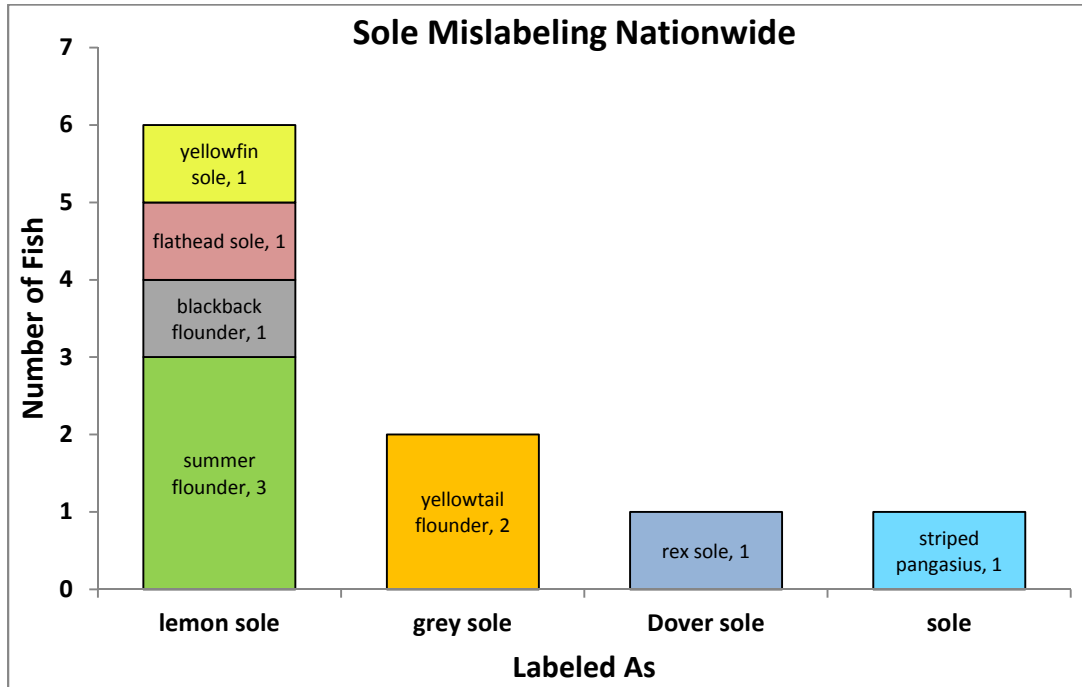


Figure 15.

YELLOWTAIL/HAMACHI

Twenty-six samples going by the name of yellowtail or hamachi were collected from eight cities, and 92 percent were mislabeled according to federal guidelines but do not likely represent intentional fraudulent deception. All but four of the samples were from sushi venues, where the mislabeling rate was 100 percent. All of the fish substituted for yellowtail were Japanese amberjack or buri (*Seriola quinqueradiata*). As indicated by our results, this Japanese species, which is largely farmed, is commonly mislabeled in sushi venues as yellowtail or hamachi. It is likely that many of the instances where we found Japanese amberjack substituted for yellowtail are due to issues in foreign name translation and presumably do not represent intentional deception.

Yellowtail is part of the common name, as well as the vernacular name, for many different species sold in the U.S., including some types of flounder, snapper, rockfish, mackerel, scad and several amberjacks. However, according to the FDA, yellowtail is the acceptable market name for only one species, (*Seriola lalandi*), an amberjack that lives in semitropical waters worldwide and is called hiramasa by the Japanese.⁵⁸ Although vernacular names are familiar to some shoppers in some regions, seafood is a global commodity, and consumers cannot be expected to know every possible regional name for various fish species. The FDA's general policy is that vernacular names are unacceptable market names, which is one reason why they developed the standardized list of names, the Seafood List, to guide naming for seafood sold in the U.S. For example, certain conservation wallet cards advise avoiding some species

going by the name of “yellowtail,” so knowing the exact species a restaurant is serving would help guide conservation-minded consumers.^{59,60} It should be noted that the use of the scientific name on retail labels, in addition to the common name, is becoming commonplace in Europe and Australia, a practice which would clear up much labeling confusion if adopted in the U.S. and worldwide.

OTHER INTERESTING FINDS

Mahi mahi and swordfish, two kinds of fish identified as commonly mislabeled more than 20 years ago by U.S. government testing, were not found to be mislabeled in our limited testing. All of the 17 mahi mahi and seven swordfish samples tested were honestly labeled, although our testing was far from exhaustive. On the other hand, some of the lesser-sampled fish in our study revealed mislabeling even when only a few were purchased, such as fish labeled as orange roughy (one out of two), ono (two out of two), butterfish (three out of three), sanddab (two out of eight) and rockfish (five out of nine). Although limited in number, all of the lower-priced tilapia and farmed Atlantic salmon samples were honestly labeled.

SUMMARY

Oceana’s study is the largest survey of seafood fraud publically released in the U.S. to date, to the best of our knowledge. This study did not attempt to be a representative survey of misbranding of all seafood available or routinely consumed by Americans in each retail sector or location. Rather, our samples included a mix of many types of fish, some of which were previously identified as mislabeled in other studies, as well as local favorites and a random assortment of fish selected by our supporters from many different regions and retail venues. Still, the overall mislabeling rate of one-third is in line with what other broad market surveys in North America have found in the past.⁶¹ Despite frequent coverage in the press and federal and state enforcement responses, seafood fraud remains a persistent problem in the U.S. Particularly troubling is the consistently high levels of mislabeling for certain types of fish across all regions, like snapper, as well as the public health implications for some fish substitutions, such as escolar for white tuna.

While this study revealed that no retail outlet type is immune to seafood fraud, it did clearly identify which types were the worst (sushi venues) and best (grocery stores) in honestly labeling seafood according to federal guidelines, with these patterns being repeated everywhere we sampled in sufficient numbers. The stricter labeling requirements for seafood sold in large grocery stores clearly explains this trend. Even so, consumers should be aware that the labels for fresh or previously frozen seafood displayed on ice sometimes did not match what was on the receipt or on display elsewhere in the store. In addition, although grocery stores fared the best, the finding that nearly one in five grocery samples was still mislabeled points to a clear problem in need of correction.

For sushi venues, we are aware that there are some Japanese-to-English translation concerns which may explain some of the high levels of mislabeling uncovered in this study. However, sushi is prevalent, popular and profitable in so many areas of the country that consistent, legal names must be uniformly adopted in the U.S. In addition, the helpful efforts of chefs demanding traceability⁶² for the seafood they serve in their restaurants lets their suppliers know they care about when, where and how their fish products reached their kitchens.

HEALTH

Perhaps most troubling are the health concerns seafood fraud poses for consumers, as several examples from this study demonstrate. The fraudulent substitution of escolar for white tuna can have immediate and serious digestive effects for some people who eat more than a few ounces, which is why the FDA advises against the sale of this species, and other countries have banned it outright. But how would anyone know they are eating escolar when up to 84 percent of it is fraudulently mislabeled as white tuna?

Given that seafood is one of the most highly traded food commodities in the world, the FDA states that:

In the interest of public health, it is vital that both domestically processed and imported seafood is safe, wholesome, and properly labeled...There are numerous potential health risks associated with misbranding seafood species.

For example, in 2007 several serious illnesses resulted from the illegal importation of toxic pufferfish that had been mislabeled as monkfish to circumvent U.S. import restrictions for this product (Cohen *et al.* 2009). Additional examples of species-specific hazards are listed in the FDA Seafood Hazard Guide: [Food and Drug Administration Fish and Fisheries Products Hazards and Controls Guidance](#)¹, Fourth Edition (2011)]. To aid in the proper labeling of seafood, the FDA maintains a list of acceptable market names for seafood sold in U.S. interstate commerce [The Seafood List](#)² (FDA 2010).⁶³

In 2004, the FDA and the Environmental Protection Agency jointly released a health advisory recommending women of childbearing age, pregnant and nursing women and young children to avoid four kinds of fish due to high mercury levels: swordfish, shark, tilefish and king mackerel.⁶⁴ They also advised limiting consumption of albacore tuna and fresh tuna steaks to six ounces per week. Most consumers are familiar with swordfish, as it is frequently sold in restaurants and many grocery stores, but few have likely seen tilefish or king mackerel sold in retail outlets. The troubling substitution of these species for grouper, halibut and snapper uncovered in our study may help explain why. King mackerel has been found substituted for other species in at least two other studies in the U.S.,^{65,66} and this Western Atlantic/Gulf of Mexico species even turned up mislabeled in South Africa.⁶⁷ When not fraudulently substituted as grouper, consumers may also be unknowingly consuming king mackerel when they purchase Spanish mackerel, a fish with somewhat lower mercury levels. Unfortunately for people trying to follow the FDA's health advice, the FDA allows king mackerel to be marketed as Spanish mackerel.⁶⁸

FDA testing has also revealed that some tilefish harvested from the Gulf of Mexico have higher mercury levels than tilefish from Atlantic waters. Similarly, some tunas from the Mediterranean and North Atlantic are higher in mercury than those harvested elsewhere.⁶⁹ For consumers, knowing the exact species being sold and the location where it was harvested matter greatly from a health standpoint.

Seafood substitution also poses serious risks for people allergic to certain species. Fish and shellfish are some of the most common triggers for severe allergic reaction.⁷⁰ Ciguatera, caused from consuming certain tropical reef species from affected waters and one of the most frequent forms of seafood poisoning, can cause acute and chronic debilitating symptoms and is best treated within one to three days of consumption.⁷¹ As with any food outbreak, being able to quickly and correctly identify the disease and food source can lessen the severity and number of individuals affected. However, without clear and honest labeling for all seafood, as well as a complete and transparent traceability system that allows consumers to tell when and where their fish was caught, many consumers are left in the dark about what species they are really consuming, leaving them unable to make informed choices to minimize exposure to contaminants, toxins or allergens.

OCEANS

Without full traceability that is transparent and verifiable, tracing fish from boat to plate, including information regarding when, where and how their fish was caught, many conservation-minded consumers may be unknowingly selecting overfished, illegally caught or even endangered or critically endangered IUCN Red List species, such as Atlantic halibut or speckled hind substituted for more sustainable fish, such as Pacific halibut or red grouper, as this study illustrates. With no effective accountability in the

seafood supply chain, fish obtained by illegal and unregulated means are finding an easy and profitable entry onto our dinner plates. These fraudulent practices harm every honest person along the seafood supply chain, from the fishermen to the retailer as well as the health of our oceans.

ECONOMIC

U.S. consumers spent more than \$82 billion on seafood in 2011.⁷² If even a small fraction of the seafood purchased was mislabeled or fraudulent, that might reflect upwards of millions to perhaps billions of dollars spent on a product other than what was ordered or desired, as a very rough estimate. More refined estimates of the cost of seafood fraud would depend on the economic value of all substitutions compared to the chosen species in various retail categories. For example, a recent estimate of the cost to consumers for farmed salmon substituted for wild places the value at nearly \$7 million per year for the U.S.⁷³ These rough estimates indicate that serious money is to be made for those engaging in seafood fraud. These deceptive and illegal practices not only hurt consumers' wallets, but they also decrease public confidence in an important and healthy food source. Likewise, honest fishermen and seafood suppliers and retailers are being undercut when fraudulent products flood the market and lower the prices of honestly labeled seafood.

CONCLUSIONS

Consumers have the right to know more about the seafood they eat and have confidence that the information they receive is accurate. Seafood fraud not only cheats consumers, but it can also have harmful impacts on human health and our ocean ecosystems. Oceana tested seafood in more than a dozen cities across the country and we found seafood mislabeling in every city we went to. Seafood fraud is a nationwide problem that needs federal attention. Ensuring that the seafood sold in the U.S. is safe, legal and honestly labeled should not be a luxury, but a necessity.

TRACEABILITY

Seafood traceability, or tracking fish from boat to plate, would significantly reduce seafood fraud, while providing consumers with more information about what they are eating. U.S. fishermen already provide information when they land their fish, yet little to none of that information follows the fish through the supply chain. By requiring information to follow each fish sold in the U.S. throughout the supply chain, every person in the supply chain will have specific information about that fish and will continue to pass information to the next in line. Traceability allows officials and those in the supply chain to know more about where the fish came from, while making it harder to mislabel and misrepresent seafood.

LABELING

Labeling requirements should be included in any traceability system adopted by the U.S. Seafood labels need to include critical information such as when, where and how a fish was caught, what species it is, whether it was farmed or previously frozen and if any additives have been used during processing. Without this information, it is difficult for consumers to make informed decisions about the seafood they serve to their families.

STATE/FEDERAL EFFORTS AND ENFORCEMENT

With such high rates of mislabeling, federal and state officials must make stopping seafood fraud a priority. In the U.S., more than 90 percent of the seafood consumed is imported, with less than 2 percent inspected at the border and even less inspected specifically for fraud. By requiring full traceability of all seafood sold in the U.S., our government can protect consumers from seafood fraud and keep illegally caught fish out of our market.

Current laws are supposed to provide the federal government with the authority to protect consumers from misbranding of food and to ensure that the seafood sold in the U.S. is safe, legal and honestly labeled. However, it is clear that existing efforts are not enough. The federal government needs to increase seafood inspections and testing, improve documentation and verification of our seafood and require seafood traceability, while providing more information to consumers. Stopping seafood fraud will protect our wallets, our health and our oceans.

What Consumers Can Do

After reading how often mislabeling occurs, many seafood consumers may be wondering what they can do to minimize their risk of consuming mislabeled fish.

Ask questions. Consumers should talk to the person who sells or serves their seafood and ask them questions like what kind of fish it is, if it is wild and where and how it was caught. If retail seafood purveyors know there is a demand for this information, they may be more willing to ask their suppliers to provide such information when they purchase their seafood.

Check the price. If a seafood item is being sold at a price that seems too good to be true, then it is probably is. Similarly, if a seafood price does not seem right, it may be wise to make a different seafood selection.

Purchase the whole fish. Some consumers may also wish to purchase whole fish, which are harder to disguise as mislabeled than fish in fillets.

Report fraudulent activity. If something seems suspicious, consumers are encouraged to contact federal agencies that work on this issue. The National Oceanic and Atmospheric Administration (NOAA) also works to combat seafood fraud. Observant consumers who suspect mislabeling may e-mail them at safe.seafood@noaa.gov or call the toll-free hotline at 1-800-853-1964. For more information about NOAA's enforcement of seafood mislabeling please visit: http://www.nmfs.noaa.gov/stories/2012/11/11_15_12seafood_fraud_enforcement.html.

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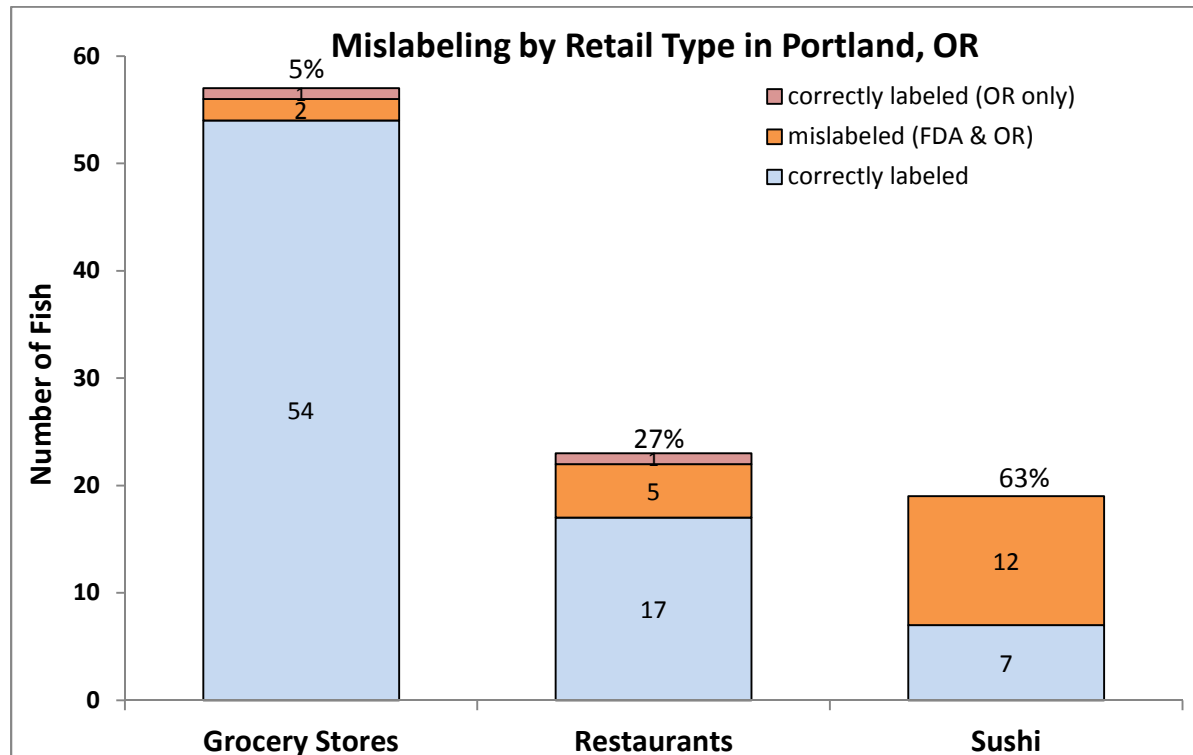
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Part 2: Regional Studies

Portland, Oregon – 21% Mislabeled

Oregon’s largest city serving mislabeled seafood: Oceana finds fraud in more than 50 percent of restaurants and 75 percent of sushi venues



Fish¹

Of the 98 seafood samples purchased in the Portland-area, 21 percent were mislabeled. However, even though more than one in five fish was mislabeled, Portland’s mislabeling rate was one of the lowest in the country. Salmon was the most commonly sampled fish, 12 percent of which was found to be mislabeled. If looking to buy correctly labeled fish, Portland residents may want to try sole, as all of the 19 sole samples purchased were honestly labeled. On a less positive note however, snapper again led the pack as the most mislabeled fish. Every snapper sample was mislabeled according to FDA guidelines, and only two were correctly labeled according to Oregon law, which has different guidelines.²

¹ The 98 samples from the Portland area were collected between April and August of 2012, and 21 were mislabeled (21 percent). Mislabeled seafood was found in 16 of 57 retail outlets visited.

² Or. Rev. Stat. § 506.800

Venue

More than one in four (28 percent) of the grocery stores, restaurants and sushi venues visited in Portland sold mislabeled fish. Most of the samples came from the 37 grocery stores we tested, but as seen in other cities tested, grocery stores yielded the lowest level of mislabeling (5 percent). Sushi again had the highest rate of fraud (63 percent), with seven out of nine sushi venues selling mislabeled fish. All of the six snapper samples sold in sushi venues were mislabeled, with most of them actually being tilapia and one a bream. Three out of the six salmon sushi samples in Portland were mislabeled.

While none of the grocery stores visited sold mislabeled salmon, one out of four salmon dishes ordered in Portland restaurants was mislabeled. Sockeye salmon was also sold as coho salmon at a restaurant, while farmed Atlantic salmon was substituted for wild and king salmon at sushi venues.

Highlights

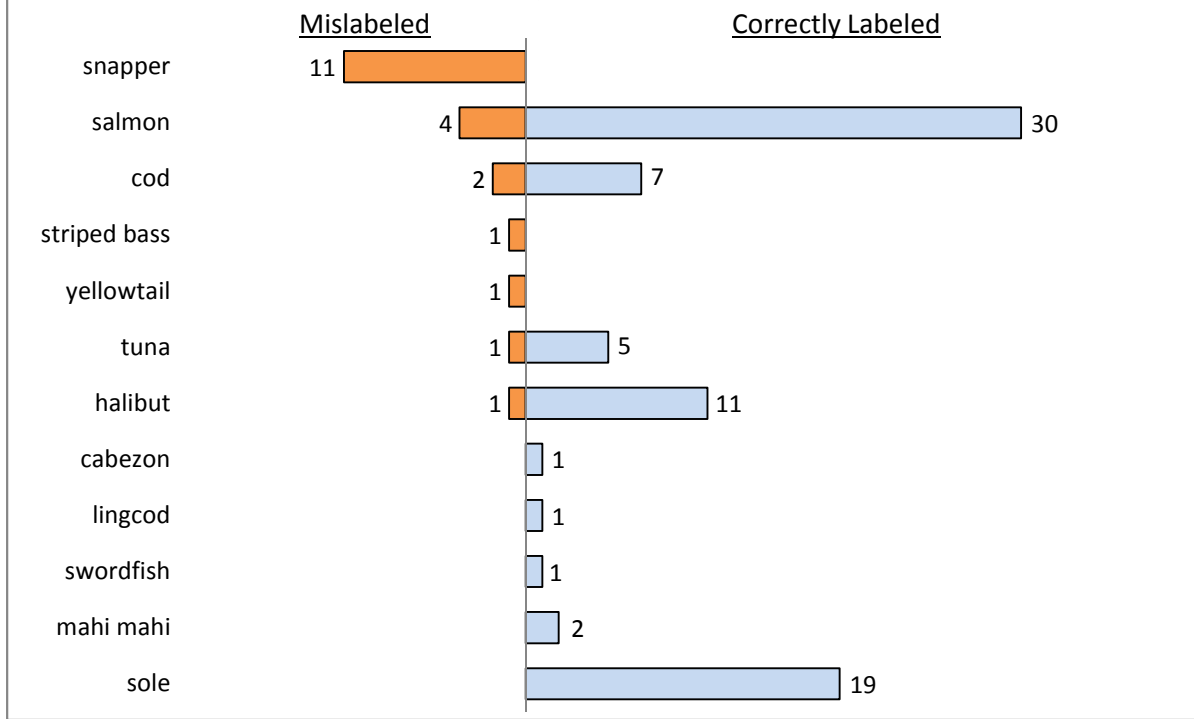
Snapper confusion continues in Portland. Oregon has some very lax labeling rules when it comes to this popular species.³ Oregon law allows 12 rockfish species (*Sebastes* sp.) to be labeled as any of the following: Pacific red snapper, Pacific snapper, Oregon red snapper, Oregon snapper, red snapper and snapper. However, this law only applies to fish caught and sold in Oregon. What many consumers may find confusing is that snappers are a completely different fish from rockfish, in terms of habitat, life history and taste. Only two fish, olive rockfish sold as Pacific snapper and yellowtail rockfish sold as Oregon red snapper, were correctly labeled according to Oregon law. Again, they were still mislabeled according to FDA guidelines. If these fish were caught and sold in Oregon, then FDA guidelines would not necessarily apply, since there was no interstate commerce. However, without traceability of seafood sold in the U.S., one cannot be sure that the fish were actually caught in Oregon and not California, Washington or even Alaska.

While there were only four mislabeled salmon samples out of the 22 salmon purchased in sushi venues nationwide, three out of those four were sold in Portland.

One of the more surprising substitutions was the passing off of lingcod as snapper in a Portland restaurant, the only such substitution in the nation. Lingcod are not at all related to snapper, and they are only found in North Pacific waters.

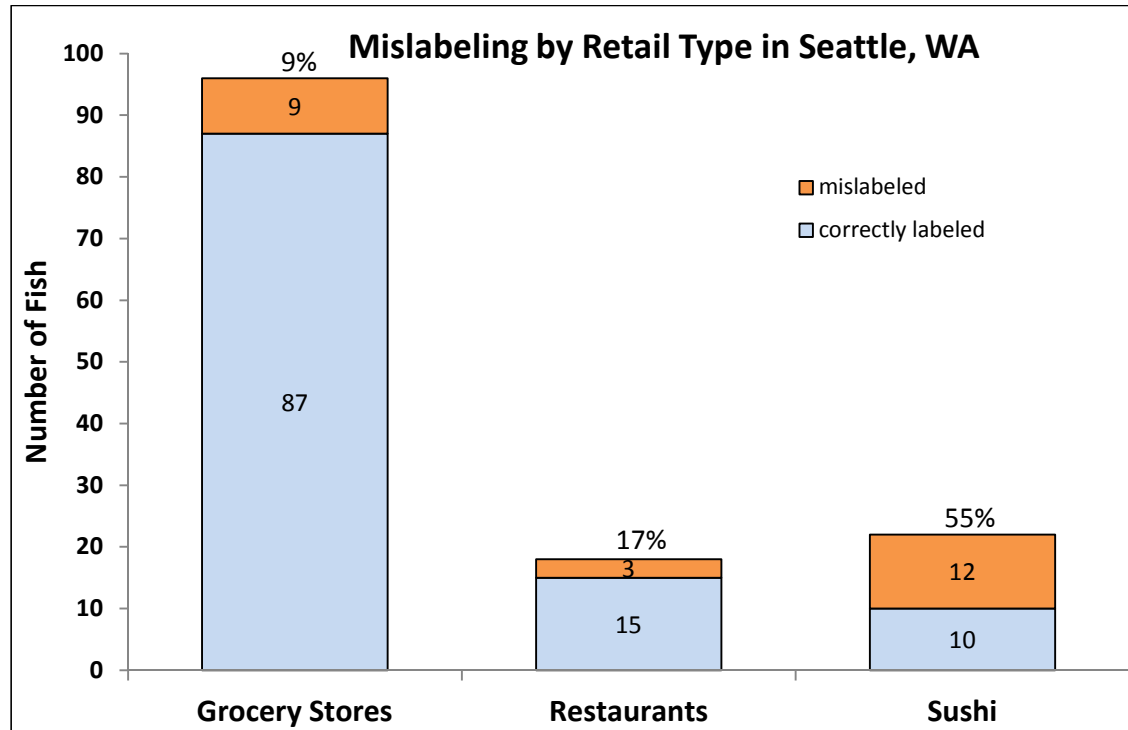
³ Or. Rev. Stat. § 506.800

Mislabeling in Portland, OR



Seattle, Washington – 18% Mislabeled

Seafood fraud pouring out of Rainy City: Oceana finds mislabeling in more than 80 percent of sushi venues, almost one-third of restaurants



Fish⁴

Known for having some of the best seafood in the country, Seattle had one of the lowest overall seafood mislabeling rates in the nation (24 out of 136 samples or 18 percent). Seattle also had one of the highest percentages of correctly labeled salmon of all the cities we tested (98 percent). Like many other cities, however, Seattle residents may want to avoid snapper, as none of the fish labeled as such were honestly labeled.

Venue

More than one out of every four retail outlets visited sold mislabeled seafood. We received the most samples from grocery stores in this region, and, following national trends, only 9 percent were mislabeled. Seattle residents may not be pleased to know, however, that when visiting a sushi venue, they may be more likely to get a mislabeled fish than not, as nine out of the 11 sushi venues visited sold mislabeled fish.

⁴ The samples from the Seattle area were collected between April and August 2012, and 24 out of 136 of them were mislabeled. Mislabeled seafood was found in 21 of 78 retail outlets visited.

Highlights

In Seattle, consumers can be more confident than in other West Coast regions we tested that the salmon they are buying is labeled accurately. All of the salmon labeled as king or coho salmon was properly labeled, while the only mislabeled salmon was a sockeye salmon sold in a restaurant that turned out to be king salmon. The low levels of salmon mislabeling seen in this survey are in contrast to higher levels of salmon fraud uncovered in western Washington in a previous study where 20 out of 99 samples obtained from restaurants and grocery stores from 2009 through 2011 were mislabeled.⁵ The 2011 federal prison sentence of one Bellingham, WA distributor selling fraudulent salmon may have been a deterrent.⁶

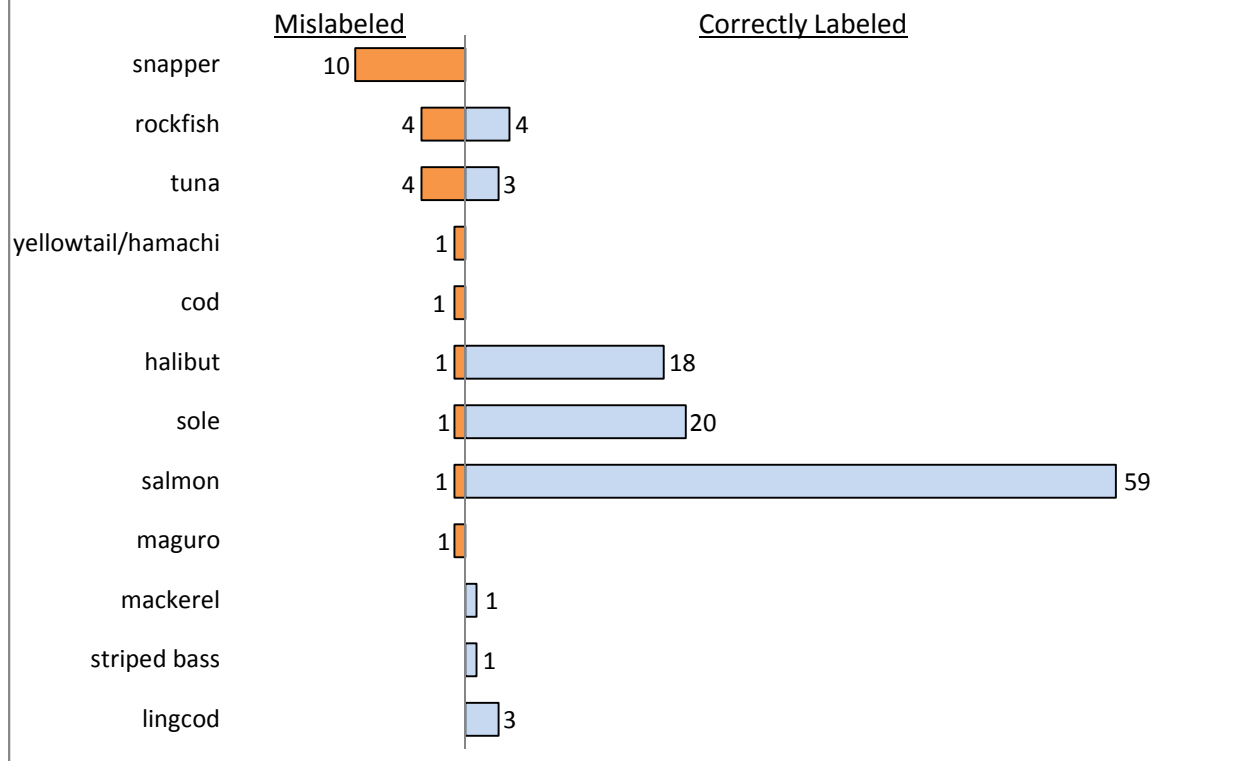
Snappers once again led the pack in frequency of mislabeled fish. Not one snapper was correctly labeled. Three of the mislabeled snapper were identified as rockfish, even though selling rockfish as snapper is not sanctioned by state law as it is in Oregon and California, where this type of snapper substitution is common. Surprisingly, one of the fish labeled as cardinal snapper in a national chain grocery store was actually Pacific creolefish, a fish mainly found in the Pacific from the Gulf of California to Peru. In contrast, the cardinal snapper is found in the western central Atlantic and the Caribbean, not to mention it is not even in the same family as the Pacific creolefish.

Although overall retail mislabeling levels were lower in Seattle than the rest of the country, the high levels of fraud in Seattle sushi venues followed the national trend. None of the snapper samples sold in Seattle sushi restaurants were snapper, but were actually tilapia and sea bream.

⁵ Cline, E. 2012. Marketplace substitution of Atlantic salmon for Pacific salmon in Washington State detected by DNA barcoding. *Food Research International*, 45, 388-393

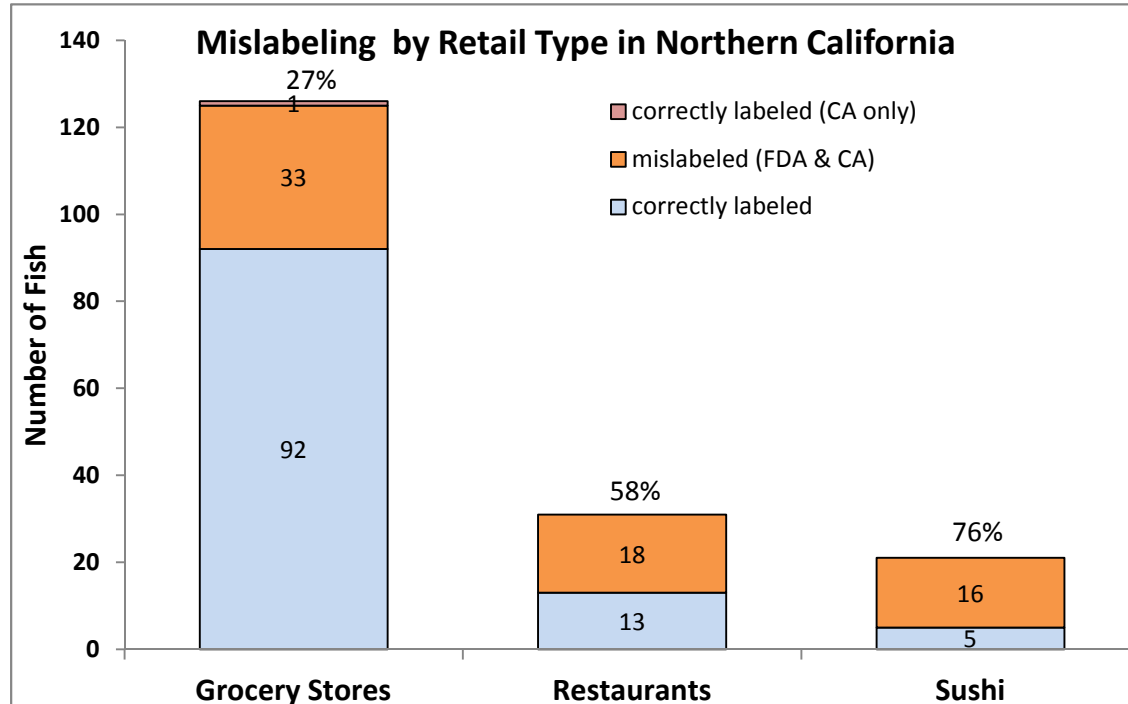
⁶ U.S. Attorney's Office, Western District of Washington, April 1, 2011 Press Release. Fish processor sentenced to prison for selling falsely labeled salmon.

Mislabeling in Seattle, WA



Northern California – 38% Mislabeled

The Golden State does not equal golden standards: Oceana finds 38 percent of seafood mislabeled, including all snapper samples



Fish⁷

Of the 178 seafood samples collected in Northern California, 68 were mislabeled (38 percent). In California, federal guidelines and California law do not match up. The state of California allows 13 different species of rockfish to be sold as “Pacific red snapper,” while FDA guidelines allow only one species of fish to be called red snapper. All of the snapper samples (36) we tested in Northern California were mislabeled according to FDA guidelines, and only one was labeled in accordance with California law, as it was one of the 13 species allowed and was labeled “Pacific red snapper.”⁸ These conflicting rules cause unnecessary confusion for retailers and consumers, many of whom may not know their state allows something other than true red snapper to be sold as a kind of “red snapper.”

The most commonly sampled species by far was salmon (71 samples), which was also one of the least mislabeled, consistent with this survey’s national trend. One reason for the low level of salmon mislabeling may be because the summer of 2012 was one of the best wild salmon seasons off the California Coast in several years, and the sampling took place at a time when wild salmon was abundant.

⁷ 178 fish were collected from Northern California between May and August of 2012. Most of the samples (169) came from San Francisco and surrounding Bay-area cities and towns. A few of the samples were from around Sacramento (5) and Santa Cruz and Monterey (4). Mislabeled seafood was found in 52 of 100 retail outlets visited.

⁸ CAL. CODE REGS. tit. 14, § 103.

Venue

More than 50 percent of the 100 retail outlets visited in Northern California sold mislabeled fish. While this area is known for having some of the best restaurants in the country, restaurants mislabeled fish in Northern California 58 percent of the time, which is among the highest in our national study. The majority of the samples we tested in this area, however, were purchased from grocery stores, which sold mislabeled fish 27 percent of the time. Consistent with a disturbing nationwide trend, every sushi venue visited in Northern California sold mislabeled fish, resulting in 76 percent of the samples being a bait and switch.

Highlights

None of the fish substituted for mislabeled snapper were even in the snapper family. All of the mislabeled samples were bass, breams, or most often, a type of rockfish. Our limited survey found 32 rockfish representing six different species being sold as snapper. Striped pangasius, a farmed freshwater Asian catfish, was sold twice as rock cod, which is actually a wild-caught ocean fish. Swapping cheaper farmed pangasius for a more expensive wild fish results in economic gain for those perpetrating fraud.

Halibut labeling in the U.S. is governed by a specific regulation, which states that only two species may use the label “halibut,” the Atlantic halibut (*Hippoglossus hippoglossus*) and the Pacific halibut (*Hippoglossus stenolepis*).⁹ However, this regulation appears to leave the fish with the common name of California halibut (*Paralichthys californicus*) without an approved market name in the FDA Seafood List. California halibut, or “California flounder,” occurs along the west coast of Baja California and the U.S. and turned up mislabeled as Pacific halibut four times in our Northern California testing.

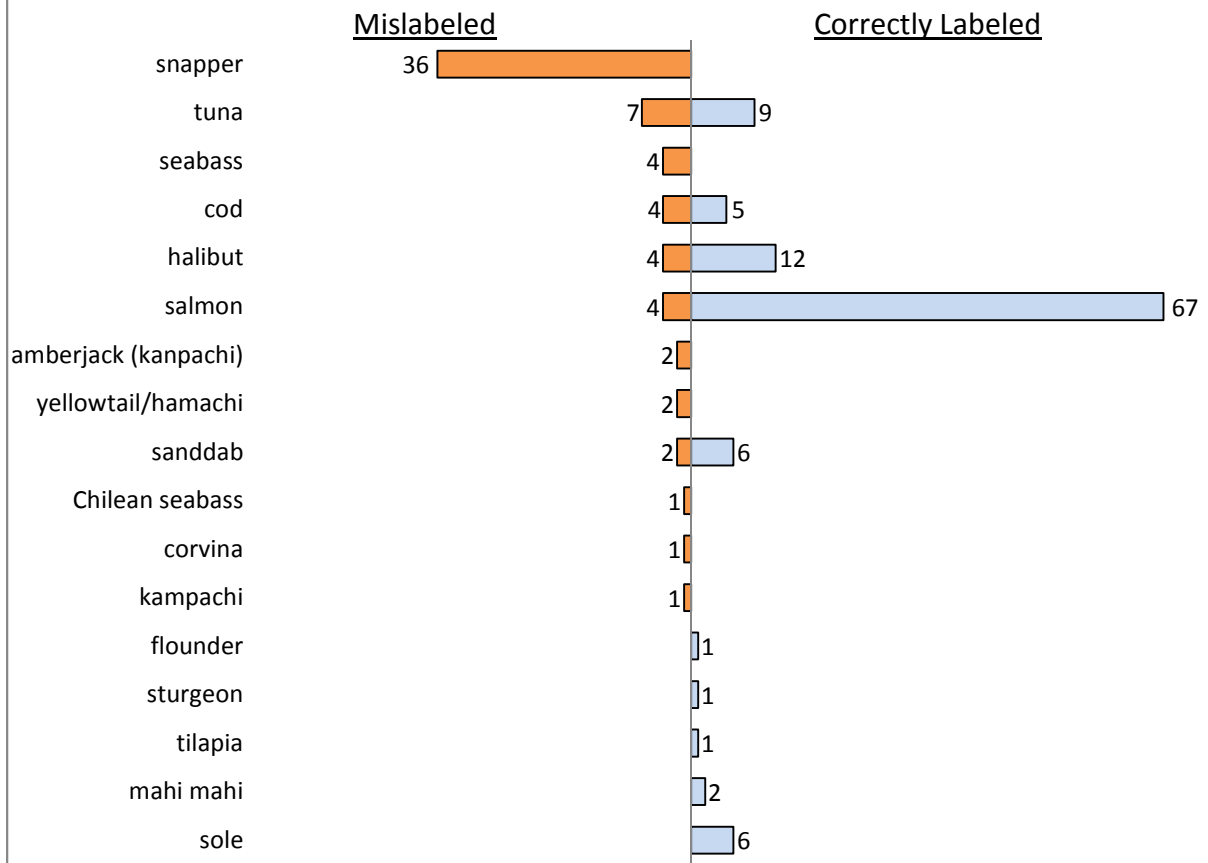
The confusing and misleading use of the vernacular name “red snapper” to market many species of overfished rockfish in California was previously highlighted by Stanford researchers in 2008¹⁰ and by Oceana in 2012.¹¹ This mislabeling impedes consumers’ ability to choose sustainable fish when so many fish go by the same name but are completely separate species, with different life histories and population statuses.

⁹ 21 CFR 102.57. Note-this regulation targets the naming of Greenland turbot yet establishes that only the Atlantic and Pacific halibut may be associated with the term of “halibut.”

¹⁰ Logan, C.A., E.S. Alter, A. J., Haupt, K. Tomalty, S. R. Palumbi, 2008. An impediment to consumer choice: overfished species are sold as Pacific red snapper. *Biological Conservation*, 141, 1591-1599

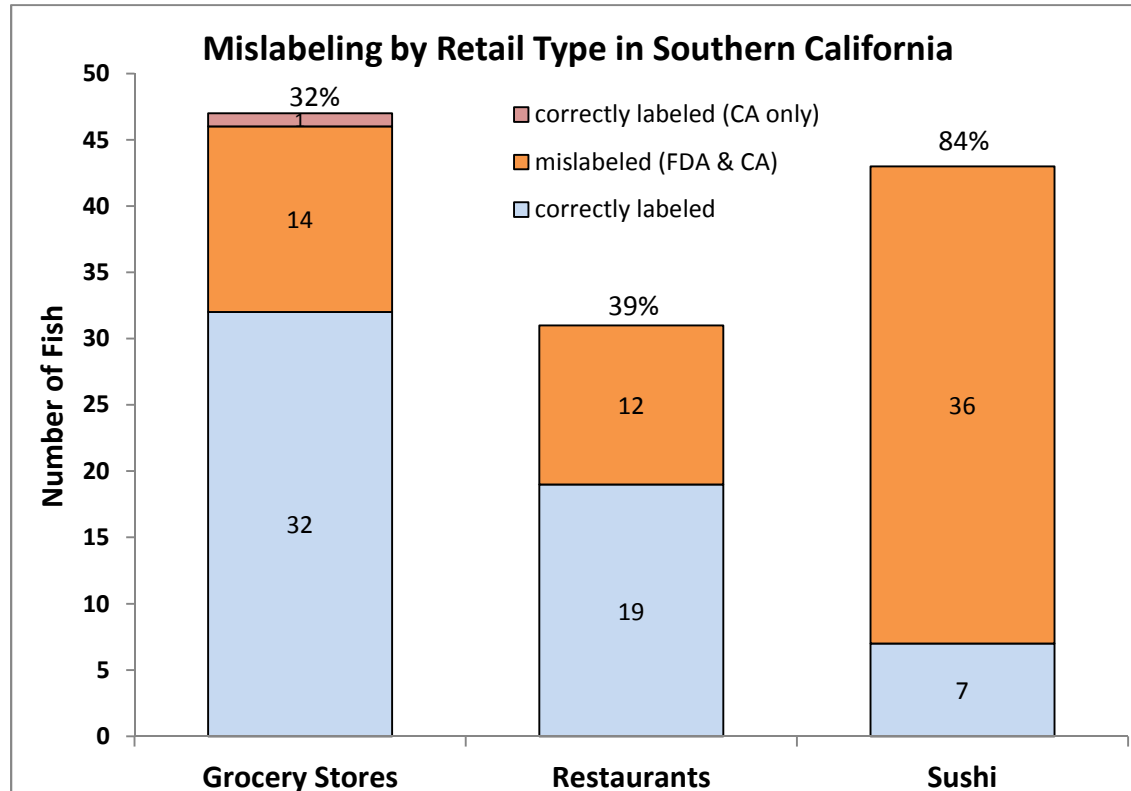
¹¹ Warner, K., W. Timme, and B. Lowell. 2012. *Widespread Seafood Fraud Found in New York City*. Washington, DC, Oceana.

Mislabeling in Northern California



Southern California – 52% Mislabeled

SoCal leads nation in seafood fraud: 52 percent of fish tested was mislabeled, nearly 20 percent higher than national average



Fish¹²

Sixty-three of the 121 samples collected in Southern California were mislabeled (52 percent), which included 89 samples from Los Angeles and 32 samples from Orange County. Oceana’s original results, released in April 2012, found that 55 percent of the seafood sampled was mislabeled. Since the report release, updates to the FDA Seafood List of acceptable market names resulted in a decrease in the overall amount of mislabeling in Southern California, as some fish previously considered mislabeled were now properly labeled.

Snapper was the most commonly sampled species as well as the most often mislabeled. All 34 snapper samples were mislabeled according to FDA guidelines. Only one of the snappers was labeled correctly according to California law, which allows 13 species of rockfish to be sold as “Pacific red snapper.” Southern California was third highest in the nation for amount of mislabeled salmon.

¹² About half of the samples from Orange County were collected in May 2011, with the rest of the Orange County samples and all of the Los Angeles County samples collected in December 2011. Mislabeled seafood was found in 42 of 74 retail outlets visited.

Venue

Southern California led the country with the highest rate of seafood mislabeling from grocery stores and one of the highest from sushi restaurants. Of the 74 different retail outlets visited, 45 of them sold mislabeled seafood. While grocery stores had the lowest rate of mislabeling (32 percent), consumers should be disturbed to learn that almost one in three samples from grocery stores were mislabeled. Our study revealed that 84 percent of the sushi purchased was mislabeled, a shameful statistic for a state with a sushi roll named after it.

Highlights

As mentioned above, none of the fish labeled as snapper were labeled correctly according to FDA's guidelines. In addition, none of the fish labeled as snapper were even snappers at all. The majority were rockfish, tilapia, or breams and seabreams, fish with names that may not inspire much appetite for consumers.

Of the 21 sushi venues visited, only one sold correctly labeled seafood. The other 20 (95 percent) sold at least one fish that was mislabeled, according to the FDA.

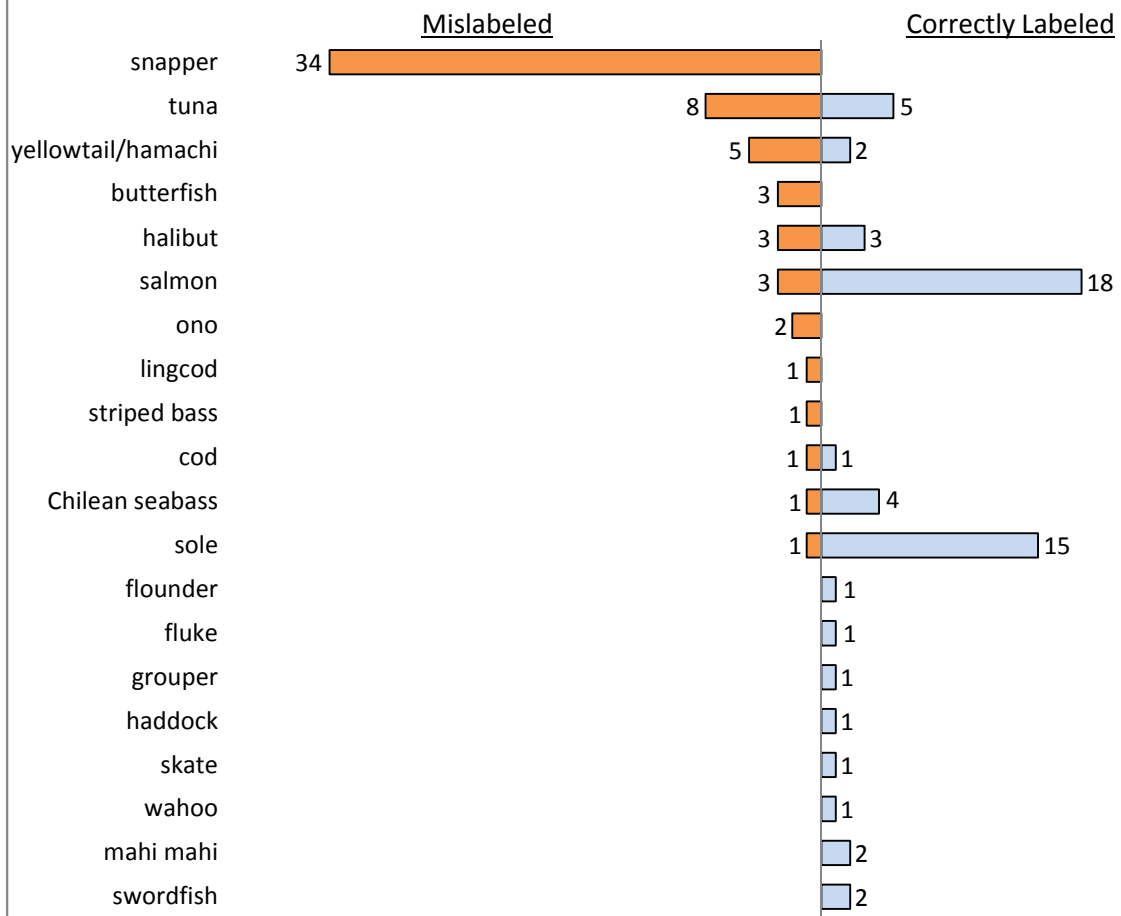
Oceana originally released the results of our Southern California testing in April 2012.¹³ Since then, the Los Angeles County Seafood Task Force¹⁴ conducted its own study and found 74 percent of the seafood facilities investigated sold mislabeled seafood, validating Oceana's findings.¹⁵ The pervasive false and inaccurate seafood labels were found at all levels of seafood commerce including retail, wholesale and import levels. The Los Angeles County officials are following up with corrective actions, including continued inspections, oversight and enforcement.

¹³ Warner, K., W. Timme, B. Lowell, and M. Hirshfield. 2012. *Widespread Seafood Fraud Found in L.A.* Washington, DC. Oceana.

¹⁴ The task force included officials from County Department of Public Health, the California Department of Food and Drug Branch and the U.S. Food and Drug Administration.

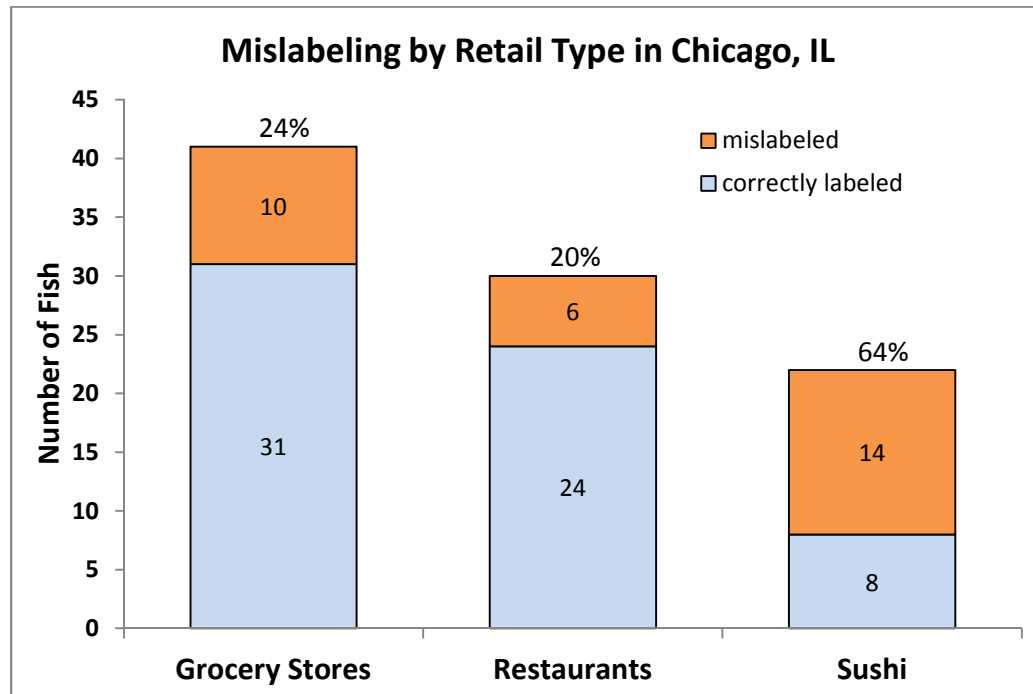
¹⁵ Garcia, Ana. 2012. Investigation Reveals Widespread Seafood Mislabeling in LA County <http://www.nbclosangeles.com/investigations/series/get-garcia/Get-Garcia-Investigation-Food-Health-Seafood-Fish-Mislabeled-Taskforce-Survey-180060901.html>. Accessed 1/8/13

Mislabeling in Southern California



Chicago, Illinois – 32% Mislabeled

Seafood fraud takes hold in Windy City: one in three fish mislabeled



Fish¹⁶

Almost one-third of the 93 seafood samples tested in Chicago were mislabeled (32 percent), close to the national average. The most mislabeled fish were those sold as snapper, with eight of the nine samples confirmed as a different species from the one sold. In addition, all of the yellowtail samples tested, as well as the single samples of corvina, jack, mackerel and perch, were mislabeled. Neither of the two lemon sole was correctly labeled, following the nationwide trend.

On a brighter note, none the salmon, the most commonly sampled fish in Chicago, was mislabeled. Additionally, all of the grouper, often thought of as a commonly swapped species, was accurately labeled.

Venue

Nearly half of the 53 retail outlets visited in Chicago sold mislabeled fish, including 34 percent of the grocery stores and 38 percent of the restaurants. In contrast to the national trends, grocery stores sold

¹⁶ All of the samples (93) in the greater Chicago area were collected between April and August 2012, and 30 of them were mislabeled (32 percent). Eleven types of fish out of the 18 kinds sampled were mislabeled. Mislabeled seafood was found in 24 of 53 retail outlets visited.

mislabeled fish at a higher rate than restaurants, and most of the fraudulently labeled samples were from large chains stores. Even more distressing, every sushi venue visited sold mislabeled fish, with 64 percent of the samples found to be mislabeled.

Highlights

Grocery stores in Chicago had some of the most unusual seafood substitutions. For example, threadfin slickhead, a fish not listed among those known to be commercially sold in the U.S.,¹⁷ was sold as Alaskan cod, a popular white-fleshed fish. Twice, grocery stores sold fish labeled as red snapper that were completely different species, a goldbanded jobfish and a slender pinjalo, the latter of which is also not found on the FDA's Seafood List. These two fish are found in the Indo-Pacific, far from the home of the true red snapper in the Caribbean and Gulf of Mexico. This blatant species substitution makes it nearly impossible for consumers to know what food they are actually buying and serving their families. All three species of the troubled bluefin tuna turned up in our Chicago testing, but only the Pacific bluefin was found mislabeled as white tuna in a sushi venue. This species, *Thunnus orientalis*, is also not among the FDA's list of 1,700 seafood species commonly sold in the U.S.¹⁸

The mislabeling of fish in this region is particularly worrisome in light of an infamous case of puffer fish substituted for monkfish in a Chicago market a few years ago.¹⁹ In 2007, a woman bought what she was told was monkfish from an Asian market. Within 30 minutes of consumption, she was vomiting, and she and her husband had numbness, tingling and weakness in their arms and legs, which the hospital determined were symptoms consistent with tetrodotoxin poisoning. Tetrodotoxin, a neurotoxin that causes paralysis and which can be fatal, is found in puffer fish and not monkfish. Although an extreme case, this highlights the serious health concerns that can arise from seafood substitution.

Another type of seafood mislabeling, short weighting, or selling less seafood than advertised on the label, was brought to light by Chicago journalists in 2010.²⁰ Short weighting typically involves adding extra water to the outside of frozen fish, known as overglazing or adding extra water to the fish by soaking it in a chemical solution, known as oversoaking. This type of seafood fraud is also distressingly widespread, particularly in the frozen food sector and translates into economic harm to many actors in the seafood supply chain, including to the final customer.²¹

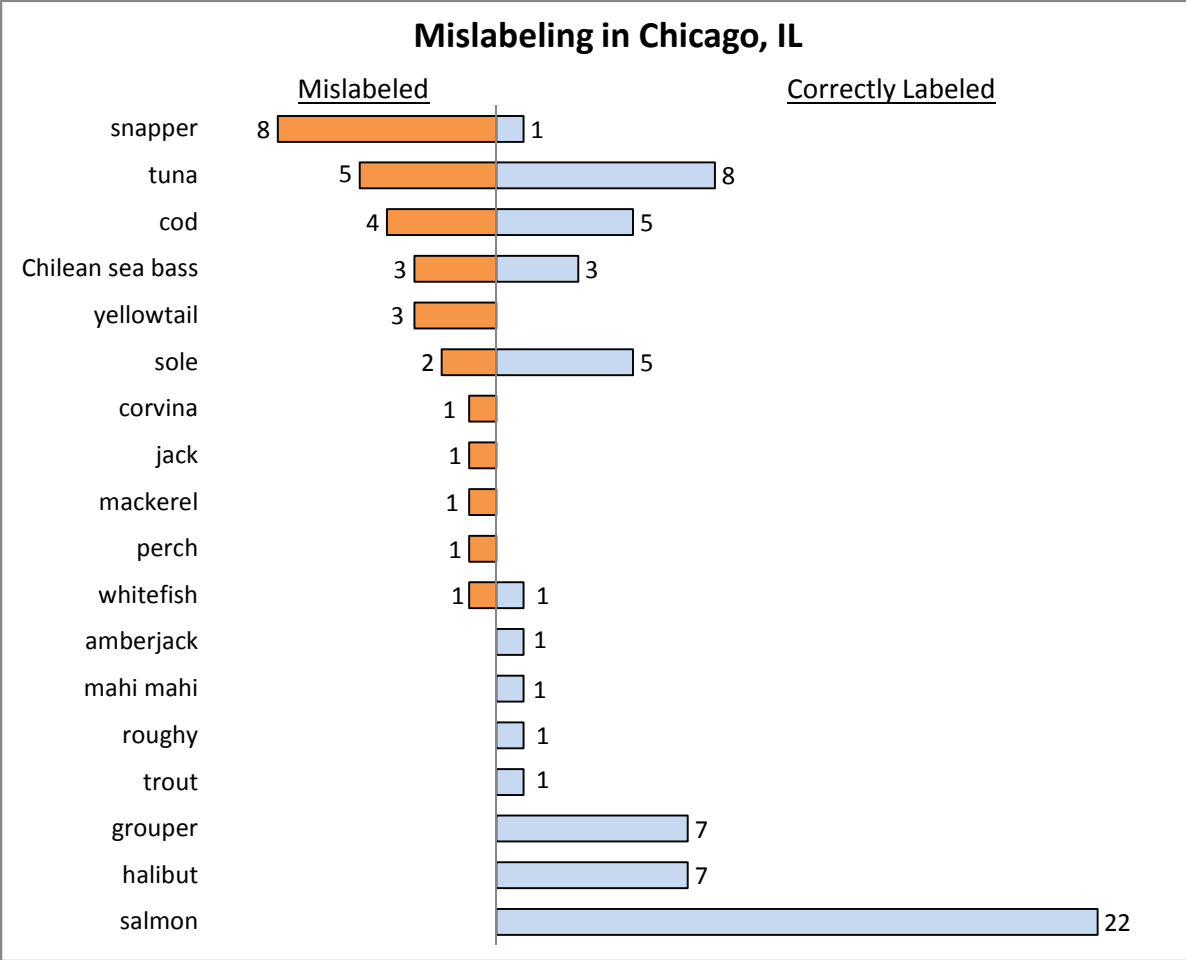
¹⁷ FDA. 2012. *The Seafood List: The FDA's Guide to Acceptable Market Names for Seafood Sold in Interstate Commerce*. http://www.accessdata.fda.gov/scripts/SEARCH_SEAFOOD/index.cfm. Accessed January 10, 2012.

¹⁸ Ibid

¹⁹ Cohen, N.J., et al. 2009. Public health response to puffer fish (Tetrodotoxin) poisoning from mislabeled product. *Journal of Food Protection*. 72(4). 810-7

²⁰ Wernau, J. and A. Cancino. 2012. *Weighty issue: Mislabeled frozen fish, seafood rarely punished*. Chicago Tribune April 25, 2010; http://articles.chicagotribune.com/2010-04-25/business/ct-biz-0425-seafood-fish--20100425_1_seafood-weighty-issue-fillets. Accessed February 5, 2013.

²¹ Ibid

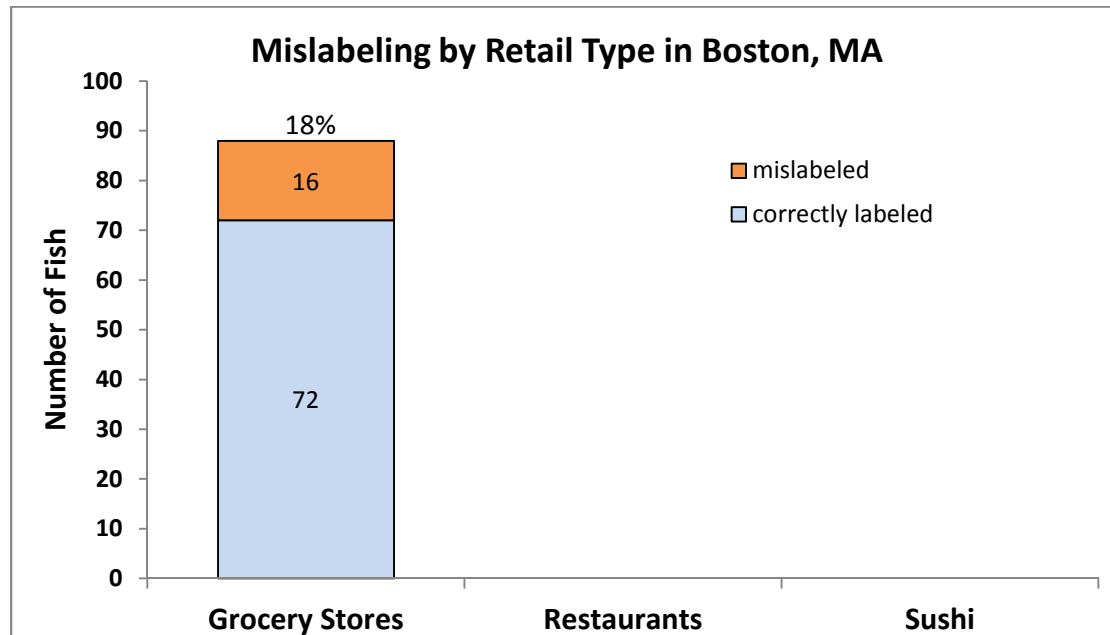


Additional Great Lakes Samples: Minnesota and Wisconsin

In addition to samples from the greater-Chicago area, Oceana also received one cod sample from a restaurant in Minnesota and four grocery store samples from Milwaukee, Wisconsin. None of the samples of cod, salmon or sole from these locations were mislabeled.

Boston, Massachusetts – 18% Mislabeled

Nearly half of all grocery stores visited sold mislabeled fish



Fish²²

Boston results were consistent with many of the trends previously identified in this study, including a lack of salmon mislabeling and universal snapper mislabeling. Cod, a popular choice in New England, was also mislabeled 31 percent of the time.

Venue

In contrast to the other areas tested, all 88 of the Boston samples came from grocery stores, which sold mislabeled fish 18 percent of the time. Our sampling targeted three top grocery store chains in the Boston area, where the same fish types were sought in five stores of each chain. Out of the 15 grocery stores visited, seven stores sold mislabeled fish, while mislabeling rates ranged from 14 to 23 percent for any given chain.

Highlights

The largest number of our nationwide cod samples came from Boston, where the substitution of Pacific cod for the iconic, rare and local favorite, Atlantic cod, was most common.

Oceana released the results of its grocery store testing in October 2011, coinciding with the large exposé of seafood fraud in Boston conducted by *The Boston Globe*.²³ The Globe investigation uncovered overall

²² All of the Boston samples were collected between February and March 2011. Our testing in Boston was limited to five fish types, and all were purchased from grocery stores.

mislabeled rates of 48 percent from grocery stores and restaurants.²⁴ On the other hand, the 18 percent grocery store mislabeling rate identified by Oceana matched both our national grocery store rate and that found by The Globe for grocery stores and seafood markets.

In response to these results, the Massachusetts Legislature's Joint Committee on Consumer Protection and Professional Licensure held a hearing on seafood fraud in January 2012 and introduced legislation in January 2013. The State also created a pilot project, partnering with the seafood industry, to track fish in select communities through the supply chain. Just months after the hearing, U.S. Representatives Edward Markey and Barney Frank, both from Massachusetts, introduced federal legislation, the Safety and Fraud Enforcement for Seafood Act (SAFE Seafood Act, H.R. 6200) that would require that all seafood sold in the U.S. is tracked from boat to plate to combat seafood fraud.

Subsequent seafood testing by The Globe in 2012 revealed continued seafood mislabeling at both the retail and wholesale levels in the seafood supply chain.²⁵ The Globe returned to many of the restaurants and stores it had sampled in 2011 and found that 76 percent of samples were still mislabeled, despite the attention that the issue had received from the media, legislators and regulators following the initial Globe investigation.

Another kind of economic fraud was exposed by The Globe in 2012 when it investigated sea scallops for the presence of extra water through soaking in a chemical solution.²⁶ Natural scallops contain nearly 75 percent water, but The Globe investigations found water content of more than 90 percent in some scallops purchased in leading grocery stores. These "wet" scallops soaked in chemicals are widely regarded as inferior to natural or "dry" scallops, and the substitution of these products deprives consumers of quality and also charges consumers for water, a simple approach to boost profits at the expense of consumers.

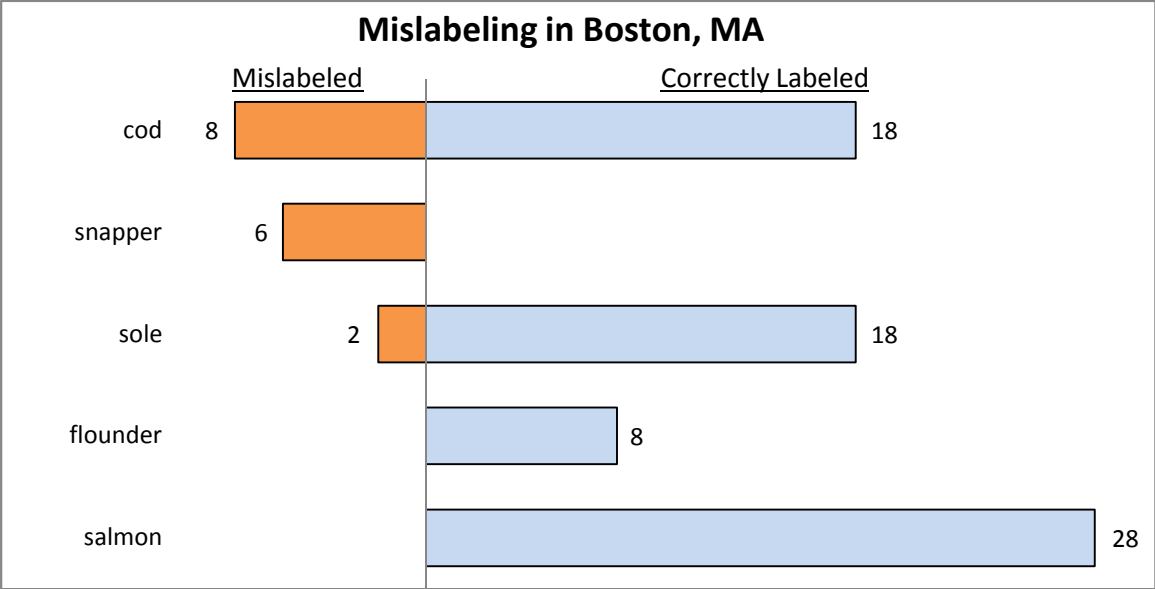
²³ Warner, K. 2011. *Seafood fraud found in Boston-area supermarkets*. Washington, DC. Oceana.

²⁴ Abelson, J. and B. Daley. 2011. *On the menu, but not on your plate*. The Boston Globe October 23, 2011; <http://www.bostonglobe.com/business/2011/10/22/menu-but-not-your-plate/NDbXGXdPR6O37mXRSVPGIL/story.html>. Accessed January 31, 2013

Abelson, J. and B. Daley. 2011. *Fish supply chains open to abuse*. The Boston Globe October 24, 2011; http://www.boston.com/business/articles/2011/10/24/from_sea_to_sushi_bar_a_system_open_to_abuse/. Accessed January 31, 2013.

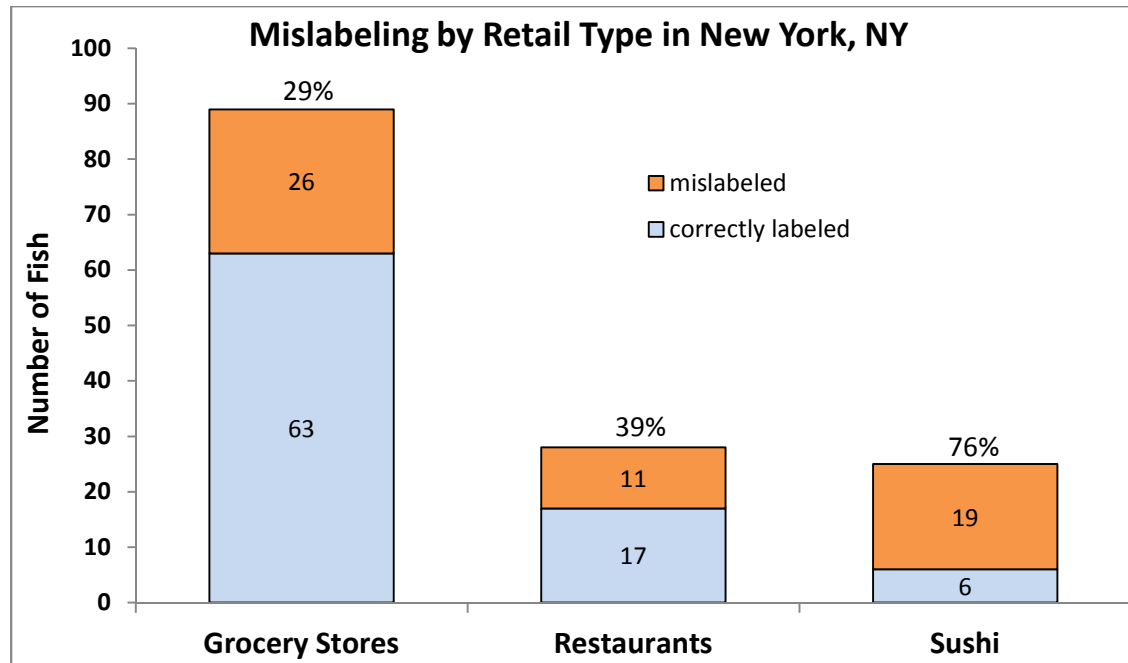
²⁵ Abelson, J. 2012. *Bid to Fight Mislabeled Fish Gets Ramped Up: FDA Launching Effort to Perform DNA Tests*. The Boston Globe March 13, 2012; <http://www.bostonglobe.com/business/2012/03/12/bid-fight-mislabeled-fish-gets-ramped/b8slpNBWTD3xCq5a3tEcyM/story.html>. Accessed January 31, 2013.

²⁶ Abelson, J. 2012. *They're called scallops but some sold in grocery stores are more than 85 percent water*. Boston Globe September 22, 2012. <http://www.bostonglobe.com/business/2012/09/22/they-called-scallops-but-some-sold-grocery-stores-are-more-than-percent-water/9TAo9cZ7xJGHW3OrjC6hYJ/story.html>



New York, New York – 39% Mislabeled

Big Apple has big problem with seafood fraud: 94 percent of tuna and more than three quarters of sushi samples in New York City mislabeled



Fish²⁷

Of the 142 fish samples collected in New York, 39 percent were mislabeled. New York City led the nation with the highest occurrence of mislabeled salmon as well as the highest amount of fraud among salmon collected from grocery stores and restaurants. As in many other regions, salmon was the most commonly sampled fish and was mislabeled 20 percent of the time in New York.

The most commonly mislabeled fish type, however, was tuna, which was mislabeled 17 of the 18 times it was purchased (94 percent). The second most mislabeled fish were snappers. Our testing revealed 13 different types of fish being sold as “red snapper” in New York City, including tilapia, white bass, goldbanded jobfish, tilefish, porgy/seabream, ocean perch and other less valuable snappers.

Venue

Three out of every five retail outlets visited sold mislabeled fish (58 percent). While New York grocery stores followed the national trend in having the lowest mislabeling rates compared to restaurants and

²⁷ One hundred forty-two fish were collected in New York between May and August of 2012, and 56 (39 percent) were mislabeled. Mislabeled seafood was found in 47 of 81 retail outlets visited.

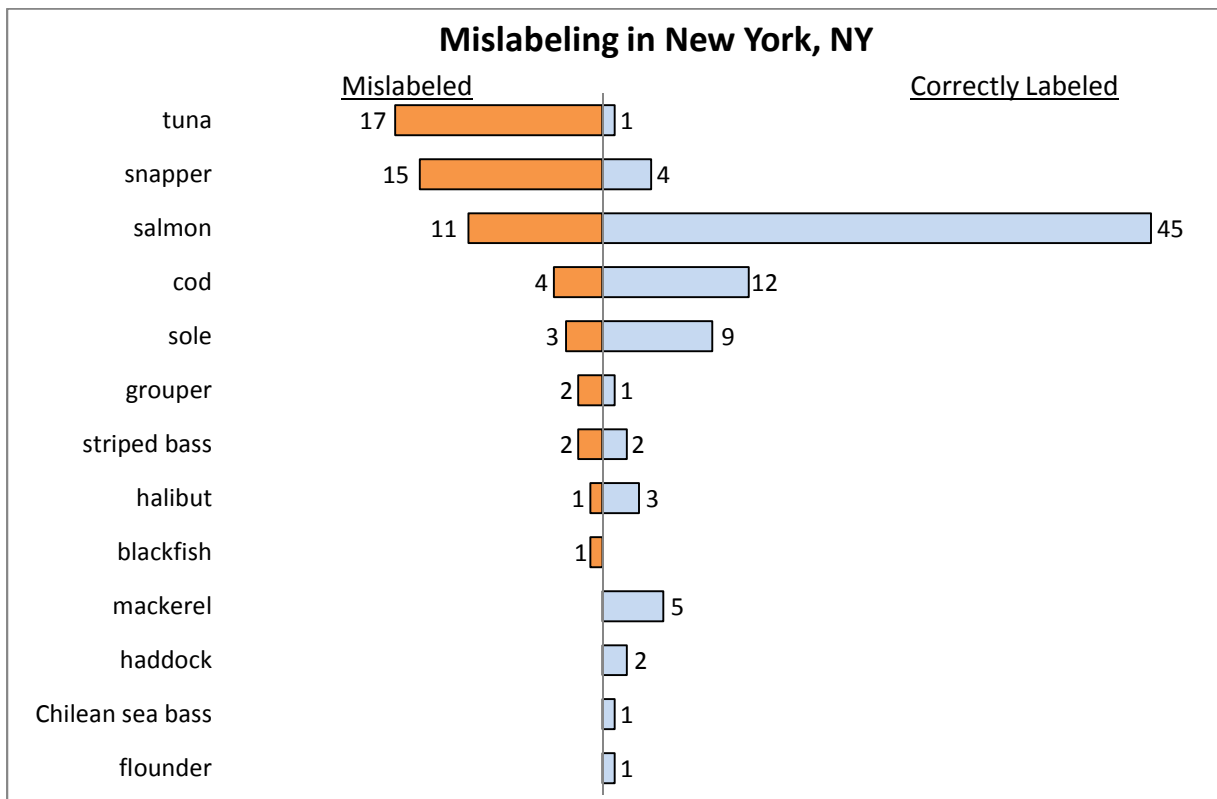
sushi venues, the grocery mislabeling rate (29 percent) was second-highest in the nation, following only L.A. Small markets had appreciably higher fraud levels (40 percent) than national grocery store chains (12 percent), which is disturbing in light of how many New Yorkers rely on their neighborhood markets to buy their groceries.

Every sushi venue visited sold mislabeled fish, and 76 percent of the samples purchased were falsely labeled, which is close to the national average for sushi.

Highlights

The health impacts of seafood fraud were displayed front and center in New York. Bluefin tilefish was sold as both Alaskan halibut and red snapper in one grocery store. Tilefish is on the FDA’s Do Not Eat list for sensitive populations, including pregnant women and children, because of its high mercury content. While all species substitutions are misleading and unacceptable, this type of egregious fraud is especially alarming, since it potentially puts consumers’ health at risk.

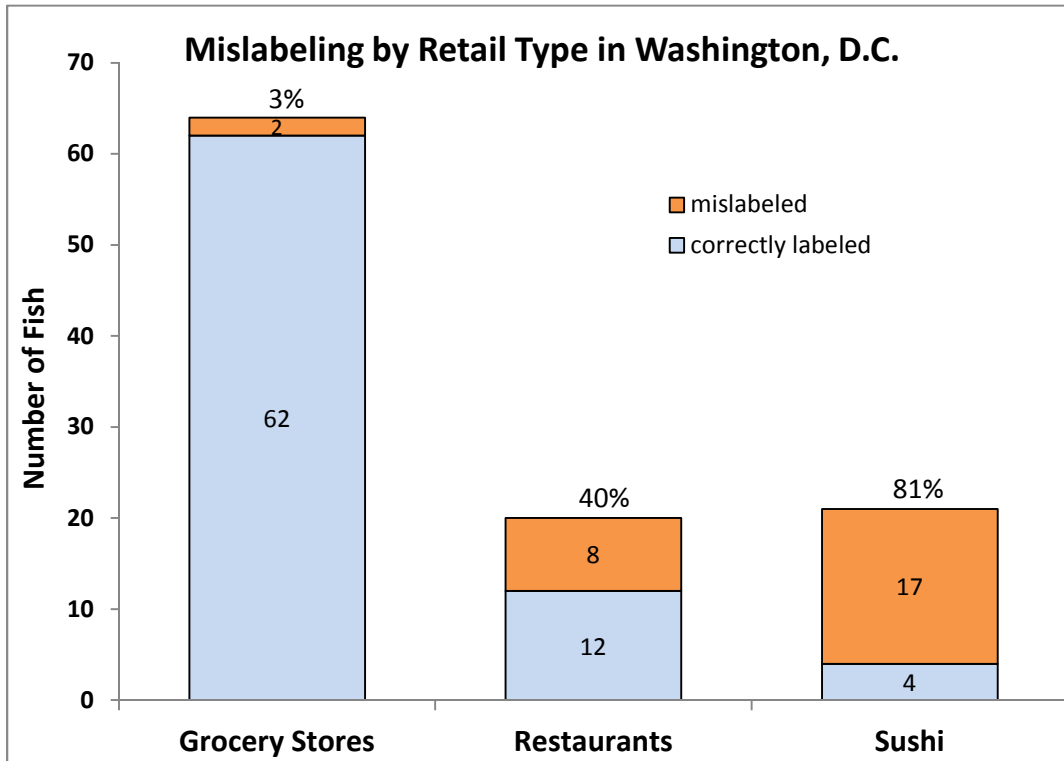
New York also led the nation with the most tuna fraud (in places where more than two samples were obtained). And while snapper was the second most-mislabeled fish in this regional study, New York had the largest number of honestly labeled red snapper (all four of them) of any city tested in the U.S. Oceana’s release of the New York City results in December 2012²⁸ was not the first time seafood fraud has been uncovered in the city, but despite frequent coverage in the press, the problem continues.



²⁸ Warner, K., W. Timme, and B. Lowell. 2012. *Widespread Seafood Fraud Found in New York City*. Washington, DC, Oceana.

Washington, D.C. – 26% Mislabeled

Nation’s Capital does not escape seafood fraud: One in four fish mislabeled; all sushi venues sold mislabeled fish



Fish²⁹

Overall, one in four fish samples was mislabeled in the nation’s capital (27 out of 105 or 26 percent). Salmon was the most commonly collected fish, and all were correctly labeled. Another commonly sampled fish was cod, and only two out of 21, or 10 percent, were mislabeled.

All of the snapper samples were found to be mislabeled in Washington, D.C. Tilapia was the most commonly substituted fish for snapper, with other substitutions being madai, white bass and different species of snapper other than the one sold (e.g. vermillion snapper substituted for red snapper).

Venue

More than one in three of the 58 retail outlets visited in D.C. sold mislabeled fish. Both sushi and restaurant seafood mislabeling rates exceeded national averages, but grocery mislabeling rates were one

²⁹ Fish from the Washington, D.C. area were collected year-round from 2010 to 2012, and 27 out of 105 (26 percent) were mislabeled. The majority of the samples were from the District, a few were from Maryland and Virginia suburbs, and two samples were from Berkeley Springs, WV. Mislabeled seafood was found in 21 out of 58 retail outlets visited.

of the lowest in the country. Only two of the 33 grocery stores visited sold mislabeled fish, while seven of 13 restaurants visited sold mislabeled fish. However, D.C. residents may want to think twice before their next sushi purchase, as every sushi venue visited misled consumers, with 81 percent of the sushi samples mislabeled.

Highlights

Escolar was substituted for white tuna in every sushi venue tested in this study. Escolar, a snake mackerel not related to tuna at all, can cause unpleasant digestive effects for some who eat more than a few ounces. These undesirable health impacts make it even more important that a consumer knows what fish they are eating, especially those sensitive to escolar's side effects.

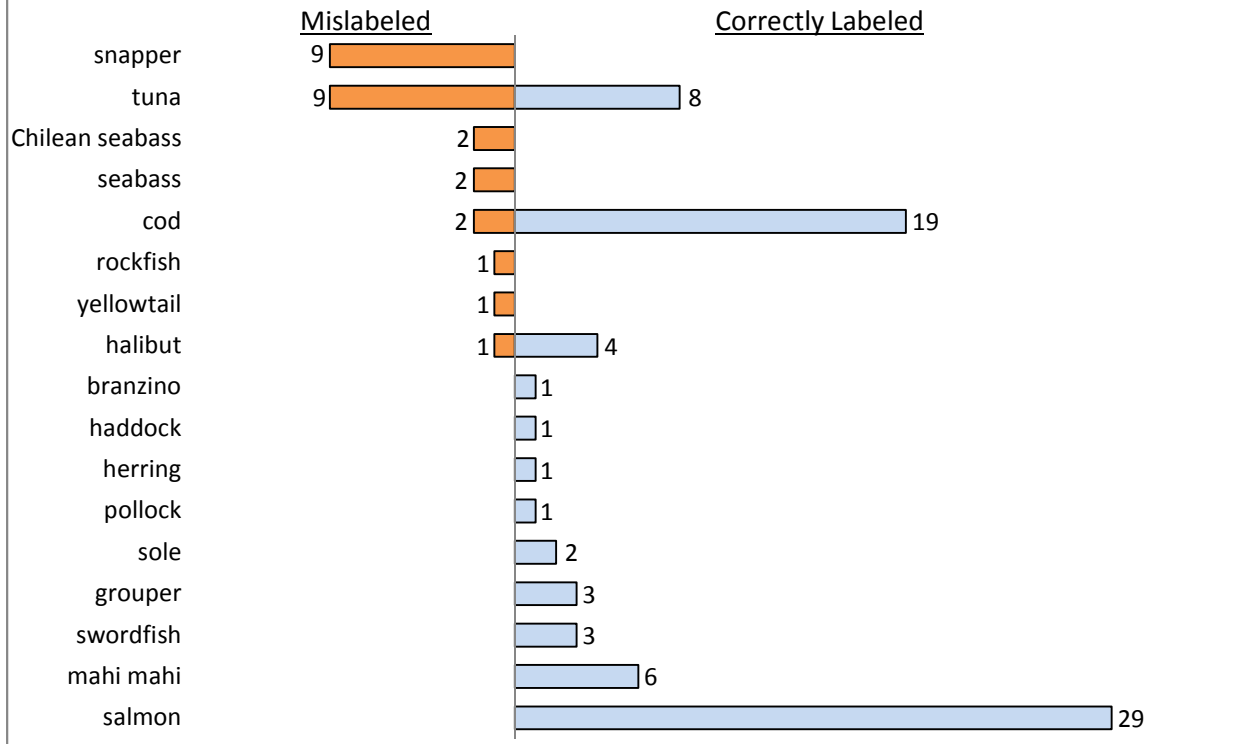
Snapper and tuna sold in the D.C. area also followed the national trend as the most mislabeled fish. All but one of the mislabeled snapper sold in sushi venues was actually tilapia, a farmed freshwater fish that is far from the ocean-living snapper it pretends to be.

One expensive restaurant in the nation's capital swapped the imperiled Atlantic halibut for the more sustainable Pacific halibut advertised on the menu.

Seafood was collected and sampled for mislabeling for more than two years in the nation's capital, even while Congress considered legislation to prevent seafood fraud.³⁰ Even at the seat of the federal government, consumers are being misled more than 25 percent of the time when they purchase seafood.

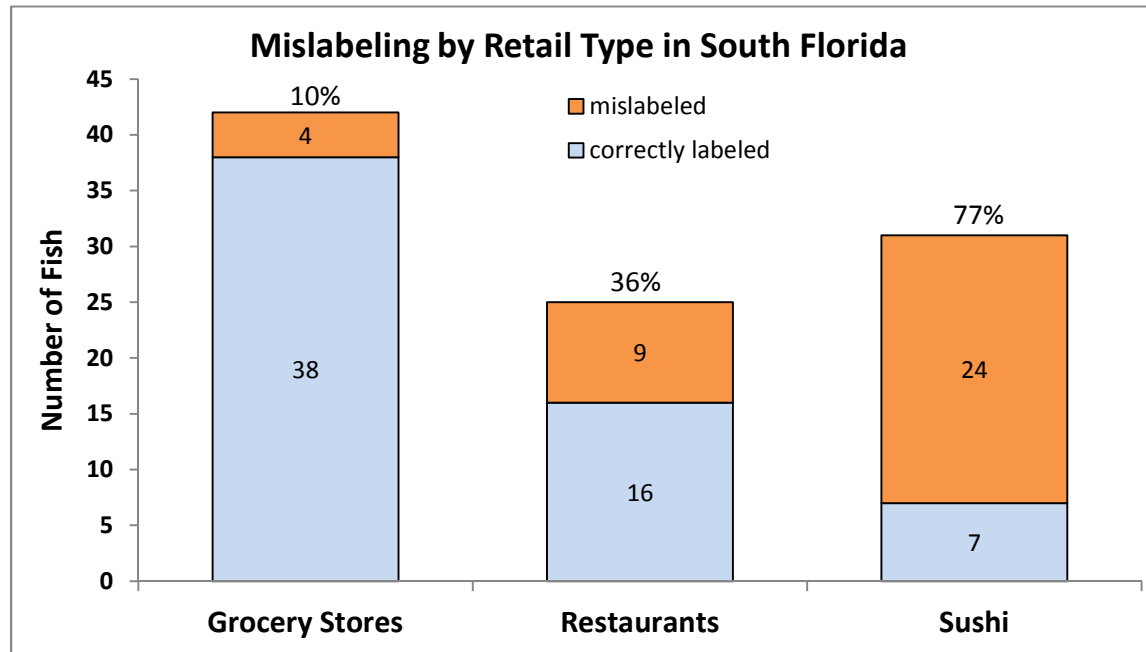
³⁰ See Oceana press releases, accessed February 11, 2013: <http://oceana.org/en/news-media/press-center/press-releases/congress-joins-fight-against-illegal-fishing>; <http://oceana.org/en/news-media/press-center/press-releases/house-introduces-bill-to-help-stop-seafood-fraud>

Mislabeling in Washington, D.C.



South Florida – 38% Mislabeled

Sunshine state takes heat on seafood fraud: 38 percent of fish mislabeled in South Florida, primarily from restaurants and sushi venues



Fish³¹

Overall, 38 percent of the fish purchased in South Florida were mislabeled.³² Oceana released results of South Florida testing in July 2012. This present data set includes newly added grouper samples and the reclassification of samples labeled as hamachi as mislabeled, to be consistent with federal guidelines and other data in this report. These changes and new data resulted in higher levels of mislabeling than originally reported

Although many species of snapper are native to Florida waters, where it is a popular, local dish, snapper was still mislabeled 38 percent of the time in this region. Even though snapper mislabeling was fairly high, South Florida had the lowest level of snapper fraud nationwide. However, fish specifically labeled as “red snapper” were mislabeled at a much higher rate (86 percent), close to the national average of 93 percent. Roughly half of the nationwide grouper samples were obtained in South Florida, where one in five were mislabeled. Nearly one in five salmon were mislabeled as well. Yellowtail/hamachi was the most mislabeled fish in this region, with all 10 samples found to be mislabeled according to federal guidelines.

³¹ The 98 fish samples collected from the Miami/Fort Lauderdale area were bought between December 2011 and May 2012, and 37 (38 percent) were mislabeled. Mislabeled seafood was found in 27 of 64 retail outlets visited.

³² Warner, K., et al. 2012. *Persistent Seafood Fraud Found in South Florida*. Washington, DC, Oceana.

Venue

Two out of every five retail outlets visited (64) sold mislabeled fish. Most of the samples came from grocery stores, which followed the national trend of having the lowest amount of mislabeling (10 percent). Every sushi venue visited in South Florida sold mislabeled fish, and 77 percent of these samples were mislabeled. Mislabeled rates in restaurants and sushi venues were close to national averages for these types of retail, while grocery store rates were 8 percent lower. Half of the 16 restaurants visited also sold mislabeled fish.

Highlights

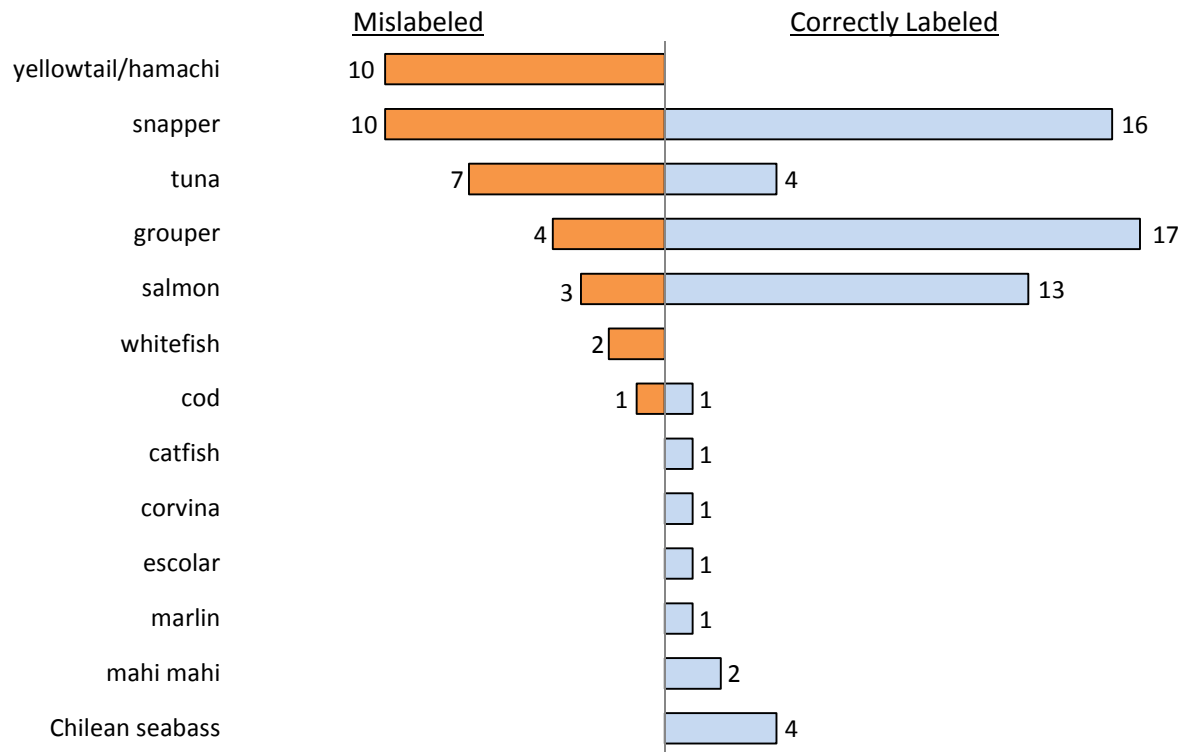
Grouper, a local fish found in many retail venues across the region, had some of the most egregious examples of fraud. In one grocery store, king mackerel was mislabeled as grouper. This is particularly alarming as king mackerel is so high in mercury that it made the FDA's Do Not Eat list for women who are or might become pregnant, nursing mothers and small children. In addition, the critically imperiled speckled hind³³ was substituted for the more sustainable red grouper in a South Florida market, the type of fraud which sabotages many consumers' attempts to make sustainable choices in the seafood they eat.

Every sample of fish labeled as white tuna was actually escolar, a snake mackerel that is known to cause troubling gastrointestinal problems. Salmon fraud levels in South Florida were the second-highest nationwide at 19 percent.

Every fish sample purchased as yellowtail/hamachi was mislabeled in South Florida. The FDA Seafood List establishes guidelines for the seafood industry to follow when selling fish in the U.S. While some fish may also be known by vernacular or regional names, the FDA sets acceptable market names for fish that must be displayed, as consumers cannot be expected to know every local name for a particular species. Seafood is a global commodity that needs standardized names to avoid confusion for consumers and retailers alike, no matter where the fish is purchased. Every sample of yellowtail/hamachi was inconsistent with the FDA's guidelines and was considered mislabeled for the purpose of this study.

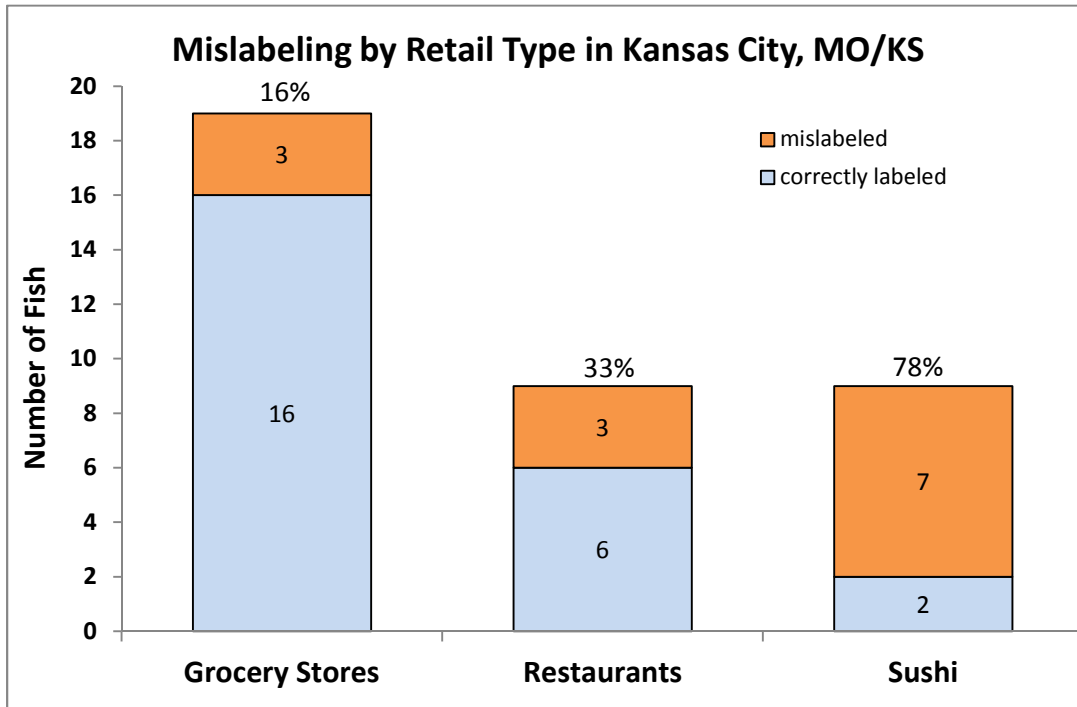
³³ Chuen, N.W. and G. Huntsman. 2006. *Epinephelus drummondhayi*. IUCN 2012. IUCN Red List of Threatened Species. Version 2012.2. <http://www.iucnredlist.org/details/7854/0>. Accessed January 10, 2013.

Mislabeled in South Florida



Kansas City, Missouri/Kansas – 35% Mislabeled

Midwest twin cities do not escape seafood fraud: one in three fish samples mislabeled



Fish³⁴

Overall, 35 percent of the seafood sampled in the Kansas City area was mislabeled, similar to the national average. The most commonly sampled fish was salmon, and on a bright note, none were mislabeled. Of the other most-sampled fish, snapper had the highest occurrence of mislabeling (five out of six), while one in three of the cod samples were also mislabeled. Both tuna samples and all of the single samples of striped bass and orange roughy purchased were mislabeled.

Venue

One out of every three retail outlets visited in Kansas City sold mislabeled fish (32 percent). While most of the samples came from grocery stores, only 16 percent of these samples were mislabeled. In contrast, 78 percent of the samples from sushi venues were mislabeled, and all of the sushi venues visited sold mislabeled fish.

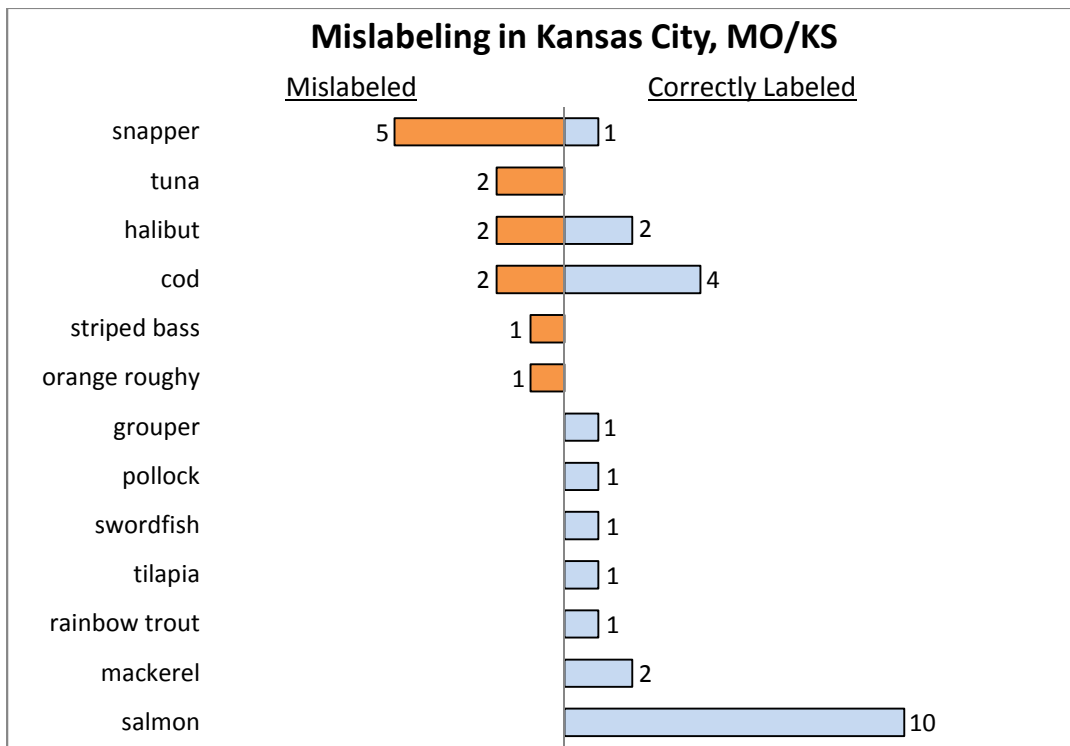
³⁴ The 37 samples from the Kansas City area were collected between May and June 2012, and 13 (35 percent) were mislabeled. Most of the fish came from cities and towns in Missouri (22), but a considerable amount were from Kansas (14). Mislabeled seafood was found in eight of 25 retail outlets visited.

Highlights

One of the more interesting substitutions occurred in a restaurant where Atlantic cod was sold as orange roughy. Orange roughy is a small, orange-colored, long-lived fish that looks absolutely nothing like a cod. Both orange roughy and Atlantic cod are listed as fish to avoid by many fish conservation guides, due to their overfished status.

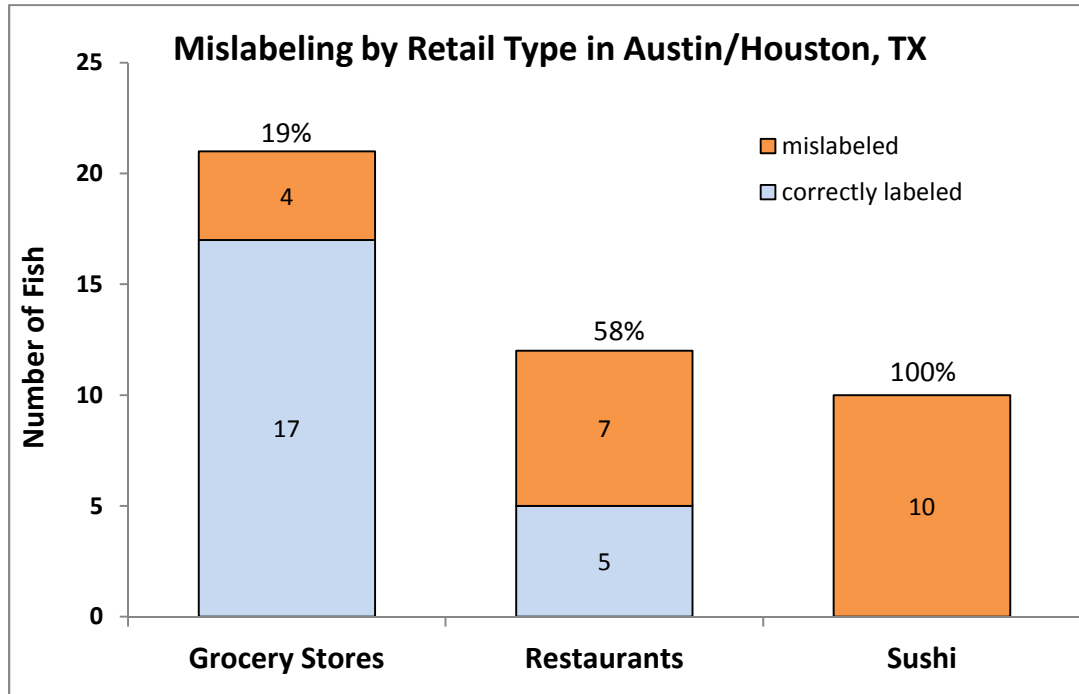
Both of the white tuna samples collected were actually escolar, following an upsetting nationwide trend in escolar mislabeling. Escolar is not even a tuna, but a snake mackerel that is also known as the “ex-lax” fish because it may cause gastrointestinal distress in some people, an unfortunate fact that many consumers do not know.

Five of the six snapper purchased in Kansas City were labeled as red snapper, and one sample actually was. Kansas City is one of only four locations in our national survey where true red snapper was found.



Austin/Houston, Texas – 49% Mislabeled

Even seafood fraud is big in Texas: Nearly 50 percent of fish sampled was mislabeled



Fish³⁵

While more famous for beef and BBQ, Texas had the second-highest seafood substitution rate in the country, with 49 percent of the 43 fish sampled in Austin and Houston found to be mislabeled. Texas followed the nationwide trend of high frequency of snapper mislabeling, at 91 percent, as well as low salmon fraud, with only one sample mislabeled.

Venue

Nearly half (48 percent) of the 27 retail outlets visited in Austin and Houston sold mislabeled fish. All 10 of the seafood samples purchased from sushi restaurants, all located in Austin, were mislabeled as well. Samples purchased from restaurants were mislabeled almost 60 percent of the time.

³⁵ The 43 fish collected in Austin and Houston areas were bought between April and June of 2012, and 21 (49 percent) were mislabeled. Mislabeled seafood was found in 13 of 27 retail outlets visited.

³⁵ Eleven types of fish were collected from the Texas cities of Austin and Houston, and most of the samples came from the Austin area (38).

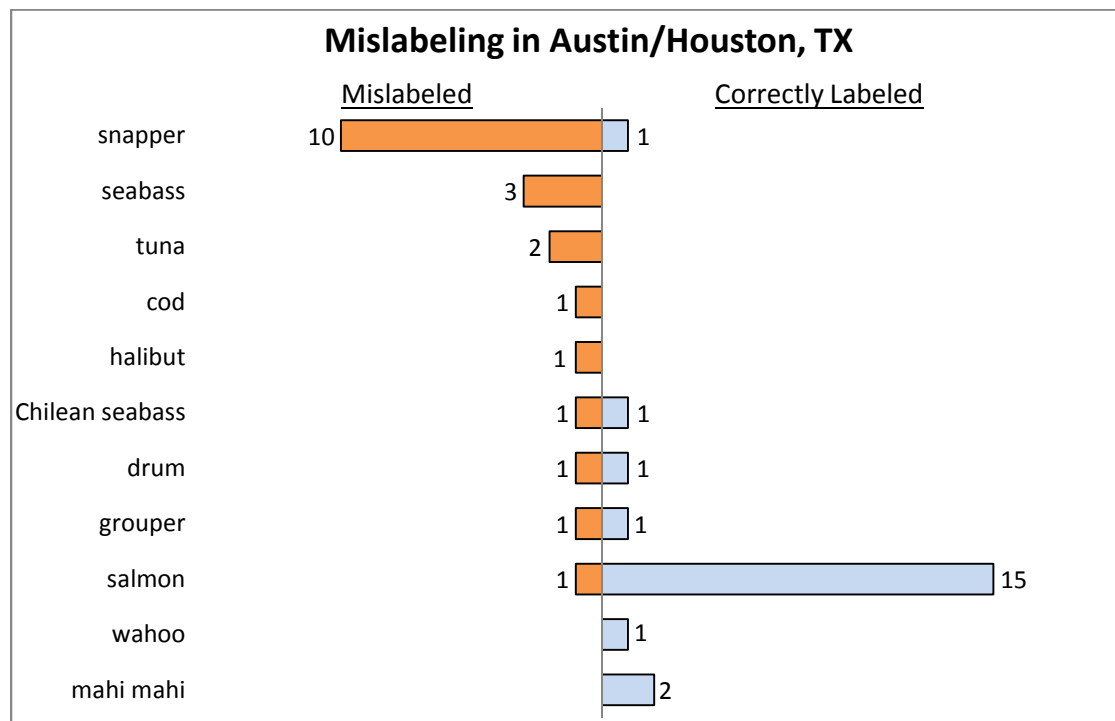
Highlights

Our Texas samples included several kinds of fish that might be found in Gulf of Mexico waters (tuna, snapper, drum, grouper, wahoo and mahi mahi), but only the samples of mahi mahi and wahoo were all honestly labeled. It is clear that even when Texas residents think they are choosing a local or sustainable catch, they may be getting something not even on the menu.

Redfish (or red drum), the Texas State Saltwater Fish, turned up honestly labeled at one Austin restaurant but mislabeled as Atlantic cod in one restaurant and black drum in another. Once heavily overfished and still under strict catch limits in the wild, the iconic redfish is now farm-raised in some Texas and foreign operations.

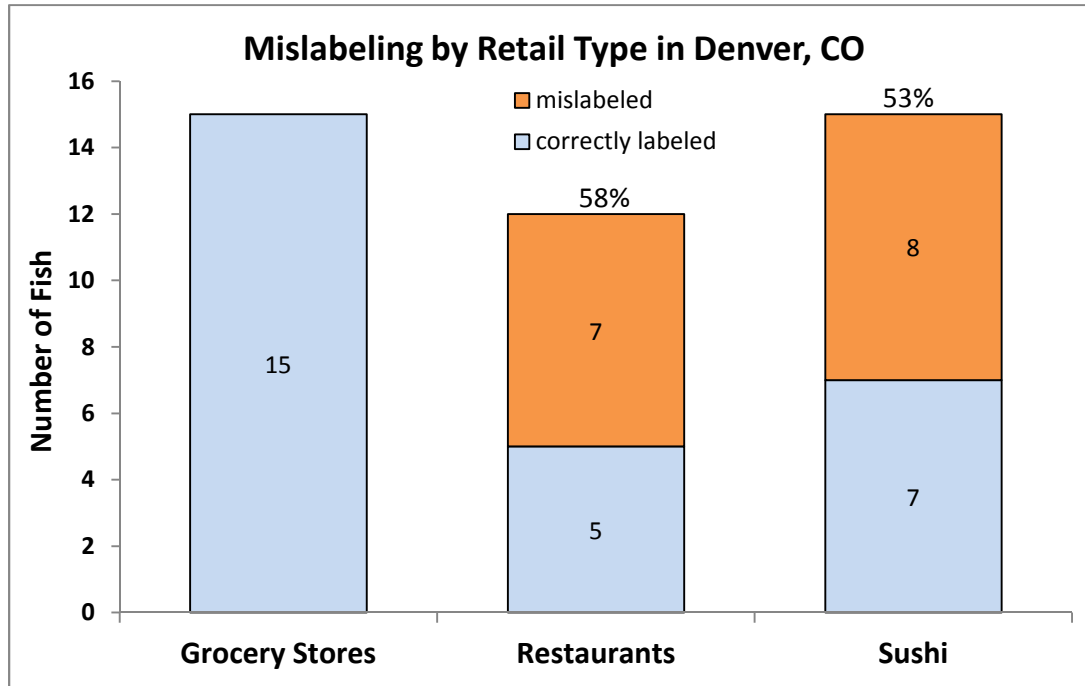
It is very difficult for consumers to purchase a real red snapper in Austin and Houston. None of the eight “red snapper” samples tested were true red snapper; three were tilapia, two were breams and three were less expensive snapper species. One grocery store sold “crimson snapper,” which was actually a goldbanded jobfish, a fish native to the Indo-Pacific.

Sushi, thought by many to be the best quality fish since it is often consumed raw, was the most mislabeled. Every sushi sample purchased in Texas was mislabeled. Escolar was swapped for white tuna in both sushi venues where it was purchased, which is a fish that can cause unpleasant digestive effects in some who eat too much.



Denver, Colorado – 36% Mislabeled

Mile-High City has tall problem with seafood fraud: one in three fish samples mislabeled



Fish³⁶

More than one-third (36 percent) of the seafood purchased in Denver was mislabeled. Denver continued the national trend of low salmon and high snapper mislabeling, with all of the salmon honestly labeled and 80 percent of the snapper mislabeled. In addition, two out of seven halibut, both grouper, and all of the single samples of amberjack, mackerel, sole and yellowtail were mislabeled.

The 42 fish samples analyzed from Denver represented 10 different types of fish. At least one sample was mislabeled in nine out of these 10 types.

Venue

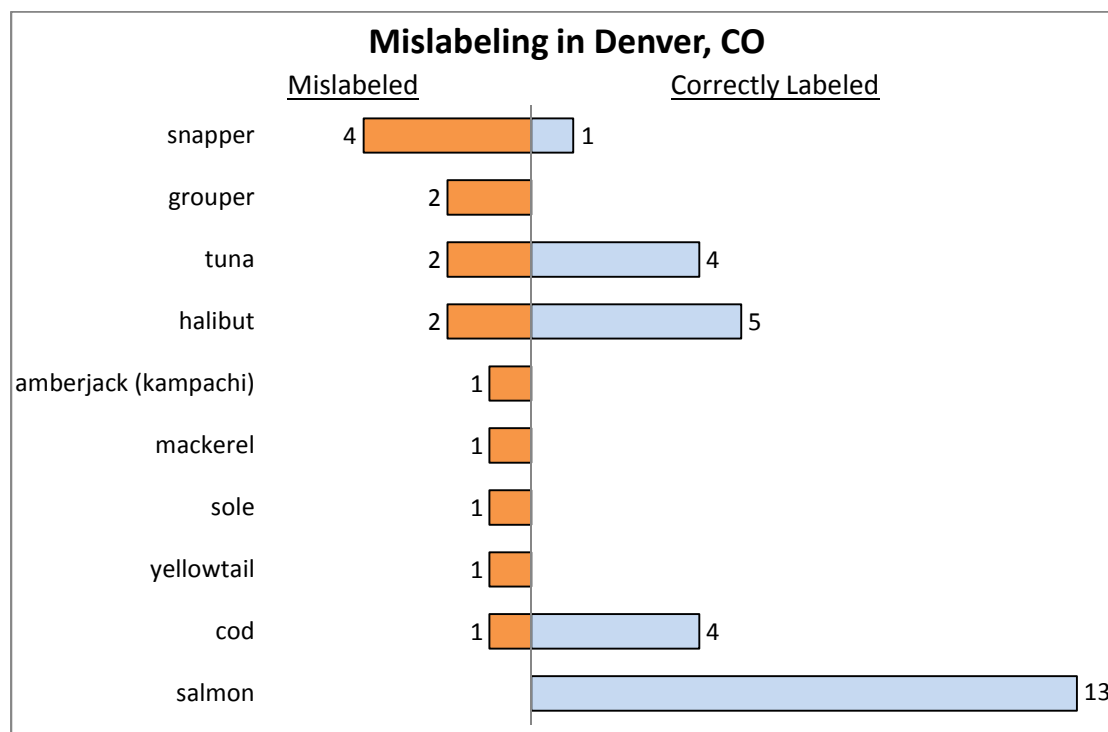
If looking for honestly labeled seafood, Denver residents may want to stick with grocery stores. Among our samples collected, all of the grocery stores frequented in the Denver-area sold honestly labeled fish, the only city in our nationwide survey where this occurred.

³⁶ The 42 Denver-area samples were collected between June and August 2012, and 15 (36 percent) were mislabeled. Mislabeled seafood found in 10 out of 23 retail outlets visited.

Restaurants and sushi venues, however, were more misleading. Fifty-eight percent of the restaurant samples and 53 percent of the sushi samples were mislabeled. Denver also had the dubious honor of being tied with Austin/Houston and San Francisco for the highest rates of restaurant mislabeling in the country, 20 percent above the national average. Additionally, Denver was the only city where the percentage of mislabeling in sushi venues was less than in restaurants.

Highlights

Like most other cities, snapper was a frequently swapped fish in Denver. Tilapia, flounder and less desirable snappers were mislabeled as other species of snapper in Denver restaurants and sushi venues. Additionally, both grouper samples were found to be mislabeled. In fact, a restaurant sold striped pangasius (Asian “catfish”), a less-expensive farmed freshwater fish, as grouper, which is a wild-caught ocean fish. In recent years, Asian “catfish” has been a target of enforcement efforts by the U.S. government because of its widespread fraudulent substitution for other fish.³⁷ However it seems that these efforts have not yet been enough of a deterrent in Denver.



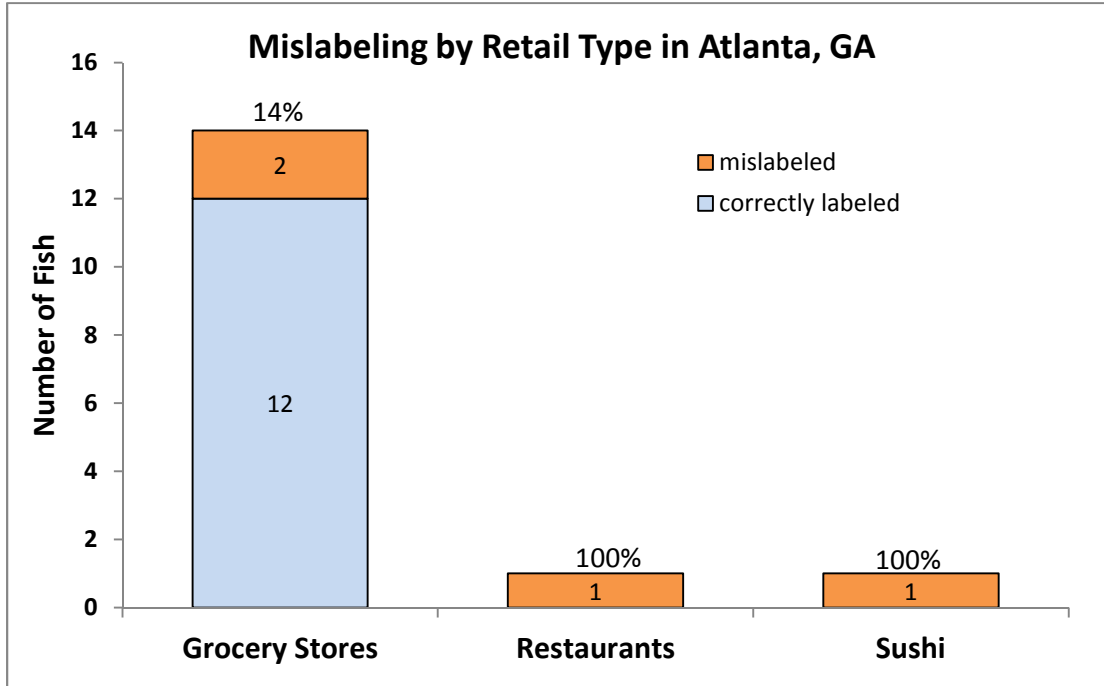
Additional Western Samples: Santa Fe, New Mexico

In addition to the samples from Denver, Oceana also received four grocery store samples from Santa Fe, NM. Of the four samples, one was mislabeled: a chinook salmon was sold as coho salmon. The other three (cod, Greenland turbot and walleye) were all correctly labeled.

³⁷ e.g. NOAA Office of Law Enforcement. 2010 Press Release. Three individuals indicted for false labeling, smuggling, and misbranding of seafood products. http://www.nmfs.noaa.gov/ole/news/news_sed_012810.htm Accessed 2/6/2013; See also NOAA law enforcement cases at http://www.nmfs.noaa.gov/ole/slider_stories/2012/11_15_12seafood_fraud_enforcement.html; accessed 2/6/13

Atlanta, Georgia – 25% Mislabeled

Nothing peachy about seafood fraud in Georgia: one in four fish samples mislabeled in Atlanta



Fish³⁸

Overall, 25 percent of the 16 fish collected in Atlanta were mislabeled. Salmon was the most-collected fish, with all five of the samples accurately labeled. Only one tuna sample was collected, and it was mislabeled. Of the two samples each of cod, grouper and snapper, one was mislabeled for each type.

Venue

Four of the 12 retail outlets sampled in the Atlanta area sold mislabeled fish (33 percent). The majority of the samples were from grocery stores, and two of the 10 stores visited sold mislabeled fish, mislabeling black grouper (actually star-studded grouper) and red snapper (actually Caribbean red snapper).

Only one sample each was collected from a restaurant and a sushi venue, but both seafood samples were mislabeled.

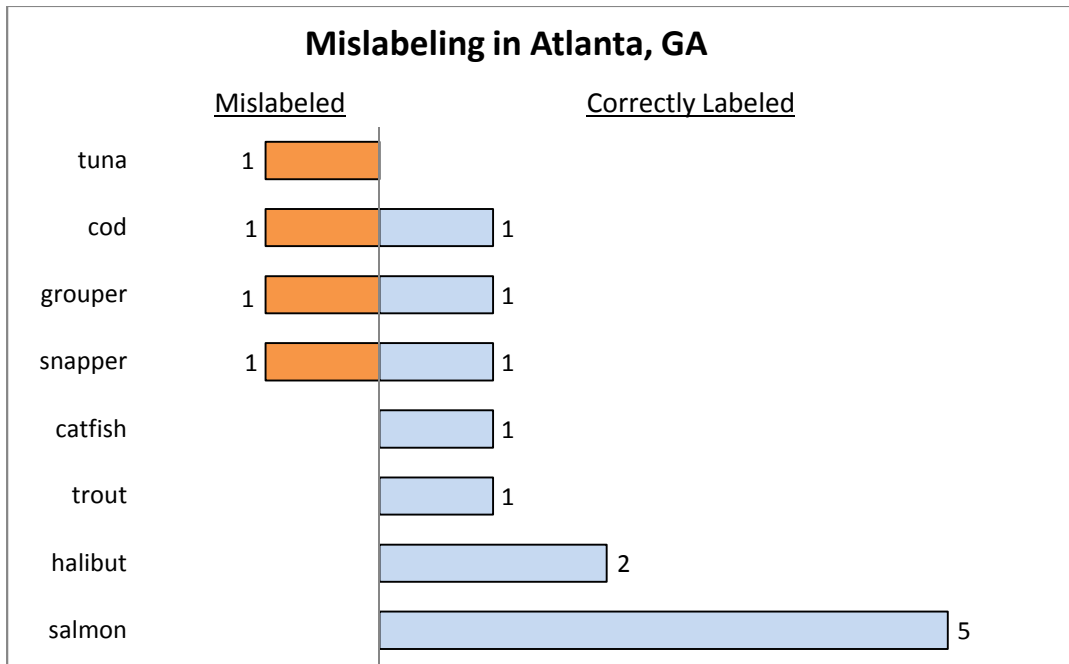
³⁸ All of the 16 Atlanta samples were bought between May and July 2012, and one-quarter of them were mislabeled. In Atlanta, eight different types of fish were sampled. Four of the eight types of fish were mislabeled (50 percent species mislabeling). Mislabeled seafood was found in four of 12 retail outlets visited.

Highlights

Not surprisingly, the white tuna sample in Atlanta was actually identified as escolar, known as the “ex-lax” fish because it can cause severe gastrointestinal issues. Escolar is a snake mackerel whose flesh contains a toxin, gempylotoxin, which can cause digestive distress in some people if even more than a few ounces are consumed.³⁹ Many sushi restaurants in the U.S. label escolar as “white tuna,” which is a fish that does not actually exist, a fact that many consumers do not know. “White tuna” is only an acceptable market name for albacore tuna when it is sold in a can.⁴⁰ Otherwise, “albacore tuna” or “tuna” is the acceptable market name for albacore when sold in fresh or frozen form.

One of the two red snapper purchased in Atlanta was the real red snapper. Atlanta was one of only four locations tested nationwide that sold honestly labeled red snapper. The other fish sold as red snapper in Atlanta was actually Caribbean red snapper, a close cousin of true red snapper. These two fish are very similar genetically and in appearance,⁴¹ but they live in largely different regions. Red snapper is mostly found in the Western Atlantic, along the East Coast of the U.S. and throughout the Gulf of Mexico,⁴² whereas the Caribbean red snapper is found throughout the Caribbean to the northeast of Brazil.⁴³

Although the two species are similar, and the mislabeling may be an honest mistake, consumers deserve to know exactly what they are eating. Therefore, the only reliable way to tell these stocks apart is through a full traceability system from boat to plate that shows exactly where the fish was caught.



³⁹ Fry, F.S., *Natural Toxins: Gempylotoxin*, in *Bad Bug Book: Foodborne Pathogenic Microorganisms and Natural Toxins*, K.A. Lampel, S. Al-Khaldi, and S.M. Cahill, Editors. 2012, FDA: Washington, DC. p. 218-222.

⁴⁰ 21 CFR 161.190

⁴¹ Gomes, G., et al., Can *Lutjanus purpureus* (South red snapper) be "legally" considered a red snapper

(*Lutjanus campechanus*)? *Genetics and Molecular Biology*, 2008. 31(1): p. 372-376.

⁴² FishBase. *Lutjanus campechanus*: Northern red snapper. Updated 7/3/12.

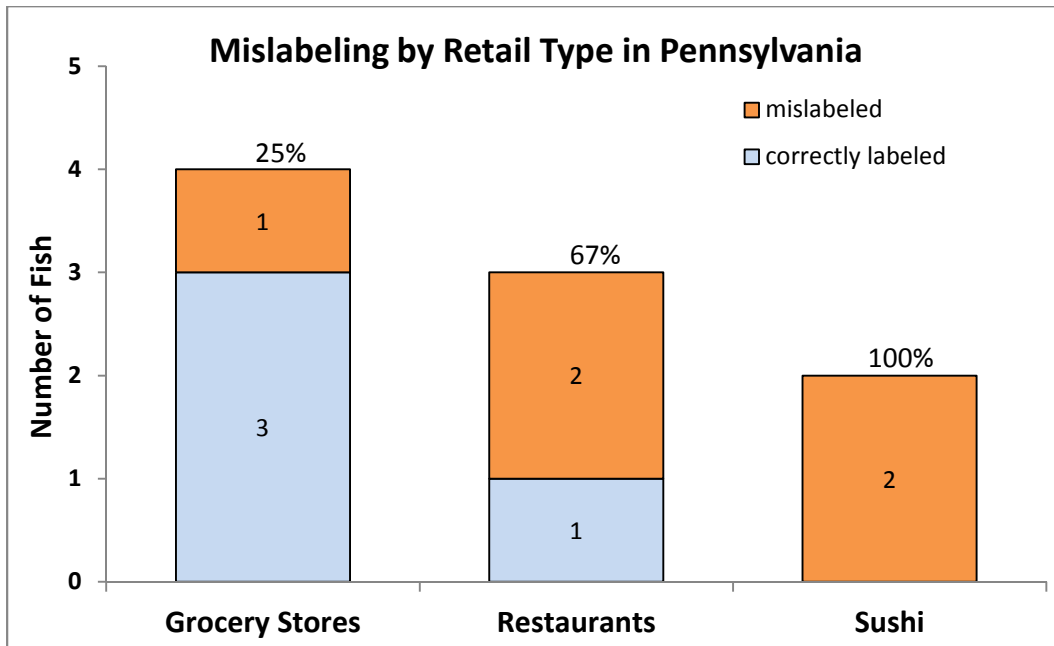
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Pittsburgh, Pennsylvania – 56% Mislabeled

Small sample size consistent with national trend: More than half of nine fish sampled in Pennsylvania mislabeled. Three out of four retail outlets visited sold fraudulent fish.



Fish⁴⁴

Although Pennsylvania had a relatively small sample size (nine), the fraud levels we found there provide more evidence that seafood fraud is a national problem, with more than half of the seafood sampled in Pennsylvania mislabeled. Two samples each of snapper, tuna and halibut were collected, and both samples of the snapper and tuna were mislabeled. Escolar was again masquerading as white tuna in Pennsylvania, and both snappers were actually tilapia, a common switch we found in our testing.

Venue

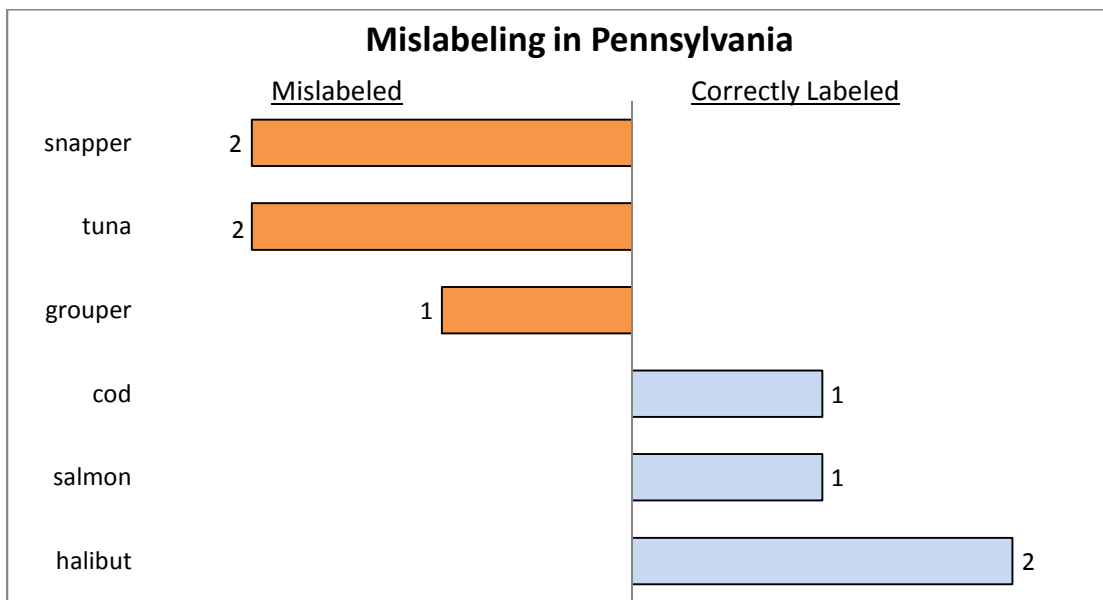
Three out of the four retail outlets visited sold mislabeled fish. One out of the four fish sampled from a single grocery store was found to be mislabeled, as were both of the samples bought at a sushi venue. Two out of three restaurant samples were mislabeled, and both mislabeled samples were purchased from the same venue.

⁴⁴ The nine samples from Pennsylvania were collected between May and June 2012. Eight of the nine samples came from the Pittsburgh area and one from central PA. Five out of nine (56 percent) of the samples and half of the fish types collected were mislabeled.

Highlights

As seen in other parts of the country, the fish samples sold as white tuna were in fact escolar, and the two fish sold as red snapper were actually tilapia. Even though very few samples were collected from the area, it seems to match the national trend, and it would not be a surprise if fraud levels in Pittsburgh matched those of other states if more samples are taken in the future.

The one mislabeled grocery store sample from the Pittsburgh area was sold as wild grouper, but was actually scamp. This switch may just be an example of naming confusion and not intentional fraud, as scamp is actually a type of grouper, but not one of the species FDA allows to be sold as “grouper.” The FDA Seafood List provides guidance for naming seafood sold in the U.S. to avoid such confusion, yet the labeling of this sample obviously ignored that guidance.



Endnotes- Part 1

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