Shrimp: Oceana Reveals Misrepresentation of America's Favorite Seafood

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Executive Summary

With shrimp, it is almost impossible to know what you are getting. Shrimp is the most commonly consumed seafood in the United States and the most highly traded seafood in the world. However, this high demand has led to many environmental and human rights abuses in the fishing, farming and processing of shrimp. Despite the popularity of shrimp, as well as the associated sustainability, human rights and environmental concerns, U.S. consumers are routinely given little information about the shrimp they purchase, making it nearly impossible to find and follow sound sustainability recommendations.

Oceana's previous studies have shown that species substitution, a form of seafood fraud, is common in the U.S. Last year, Oceana found that one-third of the more than 1,200 fish samples it tested nationwide were mislabeled, according to Food and Drug Administration guidelines. We have now turned our attention to shrimp, American's most popular seafood, to investigate mislabeling as well as the information that consumers are given about the products they purchase.

Consumers may wish to choose their shrimp more carefully for many important social and ecological reasons. For instance, consumers may wish to avoid shrimp caught in fisheries that are not responsibly managed, that have high rates of waste or discards, or that are associated with human rights abuses. At the same time, consumers may wish to avoid farmed shrimp due to health and environmental impacts. Similarly, consumers may want to actively choose shrimp caught from nearby wild populations in the U.S., rather than shrimp caught overseas, or they may wish to purchase shrimp that are farmed using state-of-the-art techniques that minimize pollution and provide ecological benefits.

Most labels and menus do not provide consumers with enough information to make such choices. There is very little information provided, and in many cases, the information given about shrimp misrepresents the actual identity of the product. This makes it difficult, if not impossible, for consumers to make informed choices.

Oceana surveyed shrimp in grocery stores and restaurants to see what information consumers typically receive and compared it to what they actually got. Oceana's investigation included surveying how shrimp were labeled on menus and in grocery stores and collecting samples for genetic species identification. Oceana's study covered shrimp producing states in the Gulf of Mexico as well as Portland, OR, Washington, D.C. and New York City in 2013.

Highlights

Overall, 30 percent of the 143 shrimp products tested from 111 vendors visited nationwide were misrepresented, while 35 percent of those 111 vendors sold misrepresented shrimp. Of the 70 restaurants visited, 31 percent sold misrepresented products, while 41 percent of the 41 grocery stores and markets visited sold misrepresented products.

- The most common species substitution was farmed whiteleg shrimp sold as “wild” shrimp and “Gulf” shrimp.
- Forty percent of the 20 shrimp species or categories collected and identified were not previously known to be sold in the U.S.
- No samples that were labeled as “farmed” were mislabeled, while over half of the samples labeled simply “shrimp” were actually wild species.
- A banded coral “shrimp,” which is an aquarium pet not intended to be consumed as food, was found commingled with another unidentifiable shrimp in a bag of frozen wild salad-sized shrimp.
- New York City had the highest amount of misrepresented shrimp at 43%.
- Products from Washington, D.C. and the Gulf of Mexico region were misrepresented about one-third of the time.
- In Portland, only 5% of products were misrepresented, the lowest rate among regions investigated.
- Overall, 30% of the shrimp products surveyed in grocery stores lacked information on country of origin, 29% lacked farmed/wild information and one in five did not provide either.
- The majority of restaurant menus surveyed did not provide the diner with any information on the type of shrimp, whether it was farmed/wild or its origin.

Misrepresenting shrimp not only leaves consumers in the dark, but it also hurts honest fishermen who are trying to sell their products into the market. Instituting full-chain traceability and providing more information at the point of sale will benefit all stakeholders in the supply chain, from fishermen and seafood businesses to consumers. Traceability can also prevent illegally caught seafood from entering the marketplace and deter human rights violations around the world, while giving consumers the information they need to make fully informed, responsible seafood choices.

Introduction

Shrimp in the U.S.

Americans eat more shrimp than any other seafood item, yet they are often given little information about where it comes from or even if it is wild or farmed. Once a luxury seafood choice, shrimp came to dominate the U.S. seafood market with the steady rise in global aquaculture decades ago. Since the 1980s, American consumption of imported shrimp has far outpaced consumption of domestic product.[1] In fact, in 2012, 89 percent of the shrimp consumed in the U.S. was imported, most coming from Southeast Asia and Latin America.[2] This increase in shrimp consumption over the last three decades was accompanied by a subsequent drop in shrimp prices driven by cheaper imports.[3] Shrimp is also the most highly traded seafood item by value in both the U.S.[4] and around the world.[5] More than half of the shrimp traded globally is farm-raised, and the majority of that is just one species, whiteleg shrimp, *Litopanaeus vannamei*.[6]

While only about 11 percent of the shrimp consumed in the U.S. is domestically caught, 19 states reported landings in 2011-2012.[7,8] Most shrimp fishing in the U.S. takes place in the Gulf of Mexico, which provided roughly 70 percent of domestic landings in 2011 and 2012 (Figure 1). Louisiana and Texas have the highest catch of warm-water shrimp species, including brown, white and pink shrimp. The second largest shrimp fishing region in the U.S. is the Pacific Northwest, providing 21 percent of the domestic catch, which consists mostly of smaller, cold-water species referred to as "ocean" shrimp. In Northeastern U.S. waters, fishermen catch a different species of cold-water shrimp, but these shrimp (referred to as "northern" shrimp) have been decimated in recent years by warming ocean temperatures compounded by past overfishing.[9] With stocks at their lowest levels in 30 years, and a short shrimp season in 2013, the northern shrimp fishery was closed in the Gulf of Maine for 2014.[10]

[1] U.S. Department of Commerce, National Marine Fisheries Service (NMFS) (2004).
[2] U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA) (2013a).
[3] NMFS. (2004)
[4] NOAA. (2014)
[5] United Nations Food and Agriculture Organization (FAO). (2014a).
[6] FAO. (2012)
[7] NMFS (2014)
[8] U.S. also farms a small amount of shrimp, less than 1% of domestic catch.
[9] Whitmore, et al. (2013).
[10] Hoey, D. (2013)

Most Shrimp Fished in the U.S. Caught in Gulf of Mexico

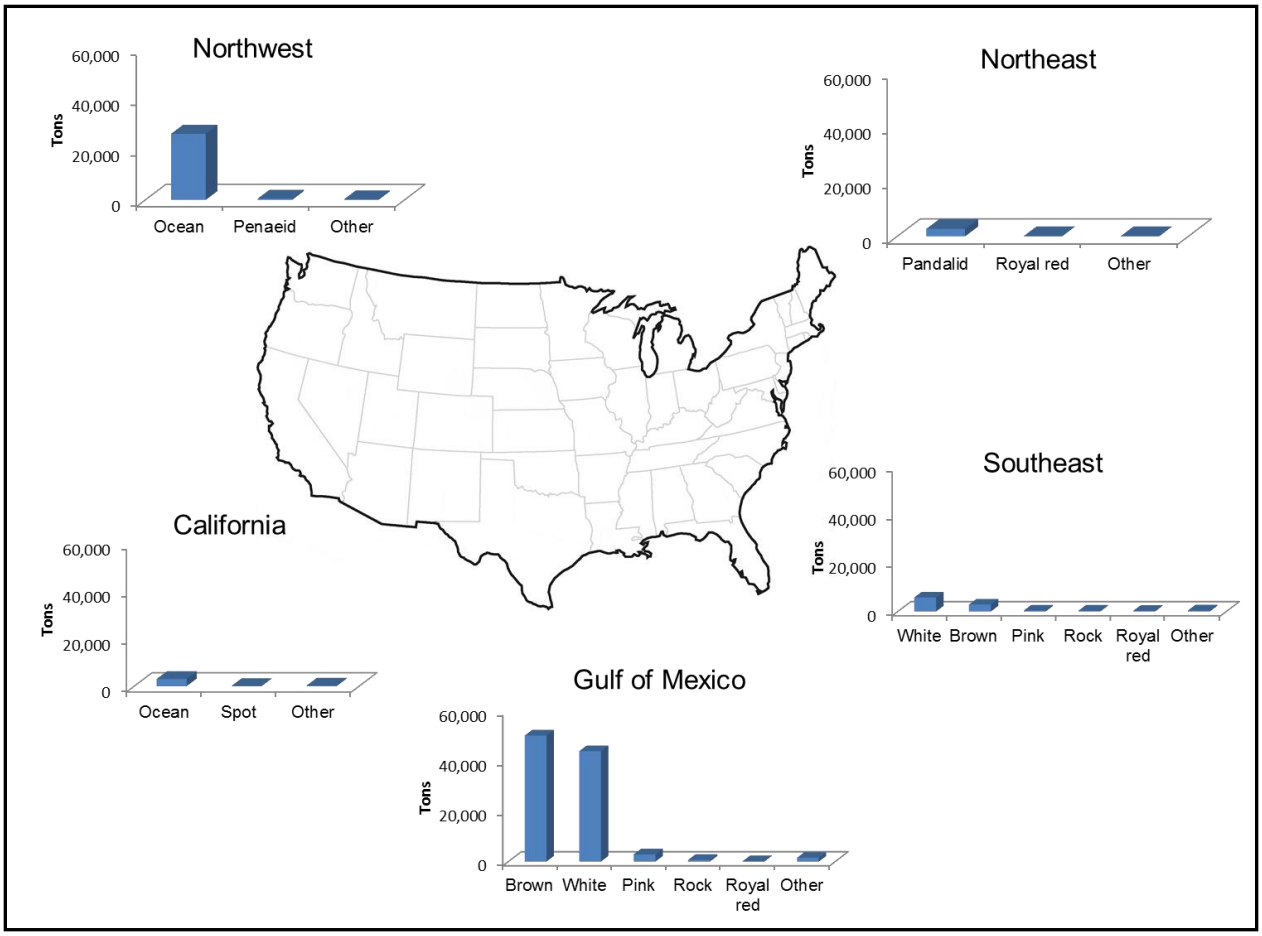

Figure 1: *Average shrimp landings in the U.S., 2011-2012. Less than 1 ton is caught in Hawaii (not shown). Source: National Marine Fisheries Service 2011-2012.*[11]

Challenges with Shrimp

Aquaculture

The global and domestic appetite for shrimp has come at a cost. Shrimp aquaculture practices have destroyed or polluted important mangrove and coastal habitats in many places around the world, and overcrowded shrimp stocking densities have led to a succession of shrimp diseases, the latest of which is Early Mortality Syndrome (EMS). The disease threat has led to the use and abuse of aquaculture chemicals on foreign shrimp farms, some of which are banned in the U.S. and other nations due to health concerns. While pollution-minimizing closed recirculating shrimp aquaculture facilities are ideal, the information that consumers are given makes it nearly impossible to find these more responsibly farmed shrimp products.

The U.S. does produce a small fraction of aquaculture shrimp, farming the same whiteleg species used worldwide. Most of the shrimp raised in the U.S. is farmed in coastal water-exchanging facilities in the Gulf of Mexico, with Texas producing 60-70 percent of the more than 3 million pounds farmed

[11] NMFS (2014) Reported landings are the average of 2011 and 2012.

nationwide.[12] There is also a small amount of shrimp farmed in closed recirculating facilities in several states, but little product is available commercially.[13] It is estimated that U.S. shrimp aquaculture accounted for less than 0.1 percent of global whiteleg shrimp production in 2012.[14,15]

Human Rights

Troubling reports of human trafficking and abuse within the shrimp industry have recently surfaced in the processing sector and wild capture fisheries used to feed aquaculture shrimp.[16,17]The exposed abuses in the Thai shrimp industry include human trafficking, withholding of pay, forced detention and bonded labor.[18]

Conservation

In the U.S. and worldwide, the wild shrimp fishery largely relies on indiscriminate bottom trawling, a type of fishing where large nets are dragged across the seafloor capturing everything in their path, including threatened and endangered sea turtles.[19,20] Under its fisheries and conservation laws, the U.S. has taken some steps to reduce the wasted catch of marine wildlife in the shrimp fishery, but many of these measures are not in place in other countries. In addition, a portion of the wild shrimp imports into the U.S. are estimated to come from the illegal and unreported seafood trade, which ignore management and conservation measures.[21]

Recent improvements in some parts of the Gulf of Mexico shrimp fishery have led the Monterey Bay Aquarium's (MBA) Seafood Watch program to list certain wild Gulf shrimp caught with specific types of gear as Good Alternatives in its 2014 seafood sustainability guide.[22]

What is "Shrimp?"

Consumers who are troubled or concerned about how shrimp and other seafood are fished or farmed often consult seafood guides, such as those produced by Seafood Watch, in an effort to choose their seafood more wisely. These same consumers may be frustrated that "shrimp" can appear on the Best Choices, Good Alternatives and Avoid sections of the list (Figure 2), yet as research presented here demonstrates, they are often not given enough information on packaging or menus to make these distinctions. As was found in Oceana's nationwide investigation into fish mislabeling, seafood fraud can undermine consumers' conscientious efforts to choose responsibly caught seafood when less sustainable fish is substituted for what they thought they purchased.[23]

[12] Treece, G. (2014)
[13] *Ibid*
[14] FAO (2014b)
[15] Treece (2014) estimates ~ 400,000 pound drop in U..S. farmed shrimp from 2012-2013.
[16] Hodal *et al.* (2014)
[17] Environmental Justice Foundation (EJF) (2014)
[18] EJF. (2013).
[19] Keledjian *et al.* (2014)
[20] Gillett, R. (2008)
[21] Pramod *et al.* (2014)
[22] Monterey Bay Aquarium (MBA) Seafood Guide (2014a); see exceptions in Table 1
[23] Warner *et al.* (2013)

BEST CHOICES	GOOD ALTERNATIVES	AVOID
Abalone	Basa/Pangasius/Swai	Abalone (China & Japan)
Arctic Char (farmed)	Cod: Atlantic (imported)	Cod: Pacific (Japan & Russia)
Bass: Striped (US hook & line, farmed)	Cod: Pacific (US trawl)	Crab: Canned (imported)
Catfish (US)	Crab: Blue & King (US)	Crab: Red King (Russia)
Clams, Mussels, Oysters	Flounders, Soles (US)	Lobster: Spiny (Belize, Brazil, Honduras & Nicaragua)
Cod: Pacific (US hook & line, longline & trap)	Grouper: Red (US Gulf of Mexico)	Mahi Mahi (imported)
Halibut: Pacific (US)	Lobster (Bahamas & US)	Orange Roughy
Lobster: Spiny (Mexico)	Mahi Mahi (Ecuador & US)	Salmon: Atlantic (farmed)
Prawn: Spot (AK & Canada)	Monkfish (US)	Sardines: Atlantic (Medit. Sea)
Sablefish/Black Cod (AK & Canada)	Pollock (US)	Sharks
Salmon (AK)	Salmon (CA, OR & WA wild)	Shrimp (imported farmed)
Sardines: Pacific (Canada & US)	Scallops (wild)	Shrimp (LA & Mexico wild)
Scallops (farmed)	Shrimp (Canada wild & US)	Squid (Imported)
Shrimp (AK)	Snapper (US)	Swordfish (imported)
Tilapia (Ecuador & US)	Squid (US)	Tuna: Albacore/White canned (except Canada & US troll, pole and US longline)
Trout: Rainbow (US farmed)	Swordfish (US)	Tuna: Bluefin
Tuna: Albacore/White canned (Canada & US troll, pole)	Tilapia (China & Taiwan)	Tuna: Skipjack/Light canned (imported longline and purse seine)
Tuna: Skipjack/Light canned (FAD free, US troll, pole)	Tuna: Albacore/White canned (US longline)	Tuna: Yellowfin (except troll, pole and US longline)
Tuna: Yellowfin (US troll, pole)	Tuna: Skipjack/Light canned (imported troll, pole and US longline)	
	Tuna: Yellowfin (imported troll, pole and US longline)	

Figure 2: *Monterey Bay Aquarium, Seafood Watch, National Guide.*[24]

After further investigation into the shrimp categories on the Seafood Watch website, additional information shows that not all U.S. wild-caught shrimp are Best Choices or Good Alternatives, while some imported and domestic farm-raised shrimp (e.g. “black tiger”) are actually best choices (Table1).

[24] Monterey Bay Aquarium (MBA) Seafood Watch National Guide. (2014a) Note: MBA does not always use FDA common names in their guides; e.g. the FDA common name for the MBA “black tiger shrimp” is “giant tiger prawn.”

Table 1: SEAFOOD WATCH 2014 Recommendations for Shrimp				
SEAFOOD	**RATING**	**MARKET NAMES**	**LOCATION**	**HOW CAUGHT/FARMED**
Black Tiger Shrimp	BEST CHOICE	Tiger Shrimp	Southeast Asia	Farmed, Selva Shrimp (R) Verified Farms
Shrimp	BEST CHOICE	Pacific White Shrimp, West Coast White Shrimp, Ebi	U.S.	Farmed in Fully Recirculating Systems or Inland Ponds
Freshwater Prawn	BEST CHOICE	Giant River and Malaysian Prawn, Shrimp	U.S.	Farmed
Spot Prawn	BEST CHOICE	Prawn, Spot Shrimp, Amaebi	Canada	Wild
Shrimp	BEST CHOICE	Coonstripe, Northern Pink Shrimp, Sidestripe Shrimp, Spot Prawn, Ebi	Alaska	Wild
Shrimp	GOOD ALTERNATIVE	Pacific White Shrimp, West Coast White Shrimp, Ebi	U.S.	Farmed in Open Systems
Shrimp	GOOD ALTERNATIVE	Pacific White Shrimp, West Coast White Shrimp, Ebi	Thailand	Farmed in Fully Recirculating Systems
Shrimp	GOOD ALTERNATIVE	Black Tiger Shrimp, White Shrimp, Tiger Prawn, Ebi	Global Aquaculture Alliance 4-Star Certified Shrimp Farms	Farmed
Shrimp	GOOD ALTERNATIVE	Black Tiger Shrimp, White Shrimp, Tiger Prawn, Ebi	Naturland Certified Shrimp Farms	Farmed
Shrimp	GOOD ALTERNATIVE	Black Tiger Shrimp, White Shrimp, Tiger Prawn, Ebi	Aquaculture Stewardship Council Certified Shrimp Farms	Farmed
Shrimp	GOOD ALTERNATIVE	Coldwater Shrimp, Cocktail Shrimp, Pink Shrimp, Sidestripe Shrimp, Ebi	Canada	Wild
Shrimp	GOOD ALTERNATIVE	Brown Shrimp, Pink Shrimp, Royal Red Shrimp, Seabob Shrimp, White Shrimp, Ebi	U.S. Gulf of Mexico except Louisiana, U.S. South Atlantic	Otter Trawl
Shrimp	GOOD ALTERNATIVE	Coonstripe Shrimp, Pink Shrimp, Ridgeback Shrimp, Sidestripe Shrimp, Spot Prawn, Ebi	California and Washington	Wild
Shrimp	GOOD ALTERNATIVE	Ebi, Prawn, Brown, Oregon Pink, Seabob	Marine Stewardship Council Certified fisheries	Wild
Shrimp	AVOID	Pacific White Shrimp, West Coast White Shrimp, Ebi	Mexico	Farmed in Open Systems
Shrimp	AVOID	Black Tiger Shrimp, White Shrimp, Tiger Prawn, Ebi	Imported	Farmed in Open Systems
Shrimp	AVOID	Brown Shrimp, Pink Shrimp, Seabob Shrimp, White Shrimp, Ebi	Louisiana	Wild
Shrimp	AVOID	Blue Shrimp, Brown Shrimp, Pink Shrimp, Seabob Shrimp, White Shrimp, Ebi	Mexico	Wild
Shrimp	AVOID	Brown Shrimp, Pink Shrimp, Seabob Shrimp, White Shrimp, Ebi	U.S. Gulf of Mexico	Skimmer Trawl

Source: *Adapted from Monterey Bay Aquarium Seafood Watch 2014 shrimp recommendations.*[25] *Note: MBA does not always use FDA Common Names in their guides.*

[25] MBA (2014b)

Country of Origin Labeling

For shrimp shoppers, it may take a law degree and magnifying glass to figure out which seafood items must abide by country of origin labeling (COOL) regulations, what the "country of origin" actually means, and where on the package this information resides.[26] Country of Origin rules are administered by both Customs and Border Protection (Customs) and the U.S. Department of Agriculture (USDA). Under the two independent regulatory schemes, seafood must be labeled with its country of origin, unless it has been "transformed" according to Customs regulations (at which point the country of transformation becomes the new country of origin), or "processed" under USDA regulations (processed items are exempt from USDA COOL).

The USDA largely defines "processing" to mean the cooking, curing, smoking, restructuring or combining with other ingredients. In addition, USDA COOL does not apply to seafood products sold at restaurants or small retailers or grocers.[27] On the Customs COOL side, courts have interpreted "transformation" in a variety of ways. While one court found that the filleting and freezing of fish may be considered transformation,[28] another court found that the "peeling, deveining, cooking, freezing, and repacking," and beheading, of shrimp would not count under this definition.[29, 30] Within Customs COOL, "country of origin" rarely actually means where the seafood item was landed or farmed, but rather the last country in the long seafood supply chain that transformed the product before it was imported into the U.S. In addition, the country of origin information only travels to the "ultimate purchaser," defined as the last person or business that purchases the good in its imported form—therefore any U.S. entity that transforms the seafood product does not have to pass along *any* country of origin information to the customer who will ultimately eat the product. As a result, these two laws unfortunately still leave many customers in the dark about the real origins of their seafood.

Shrimp Industry in 2013

In general, 2013 was a tough year for shrimp, both in the U.S. and worldwide. The EMS disease plagued the shrimp farming industry in the major shrimp aquaculture producing countries in Southeast Asia and Latin America. At the same time, the U.S. initially imposed duties on some of the major shrimp exporting countries for part of the year,[31] inflating shrimp prices from those countries. As a result, shrimp imports into the U.S. were lower in 2013 compared to 2012.[32,33] Meanwhile, U.S. domestic shrimp catches in 2013 were at a three-year low.[34] The resulting effects from the depressed shrimp supply in 2013 were record high prices for both imported farmed and domestic wild shrimp.[35]

[26] E.g. Lagasse *et al.* (2014)
[27] "Small" retailers are defined as those selling more than $230,000 per year of fresh and frozen fruits and vegetables.
[28] *Koru North America v. United States*, 701 F. Supp. 229, 234 (Ct. Int'l Trade 1988).
[29] *Contessa Food Prod. V. Lockpur Fish Processing Co.* 2001 U.S. Dist. LEXIS 25999, 23 (C.D. Cal. Dec. 19, 2001).
[30] United States Department of Agriculture (USDA) (2004)
[31] United States Department of Commerce International Trade Administration. (2013) International Trade Commission reversed some of these duties later in 2013.
[32] FAO Globefish. (2014a)
[33] NOAA (2014)
[34] FAO Globefish. (2014b).
[35] Ibid. Estimates of 40% higher for U.S. wild shrimp 42-50% higher for farmed imports.

Oceana Investigation[36]

Despite the popularity of shrimp in the U.S., until now, there has been very little investigation into what consumers actually get when they purchase shrimp. This study was not designed to be a scientifically representative survey of authenticated shrimp products typically available on all menus and grocery stores, but an investigation into whether what is portrayed on a label is actually what the customer received.

Oceana examined what information consumers typically are provided with, as well as what they actually got, when purchasing shrimp, including surveying how shrimp were labeled on menus and in grocery stores and collecting samples for genetic species identification. Oceana's study covered the major shrimp producing states in the Gulf of Mexico, Portland, OR, Washington, D.C. and New York City in 2013 (Figure 3). Samples purchased were mostly "wild" products (72 percent) with one in five sold as a particular wild species (e.g. royal red). One-quarter of the samples were labeled simply as "shrimp" and 3 percent labeled as farmed.

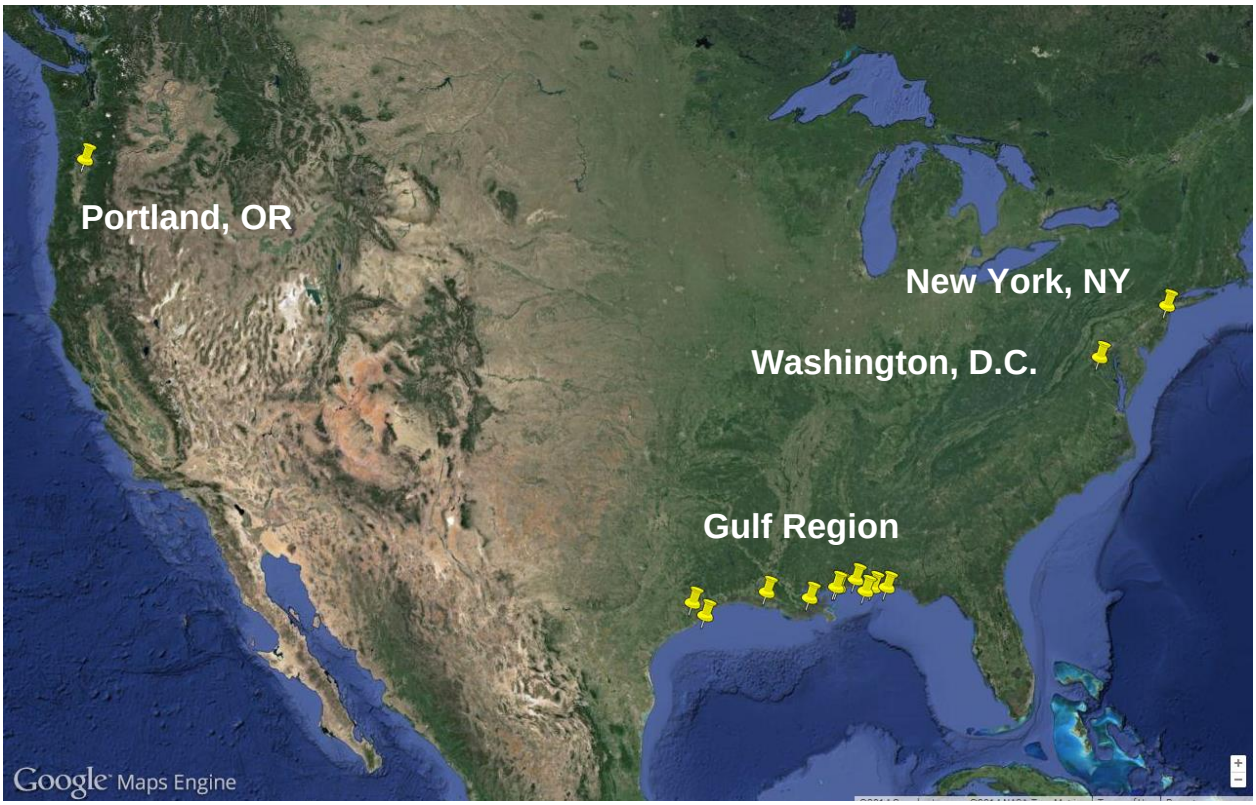

Figure 3: *From August-December 2013, Oceana purchased shrimp in 13 cities across the United States: Pensacola and Fort Walton Beach, FL; Mobile and Orange Beach, AL; Ocean Springs and Biloxi, MS; New Orleans and Lafayette, LA; and Houston and Galveston, TX; Portland, OR; New York, NY and Washington, D.C. Grocery store surveys were conducted in all the same locations except for Portland, OR.*

Oceana had the shrimp samples analyzed using DNA techniques to identify the species. Results were obtained for 143 of the 146 shrimp products purchased from 111 retailers, including grocery stores (37), small markets (4) and restaurants (70). Duplicate samples taken from five bagged shrimp products

[36] More detailed methods are in Appendix A1

resulted in unique genetic results for 148 samples.[37]

Region	# Products Purchased	# Restaurants	# Grocery stores/Markets	Total # of vendors
Gulf of Mexico	63	38	17	55
New York, NY	30	12	12	24
Washington, D.C.	30	12	8	20
Portland, OR	20	8	4	12
Total	**143**	**70**	**41**	**111**

***Table 2**: Product sampling by region and vendor type.*

In order to determine what was a properly labeled shrimp, Oceana consulted the U.S. Food and Drug Administration (FDA) Seafood List, which lists the acceptable market name for more than 1,800 seafood species potentially or commonly sold in interstate commerce.[38] The "acceptable market name" is the FDA approved name for labeling seafood on consumer packaging. Of the thousands of shrimp species identified worldwide, the FDA lists only 46 species and two broad categories of shrimp.[39] The acceptable market name for most (41) of these species/categories is simply "shrimp," while only rock, royal red, California and four freshwater shrimp are specifically identified by their common name.[40]

This study categorized results into four groups: **mislabeled, misleading, mixed/mystery** and **correctly labeled**. We grouped the mislabeled, misleading and mixed/mystery groups together when presenting results and called them **misrepresented** (Described below).

Misrepresentation Found

Mislabeled, Misleading and Mixed/Mystery

Of the shrimp products tested, 30 percent (43/143) were misrepresented (Figure 4). Of the 70 restaurants visited, 31 percent sold misrepresented products while 41 percent of the 41 grocery stores and markets visited sold misrepresented products. Overall, 35 percent of the 111 vendors visited nationwide sold misrepresented shrimp.

- The most common species substitution was farmed whiteleg shrimp standing in for "wild" shrimp and "Gulf" shrimp.
- 40% of the 20 shrimp species or categories collected and identified were not previously known to be sold the U.S.
- No samples that were labeled as "farmed" were mislabeled, while over half of the samples labeled simply "shrimp" were wild species.
- A banded coral "shrimp," which is an aquarium pet not intended to be consumed as food, was found commingled with another unidentified shrimp in a frozen bag of wild salad-sized shrimp.
- New York City had the highest amount of misrepresented shrimp at 43%. (Figure 5)
- Products from Washington, D.C. and the Gulf region were misrepresented about one-third of the time.

[37] Results are reported for "shrimp product" rather than by sample because these duplicate samples from the same bag of some shrimp products resulted in more samples than products.
[38] U.S. Department of Health and Human Services, Food and Drug Administration (FDA) (2014).
[39] The two broad categories are the genera *Penaeus* and *Cragnon*
[40] FDA (2014). While the names "rock," "royal red" and "California" shrimp each refer to a single shrimp species, four different species may be marketed as "freshwater shrimp."

- In Portland, only 5% of products were misrepresented, the lowest rate among regions investigated.

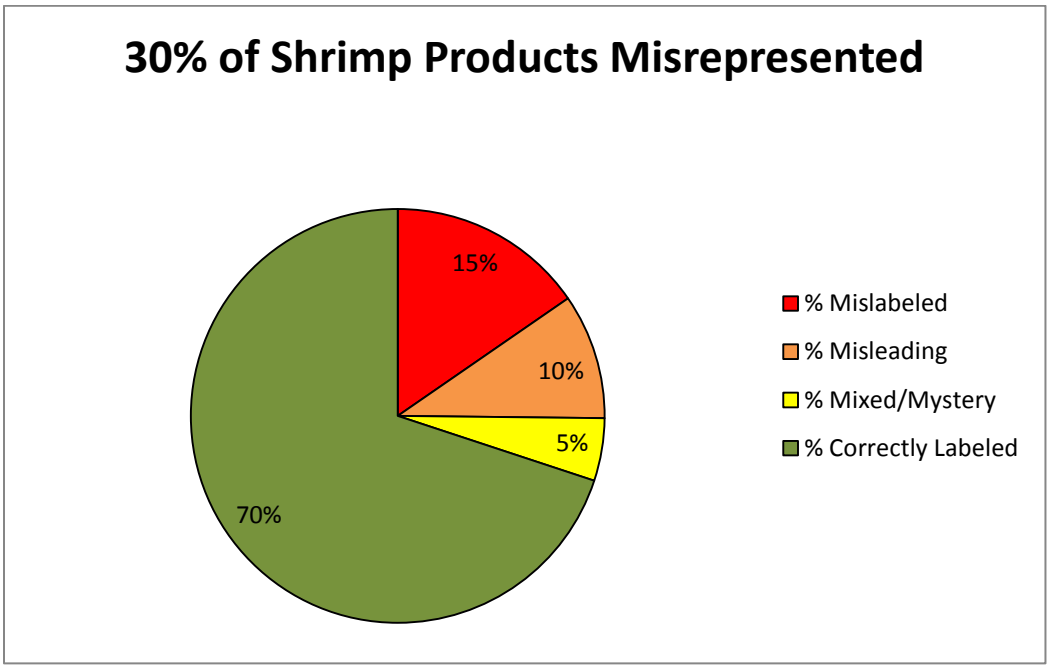

***Figure 4**: Genetic testing results for the 143 shrimp products purchased in the U.S. in 2013.*

15% Mislabeled: Twenty-two of the 143 shrimp products tested (15 percent) were mislabeled, most (59 percent) of which were the wrong species, such as "rock" shrimp replaced with whiteleg shrimp. About one-third of the mislabeled shrimp products listed the wrong method of production, where a shrimp labeled as "wild" was found to be farmed. One product was labeled with the wrong origin.[41]

10% Misleading: Fourteen of 143 products tested (10 percent) were misleading; they were labeled as coming from a region in the U.S. known for wild-caught shrimp, such as "Gulf" (12), Texas (1) or Carolina (1), but were identified as farmed whiteleg shrimp (*Litopenaeus vannamei*). This shrimp species is farmed worldwide, including a very small percentage in the Gulf of Mexico. Since the geographic origin of the globally farmed whiteleg shrimp cannot be verified with the DNA testing methods used, we cannot rule out the possibility that "Gulf" shrimp could be farmed from the Gulf region. Although we presume that most consumers expect "Gulf" shrimp to be wild-caught, we defined these labels as *misleading* rather than *mislabeled*.

5% Mixed/Mystery: Of the seven products categorized as mixed/mystery among the 143 tested (5 percent), most (57 percent) were commingled products where two samples from one bag were tested and found to be different species. Four mixed product bags yielded results for eight samples (two of which were mislabeled, but not counted among mislabeled *products)*. This labeling category is the only one that has more samples than products. The remaining samples were species that either could not be identified using our DNA methods or novel, genetically undescribed species.

[41] This product labeled as "Product of India; processed in India" was not "transformed" according to Customs COOL and therefore subject to stating the actual country of origin for this species which is found only in North American waters.

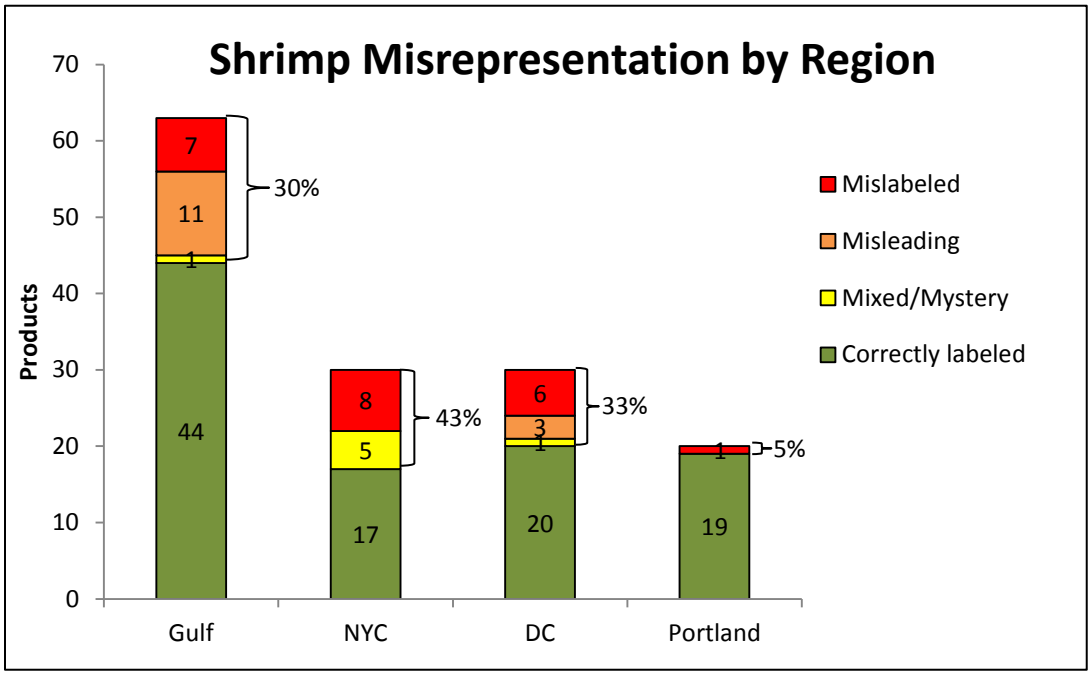

Figure 5: *Shrimp Product Labeling by Region.*

With shrimp, it is almost impossible to know exactly what you are getting. One-quarter of the shrimp labeled or presumed to be wild were actually farmed. On the other hand, of the 32 products labeled simply as "shrimp," over half (53 percent) were actually wild species. When the shrimp was sold as a specific species (rock, royal red, etc.), 41 percent of the 29 shrimp were mislabeled by species or were farmed shrimp.

Overall, the study collected and identified 20 unique kinds of shrimp (Figure 6), including eight shrimp species or categories that are not listed on the FDA Seafood List, three of which were novel, genetically undescribed species. Seven of the 20 types of shrimp were domestic species. Whiteleg shrimp (*Litopenaeus vannamei*) was the most commonly identified species and the most common substitute in the misleading and mislabeled samples.

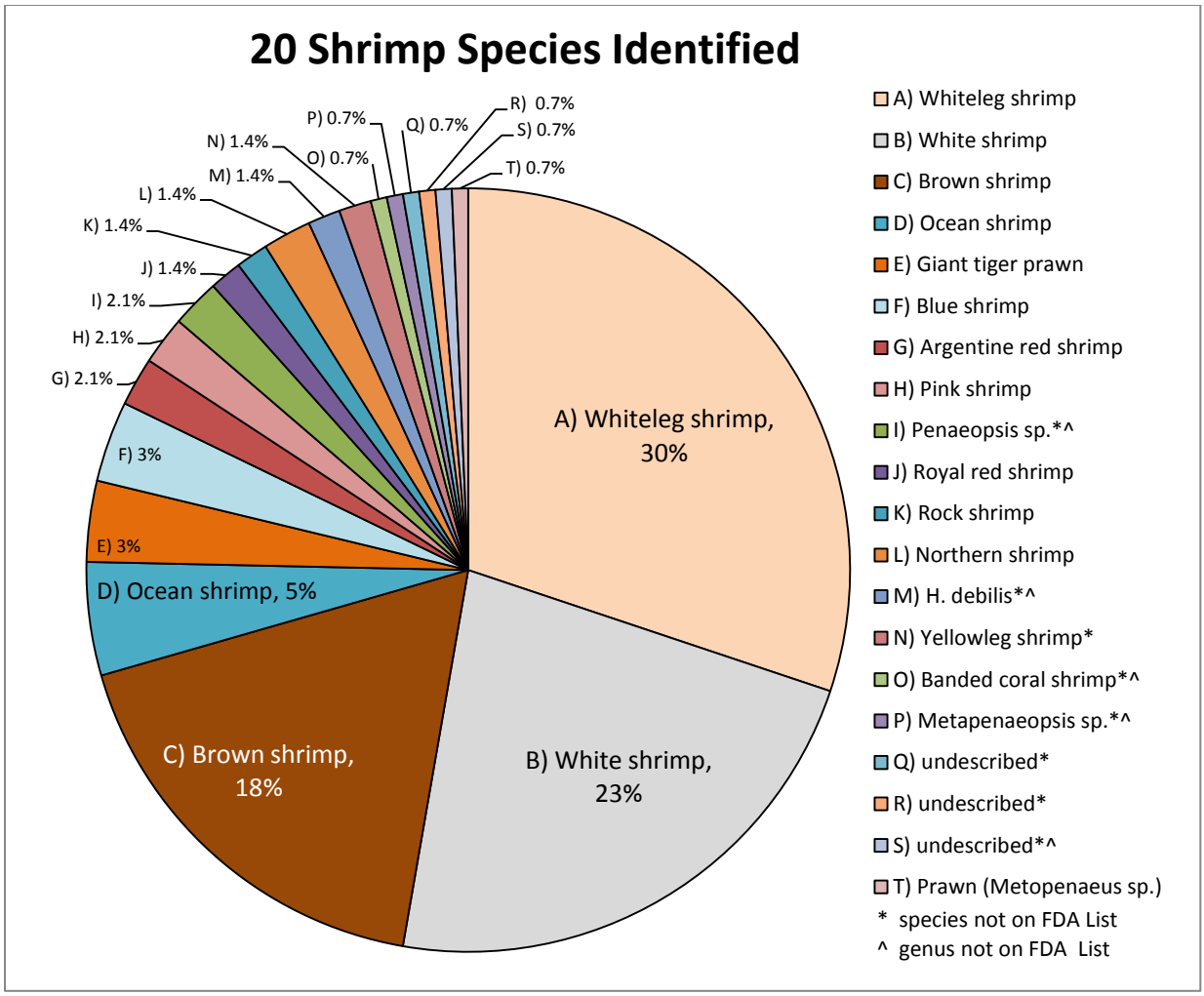

***Figure 6**: Shrimp Species and Categories Identified in Oceana's 2013 Sampling Effort.*

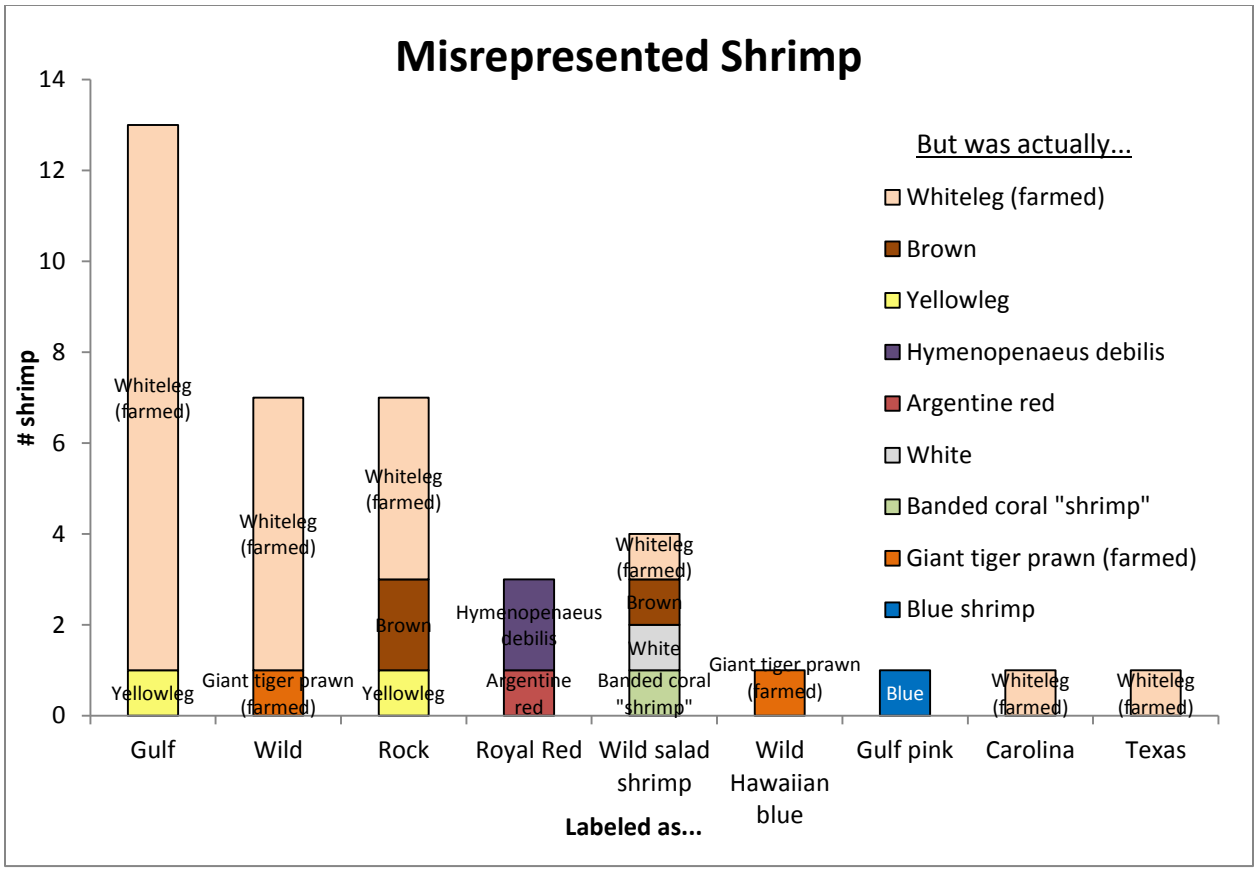

***Figure 7**: Genetic identities of misrepresented shrimp. Note: Gulf, Carolina and Texas whiteleg farmed samples were placed in the misleading category. The mislabeled brown and white salad shrimp listed the wrong origin for these species.[42] Note: Not all the mixed/mystery shrimp are included in this graph.*

Other Findings

Royal Reds: True Gulf royal red shrimp found in New York City and Washington, D.C. but not in the Gulf region

Royal red shrimp is a luxury item, prized for its sweet lobster-like flavor and recognizable by its bright red color. Genuine Gulf royal red shrimp were found in New York City and Washington, D.C., but not in the Gulf region where they are actually caught. We purchased three “royal red” shrimp dishes from cities in the Gulf region and found that all of them were mislabeled and replaced with different species; two were a deep-water Gulf shrimp species (*Hymenopenaeus debilis*), a species with no common name and not found on the FDA Seafood List, and the other was an Argentine red shrimp.

Rock Shrimp: True Gulf rock shrimp found in New York City but not in the Gulf region

Rock shrimp, another domestic species caught in the deep waters of the Gulf of Mexico, are known for their hard shells and lobster-like flavor. Of the five rock shrimp purchased in New York, only two were actual rock shrimp. We also purchased “rock shrimp” from restaurants in Washington, D.C. (3) and one other in Houston, TX, but found all of these products were substituted with other species.

[42] *Ibid*.

Missed Marketing Opportunities for Wild Domestic Shrimp

Across the country, we identified shrimp products sold as "shrimp" that were actually wild or locally caught species (Figure 8). This may represent a missed marketing opportunity for vendors, as they could easily distinguish their shrimp by adding "wild" or a local label and cater to consumer preferences if they know for certain what they are selling. In the Gulf region, wild Gulf shrimp was sold as generic shrimp 64 percent of the time. Similar missed opportunities were found in Portland, D.C. and New York City.

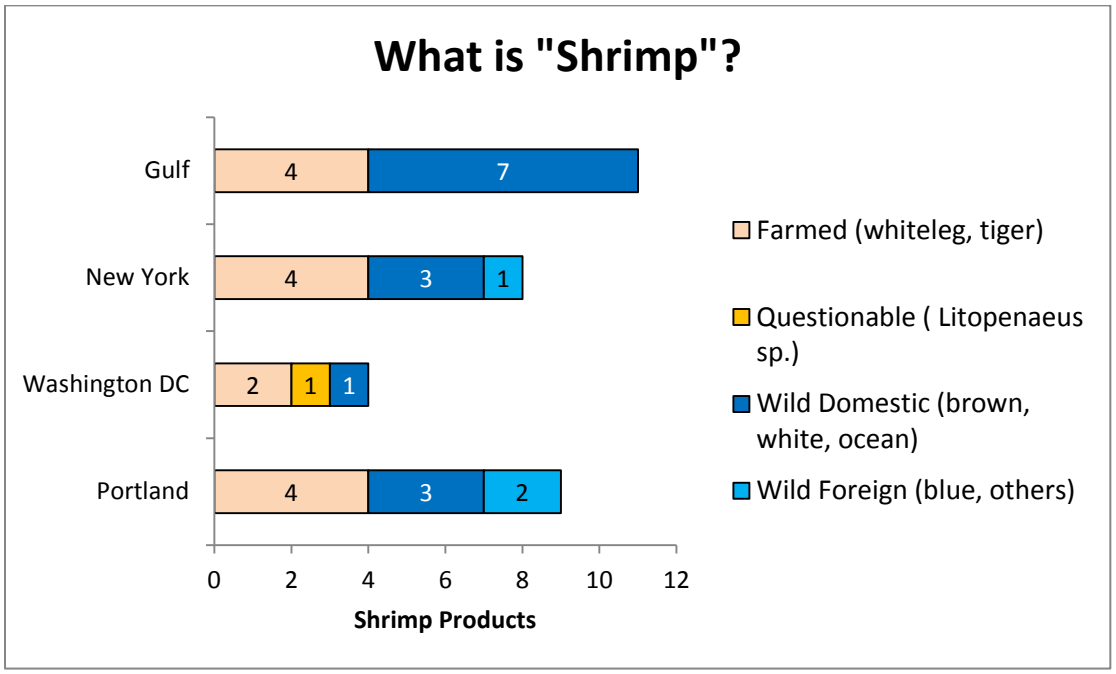

***Figure 8**: Identity of products labeled simply as "shrimp" in each region tested.*

Salad-Sized Shrimp: A Mixed Bag

We discovered some concerning results when we examined bagged salad-sized shrimp.[43] Oceana tested duplicate samples from five bags of small-sized shrimp and found four instances of commingling of species and even odder results, including species not known to be sold in the U.S. and even several that were genetically unknown to science**.** Four bags contained at least two different species in the same bag. Three of the commingled bags, labeled as imported wild salad shrimp, were purchased at major grocery store chains; the other commingled bag was dried shrimp purchased at a small market.

Misrepresentation at Grocery Stores and Restaurants

Shrimp products from grocery stores and markets were misrepresented at the same rate: 30 percent (Figure 9). Restaurants and grocery stores/markets sold about equal proportions of *mislabeled* products (15 percent and 16 percent respectively). However, restaurants offered a higher proportion of *misleading* products (15 percent), while only grocery stores and markets sold *mixed/mystery* products (11 percent). This finding is in contrast with our nationwide fish study, where the level of mislabeling in restaurants was double that found in grocery stores.[44]

[43] "Salad" shrimp refer to the size of shrimp rather than a preparation. Shrimp are sold according to size (number range) and the number of individuals that are contained in one pound of shrimp. Salad shrimp are small with >60 shrimp per pound. See Appendix Table A2

[44] Warner *et al.* (2014)

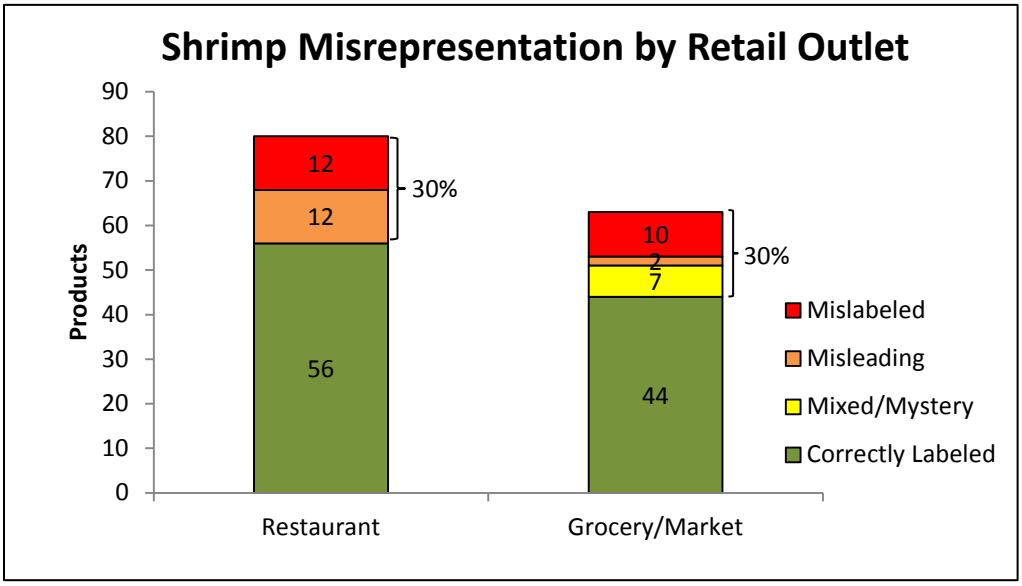

***Figure 9**: Number of shrimp products misrepresented in restaurants versus grocery stores and markets.*

Misrepresented shrimp were found at all types of restaurants, including high, mid- and low-priced as well as chain and independent establishments. In grocery stores, most ***mislabeled*** samples were purchased at the seafood counter and in frozen bags of small salad-sized shrimp, which also accounted for most of the ***mixed/mystery*** samples. The two ***misleading*** samples were found at the seafood counter and in store-processed products.

Gulf shrimp cocktail, Bronzed Carolina shrimp, popcorn shrimp

What do these shrimp dishes have in common? In our testing, where all of them were purchased from restaurants, they all turned out to be farmed whiteleg shrimp (*Litopenaeus vannamei*). Whiteleg shrimp is the most commonly farmed species of shrimp in the world, and most of the whiteleg shrimp found in the U.S. is imported from India and Thailand.

Grocery Store Surveys

Consumers purchasing shrimp at grocery stores may expect to see more information about what they are buying compared to restaurants, yet nearly one-third of the shrimp products in this survey provided no information about where the shrimp came from or if it was farmed or wild.

Oceana conducted a visual survey of 447 shrimp products available for sale in select grocery stores in three regions, New York City, Washington, D.C. and the Gulf of Mexico (Table 3). The survey included national and regional supermarket chains as well as smaller chains and markets.

Regions surveyed	Number of grocery stores surveyed	Number of shrimp products surveyed	Survey date range
Gulf of Mexico (9 cities)	17	263	August 2013
New York City	6	82	December 2013
Washington, D.C.	4	102	June – November 2013
Overall	27	447	June – December 2013

***Table 3**: Location and number of grocery stores and shrimp products surveyed in each region. Nearly half the shrimp products surveyed in grocery stores were labeled as farmed, 23 percent were labeled as wild, and the remaining 29 percent did not provide information on the production method of the shrimp.*

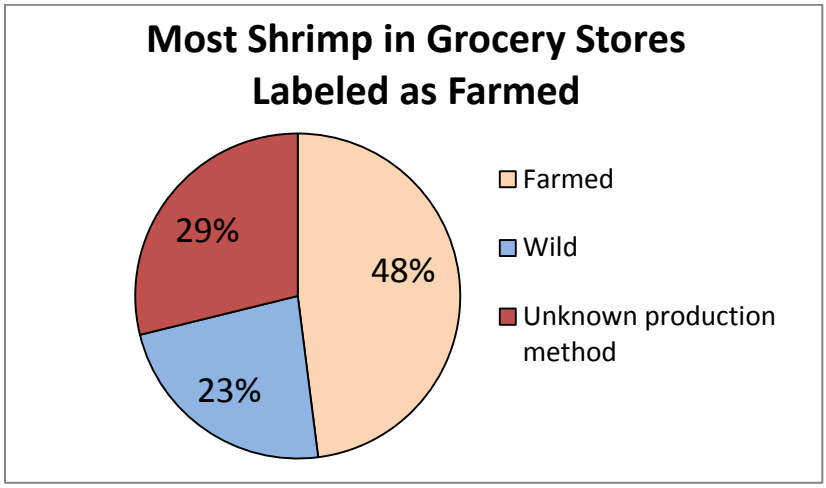

***Figure 10:** Proportion of shrimp labeled as farmed, wild or lacking this information in grocery stores surveyed.*

Thirty percent of the shrimp products surveyed did not list the country of origin, a proportion exceeding that of any other country identified (Appendix Figure A1). Thailand was the top source of imported shrimp available in surveyed grocery stores in 2013, despite the fact that Thai shrimp production was devastated by EMS disease. Furthermore, the U.S. imported more shrimp from India than any other county in 2013, yet it was a distant third in our overall survey.

COOL labeling varied by region, as shown in Figure 11. In the Gulf region, the United States is the most common origin of shrimp, followed by Thailand. However, in New York City and Washington, D.C., between 42-48 percent of products did not provide a country of origin label.

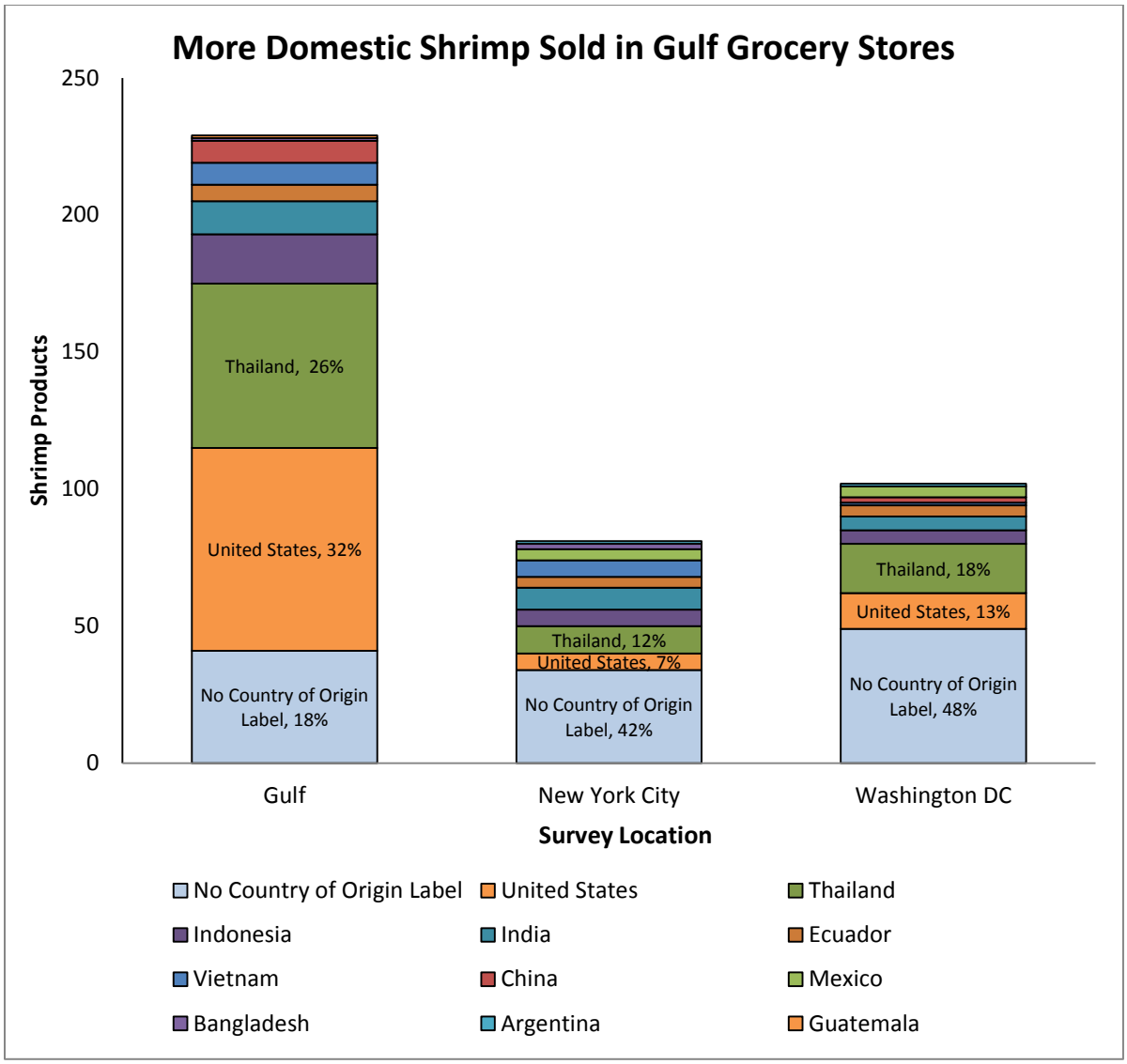

***Figure 11**: Country of Origin Labels on shrimp products surveyed in each region.*

Most of the farmed shrimp surveyed was imported or of unknown origin, while most of the wild shrimp was of U.S. origin, which may be a reflection of the large number of Gulf of Mexico grocery stores surveyed. Twenty-one percent of products lacked both production and origin information; these products were mostly processed frozen boxed shrimp, likely exempt from COOL regulations. Overall, 30 percent of shrimp products surveyed in grocery stores lacked information on country of origin, 29 percent lacked farmed/wild information and one in five told neither (Table 4).

# Shrimp products surveyed in grocery stores	Unknown country of origin	Unknown method of production (farmed/wild)	Unknown country of origin AND unknown method of production
Gulf of Mexico (263)	18%	23%	15%
New York City (82)	42%	39%	32%
Washington DC (102)	48%	35%	30%
Overall (447)	**30%**	**29%**	**21%**

Table 4: *Percentage of shrimp products lacking country of origin or production method labels in surveyed locations*.

Restaurant Surveys

Oceana wanted to investigate how shrimp was labeled on restaurant menus at chain restaurants and individually owned establishments. In total, Oceana surveyed shrimp products available on 50 menus per city in 12 cities,[45] for a total of 600 menus and 5,371 shrimp dishes. Overall, the majority of restaurant menus surveyed were vague and offered little to no information about where the shrimp was from, the species, or whether the shrimp was wild-caught or farmed.

Restaurant menu surveys were conducted from June – December 2013. Eighty-seven percent of the shrimp items surveyed did not list the origin of the shrimp, and of the 13 percent of dishes that did list an origin, most were vague and only listed "Gulf." This regional preference for Gulf is presumably because 75 percent of the menus surveyed were in the Gulf of Mexico.

Ninety-six percent of shrimp dishes failed to list the type or species of shrimp (royal red, rock, etc.). The overwhelming majority did not specify whether the shrimp was wild-caught or farmed, with only less than 0.5 percent of shrimp dishes labeled as "wild."

What's on the Menu?

Most menu labels are vague, but information can vary by region. Overall, 58 percent of the menus surveyed in this study did not list the origin of *any* shrimp dish, while only 4 percent of menus listed the origin on *every* shrimp dish (Table 5). These results vary by region. Menus in Portland had the most state-level labels, at 30 percent, while the Gulf region had the highest percentage of menus that told diners where at least one dish came from (47 percent). Cities without a local shrimp fishery, New York and Washington, D.C., gave diners even less information about the origin of shrimp on their menus.

[45] Two cities in Miss. were combined into one survey: Ocean Springs and Biloxi.

Region (number of menus)	Percent of menus with origin listed on at least one dish	Percent of menus with origin listed on all shrimp dishes	Percent of menus with state-level listed on at least one dish
Gulf of Mexico (450)	47%	3%	5%
New York, NY (50)	20%	0%	4%
Washington, D.C. (50)	24%	4%	8%
Portland, OR (50)	32%	8%	30%
Overall (600)	42%	4%	7%

Table 5: *Menu Labeling by Region.*

Gulf of Mexico — 30% of Shrimp Misrepresented

Of the 63 products tested in the U.S. Gulf of Mexico during the height of shrimp season, 30 percent were misrepresented. None of the Gulf royal red (3) or rock shrimp tested were the true Gulf species. Oceana also found that shrimp with the "Gulf" label were sometimes misleading.

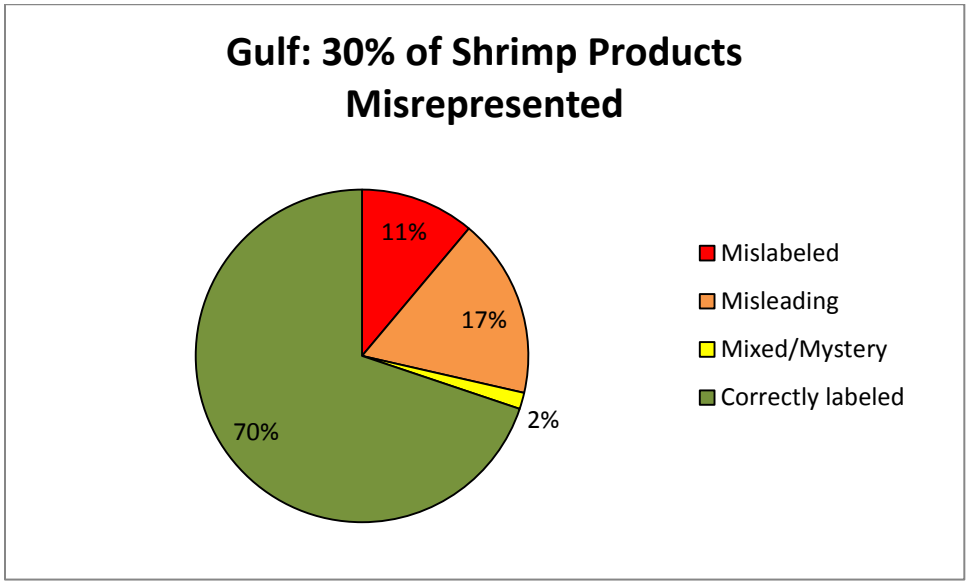

Figure 12: *Genetic testing results for the 63 shrimp products purchased in the Gulf in 2013.*

Oceana tested shrimp in the Gulf region, home to the largest shrimp fishery in the U.S., during the August 2013 Gulf shrimping season. Oceana's testing sought out the famous regional shrimps – brown, white, pink, rock and royal reds. While brown, white and pink shrimp are the most common, the rock and royal reds are considered a local treat when available.

Pride in and promotion of Gulf seafood was prominent during the shrimp survey and testing, both in restaurants and grocery stores. The Gulf of Mexico was the only region surveyed where the U.S. was the most common country of origin of shrimp products in the grocery stores, even beating "unknown" and Thailand, the second most commonly observed COOL label in our survey (Figure 11 and Appendix Figure A1). In fact, many of the grocery stores prominently displayed shrimp sourced from their state or the Gulf. However, as our results illustrate, the "Gulf" label can be ambiguous and misleading.

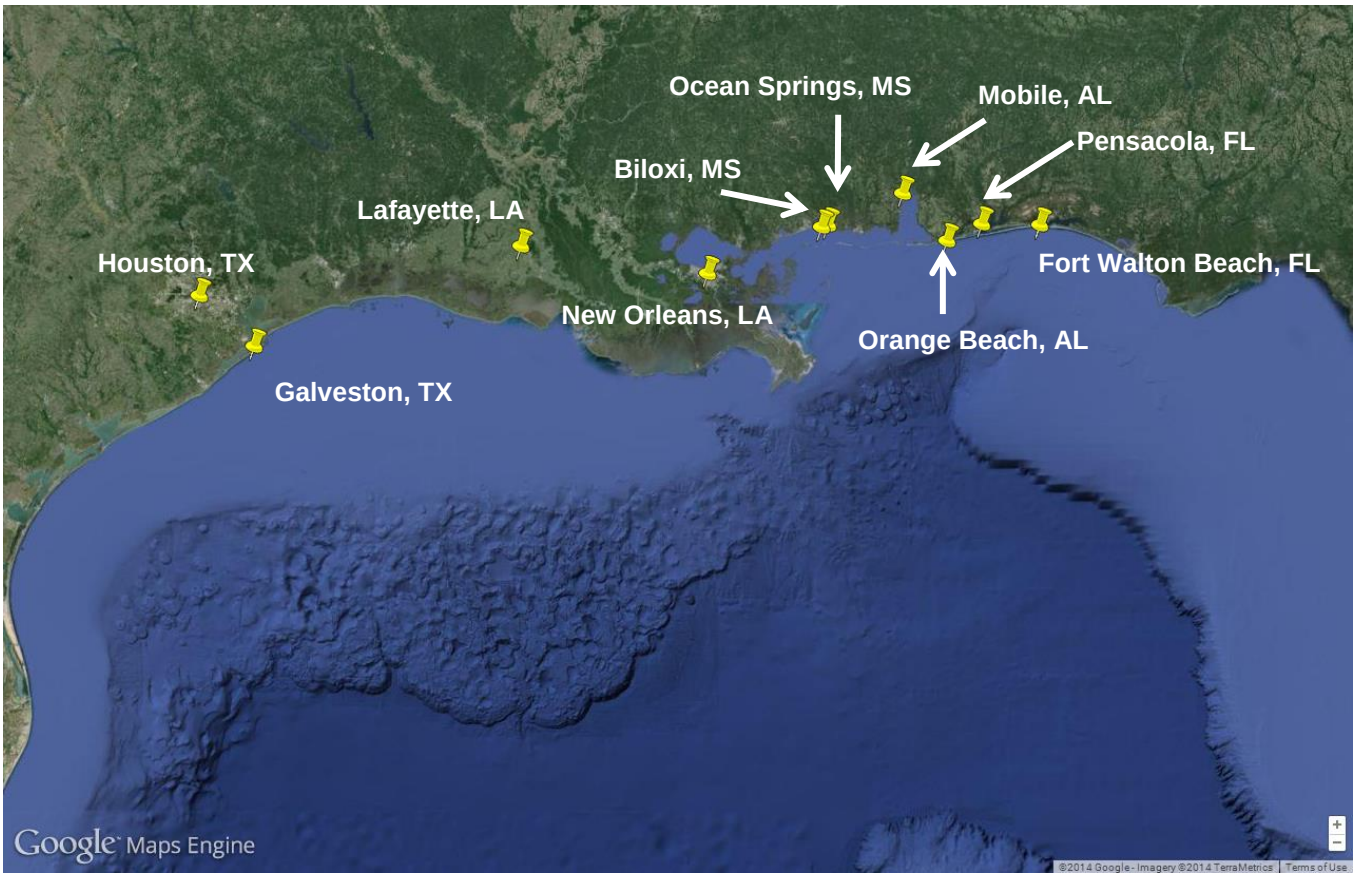

Figure 13: *Sampling effort in the Gulf region: 63 shrimp products were purchased in 10 Gulf cities from 55 vendors, including 38 from restaurants (38) and 25 products from grocery stores (17).*

Oceana surveyed 263 shrimp products in 17 national and regional grocery stores in nine cities[46] in the Gulf region, as well as 600 menus in the same cities we conducted our testing, surveying 50 menus in each city. Surveys took place during June – August 2013.

Highlights

- Overall, 30% of the shrimp products tested in the Gulf were misrepresented.
- The Gulf region had the highest level of ***misleading*** shrimp products (17%) among the regions tested (Figure 5 and 12).
- All of the misleading products were farmed whiteleg shrimp substituted for those labeled "Gulf" or "Texas." Half of the eight products purchased as a specific shrimp type, like rock or royal red were **mislabeled.**
    - Royal reds were substituted with imported Argentine red shrimp and a Gulf species no one has named in English (Figure 16).
- The lone mixed/mystery product was the banded coral "cleaner" shrimp, a crustacean more familiar to divers and the aquarium trade than to diners. It was found in a frozen bag of wild Vietnamese salad-size shrimp with a different, unidentifiable shrimp species.
- The most misleading grocery product found was displayed on ice labeled "Gulf Shrimp Frozen, Farm Raised, Product of Thailand."
- Mississippi led the Gulf states with the most *misleading* shrimp, followed by Texas, while Alabama and Louisiana led with the most *mislabeled* (Figure 14).

[46] Biloxi and Ocean Springs, MS were surveyed together as one location.

- Thirty-three percent of the 55 vendors visited in the Gulf sold misrepresented shrimp: 35% of the 17 grocers and 32% of the restaurants.
- Farmed whiteleg shrimp was the most abundant of the nine species collected in the Gulf (Figure 18). This species stood in for most of the mislabeled and misleading samples (Figure 16).
- Only 15% of the products surveyed in grocery stores did not provide any information on where the shrimp came from or whether it was wild or farmed, the smallest fraction of the regions surveyed (Table 4).
- The Gulf region sold more U.S. shrimp products than the other regions surveyed. About one-third of the shrimp surveyed was from the U.S. (Figure 11).
- Forty-four percent of the 450 restaurants surveyed in the Gulf listed at least one Gulf shrimp dish on their menu.

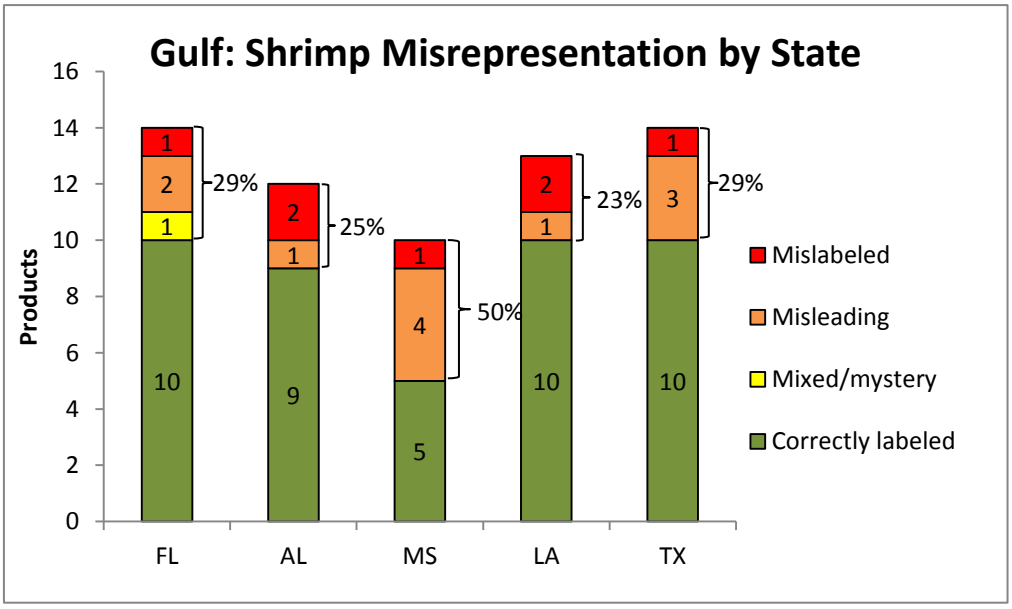

***Figure 14**: Gulf shrimp product labeling by state. (Note the small number of state-level products when considering the percentages).*

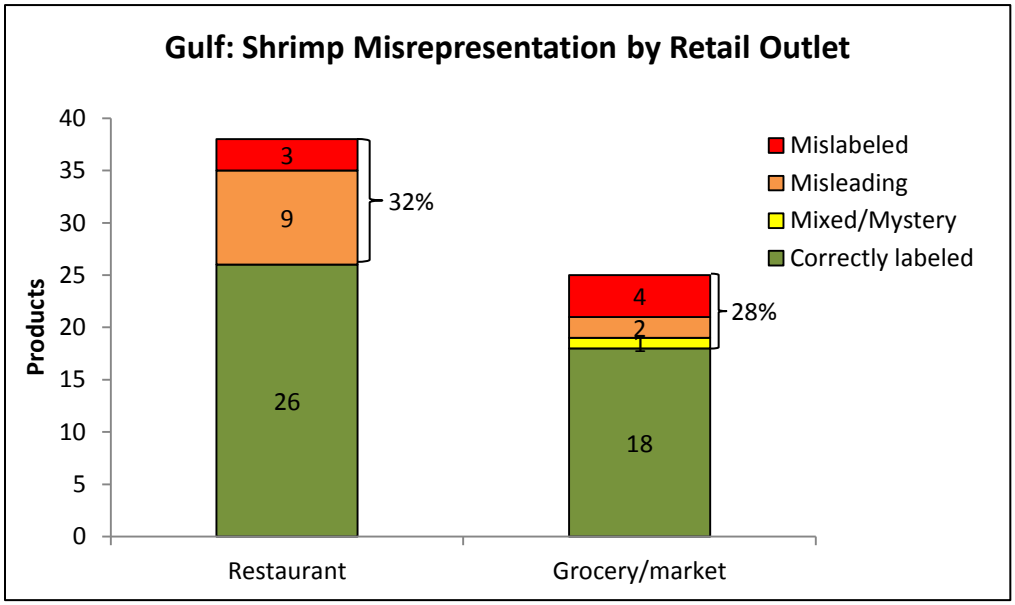

Figure 15: *Proportion and number of shrimp products misrepresented in restaurants versus grocery stores and markets in the Gulf. Similar to what was found nationally, products sold at restaurants and grocery stores in the Gulf region had similar amounts of misrepresented shrimp.*

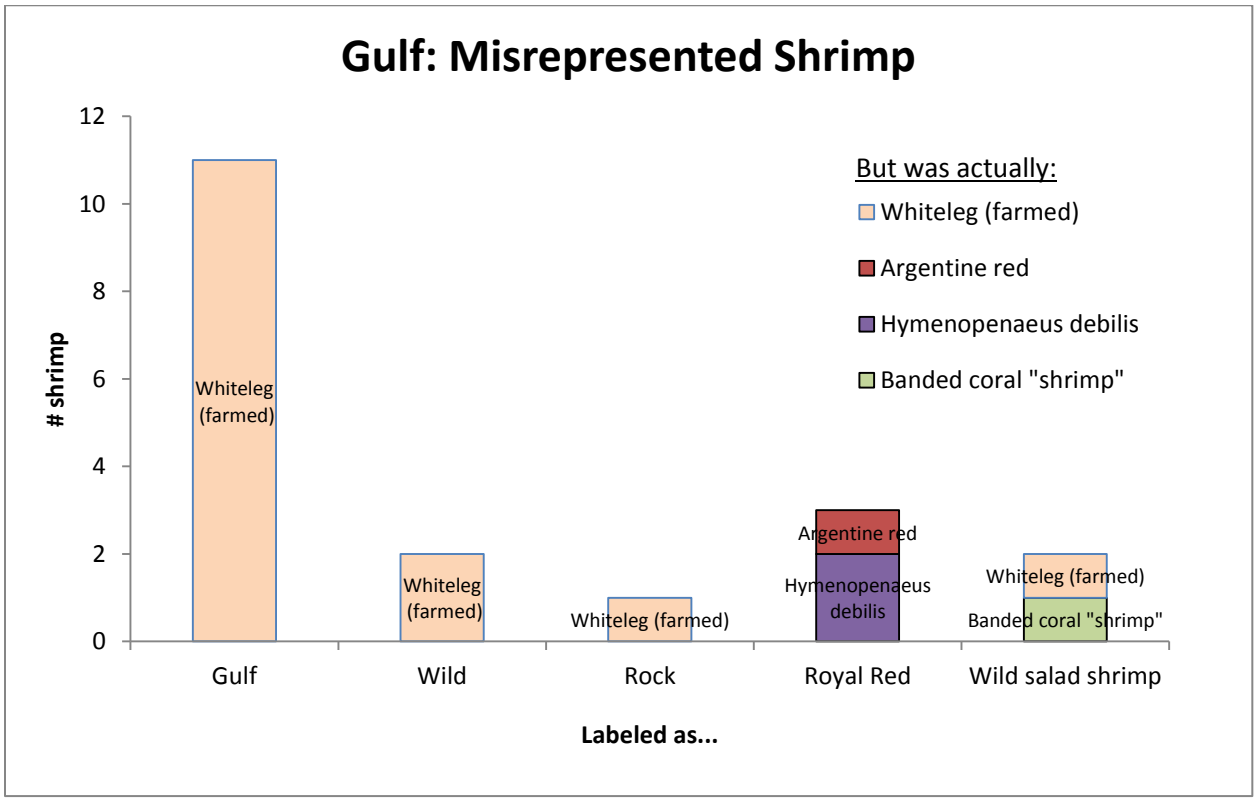

Figure 16*: Genetic identities of misrepresented shrimp in the Gulf. Note: Not all of the mixed/mystery shrimp are included in this graph.*

What is “Gulf” Shrimp?

Nearly two-thirds of the shrimp products labeled simply as “shrimp” purchased in the Gulf were actually wild-caught Gulf shrimp (Figure 17). The remaining 36 percent were what was expected: farmed whiteleg shrimp (Figure17). The same proportions held for the “Gulf” shrimp purchased. The amount of shrimp farmed in Gulf states (3,000,000+ pounds) is equal to less than 3 percent of wild shrimp fished in the Gulf in 2013, making the chances slim that the misleading samples purchased were farm-raised in the Gulf. In fact, we noted Texas farm-raised shrimp proudly advertised even when it was not actually available.

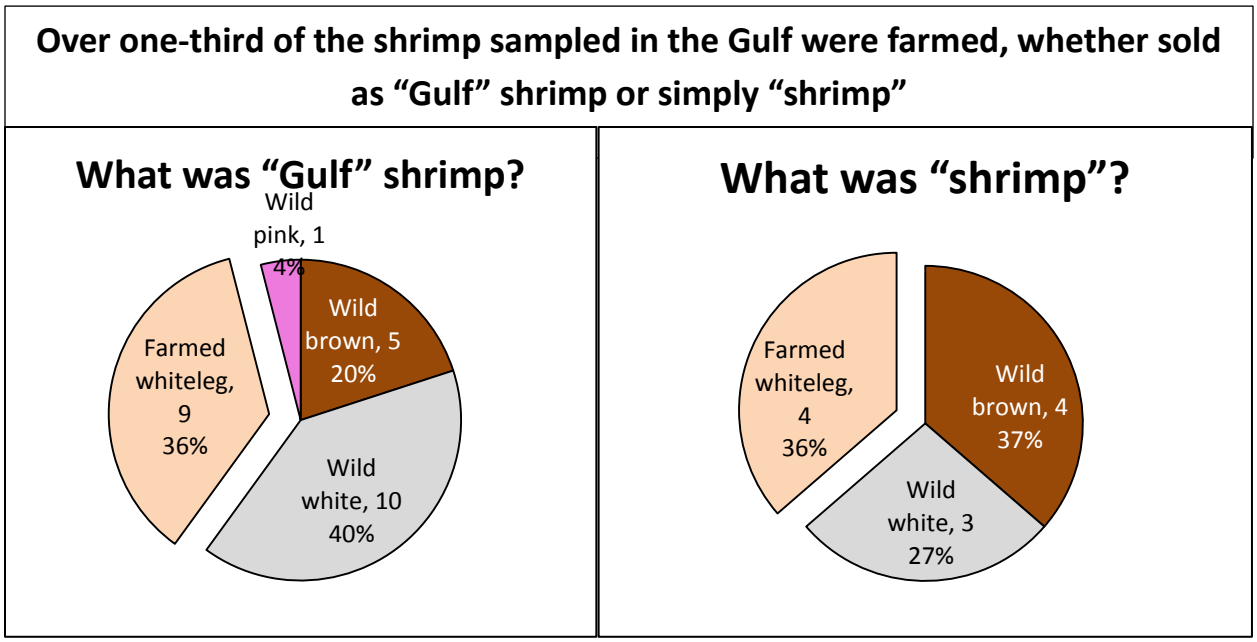

***Figure 17**: Genetic identity of products labeled simply as “shrimp” or specifically labeled “Gulf” shrimp in the Gulf region.*

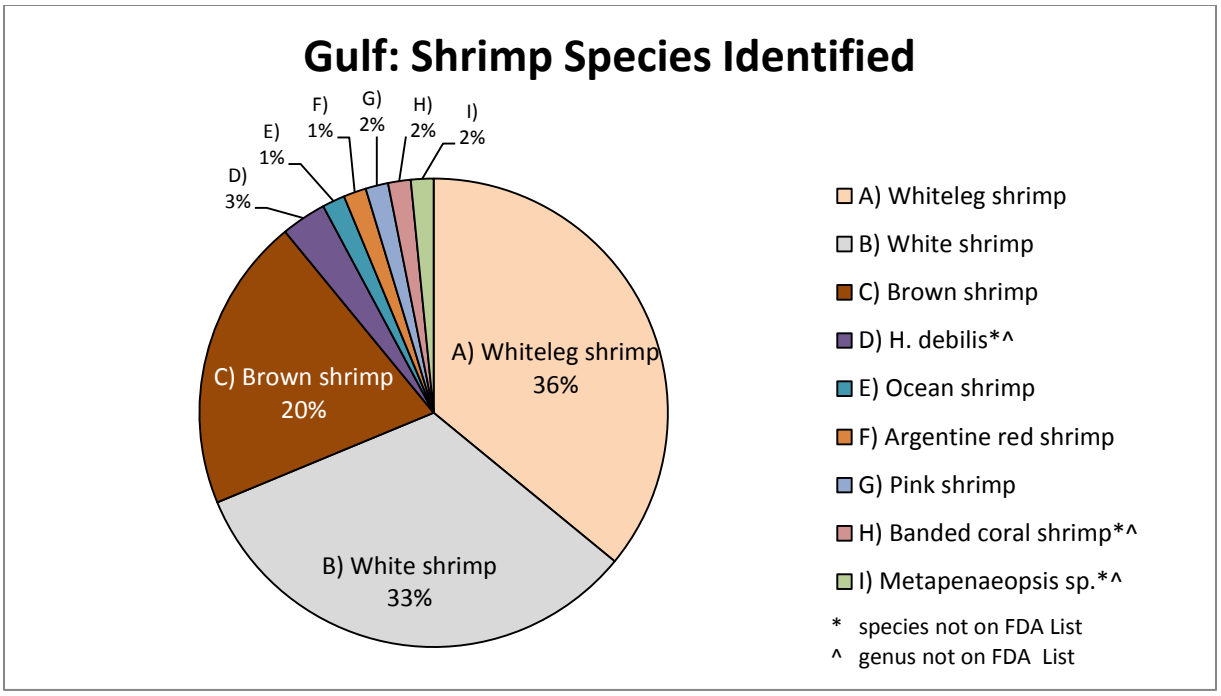

Figure 18: *Shrimp species identified in the Gulf of Mexico region in Oceana's 2013 sampling effort.*

The Gulf label deserves better definition and protection. While 44 percent of shrimp dishes surveyed on Gulf menus listed "Gulf" as the origin, our testing revealed this label does not always mean a wild-caught Gulf shrimp. Gulf residents, particularly those from Texas, might associate shrimp farmed in-state as belonging to the Gulf or Texas brand. In general, however, consumers seeking out the Gulf brand likely assume it means exactly what the Gulf Seafood Marketing Coalition and "Gulf Coast Seafood" brand promote: a wild species captured in the Gulf of Mexico.[47] On the other hand, grocery shoppers in the Gulf region enjoy getting more information about how and where shrimp are raised or caught than grocery shoppers in the East Coast cities we surveyed, with Gulf residents also having the opportunity to purchase far more domestic and local state shrimp products than in the regions surveyed where shrimp is not a prominent local product.

[47] See: Gulf Coast Seafood (2014)

New York City – 43% of Shrimp Misrepresented

New York City had the highest percentage of misrepresented shrimp of all of the regions included in this study. Grocers and small markets sold more than twice as much misrepresented shrimp than did restaurants, the highest proportion (60 percent) of regions in this study.

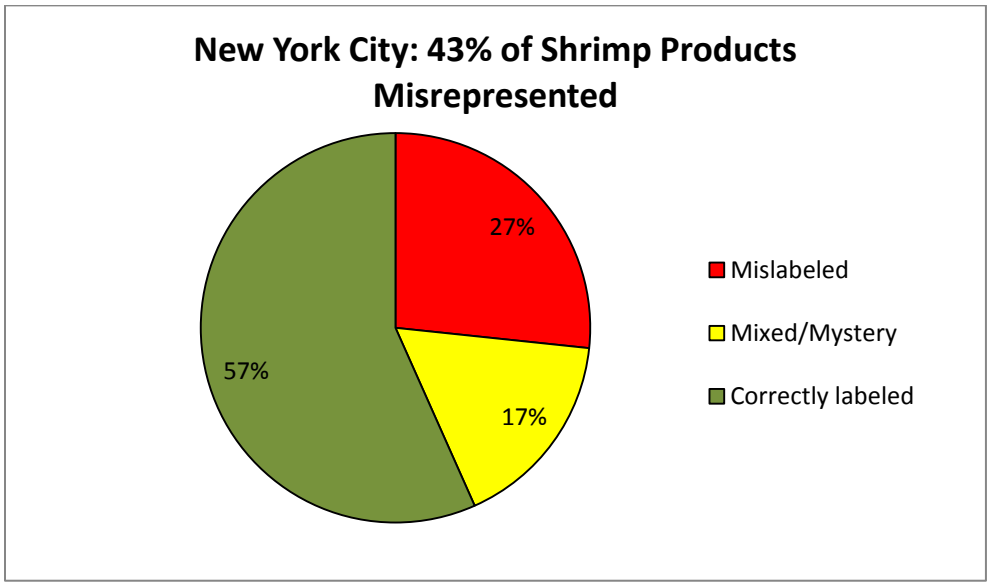

Figure 19: *Genetic testing results for the 30 shrimp products purchased in New York City in 2013.*

Consumers in the most populous city in the U.S. drive a diverse seafood market. As shrimp are not farmed or fished in New York, there is no local supply. Furthermore, this large metropolitan area hosts a variety of restaurants, ranging from smaller businesses to larger chains as well as a diversity of grocery stores. Most grocery stores in New York City are small markets or local/regional chains instead of large national chain grocery stores.

Oceana purchased 30 products from 24 vendors in December 2013: half from 12 restaurants and the other half from 12 grocery stores and markets. Of the latter half, products were purchased from both large national chain grocery stores as well as regional chains and small markets.

Oceana also surveyed 82 shrimp products in six grocery stores in New York City and the surrounding metropolitan area in December 2013. The survey included national and regional supermarket chains as well as the smaller chains and markets typical of New York, most of which do not fall under country of origin labeling regulations.

Highlights

- New York City led the regions surveyed with the largest percentage of *mislabeled* shrimp (27%) (Figures 5 and 19).
    - Over 50% of the mislabeled shrimp were farmed whiteleg shrimp disguised as wild-caught or rock shrimp (Figure 21). Others were wild domestic shrimp sold as foreign species.
- New York City also had the highest percentage of *mixed/mystery* shrimp products (17%) among the regions tested, all of which were purchased at grocery stores/markets.
    - Two were commingled bagged shrimp and three were mysterious undescribed or unidentified shrimp.

- The authentic and rare Gulf rock and royal red shrimp were found among the 12 species collected and identified, as were all of the other major commercial Gulf species, while the farmed whiteleg species was most abundant (Figure 22, Appendix Table A3).
- Restaurants in New York City misrepresented shrimp 27% of the time, while New York grocers misrepresented shrimp 60% of the time – the highest rate among regional grocery stores sampled (Figure 20).
- One-quarter of the restaurants visited sold misrepresented shrimp, while 67% of grocers did. Overall, 46% of the 24 retail outlets visited sold misrepresented shrimp products.
- Grocery shoppers in New York City are the least informed among the regions surveyed when it comes to knowing if the shrimp they purchase is farmed or wild, with 39% of shrimp products surveyed lacking this information (Table 4).
    - U.S. shrimp was a rare find in New York City markets, and a distant third after Thailand and India (Figure 11).
- Restaurant diners in New York City receive information on where at least one shrimp dish comes from only 20% of the time, the lowest level in the regions surveyed (Table 5).

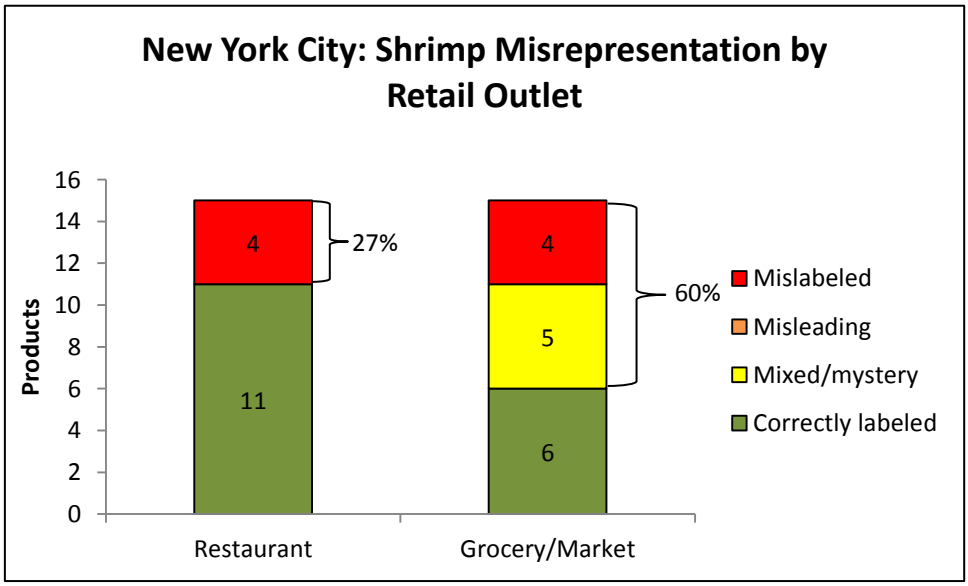

***Figure 20**: Proportion and number of shrimp products misrepresented in restaurants compared to grocery stores and markets in New York City.*

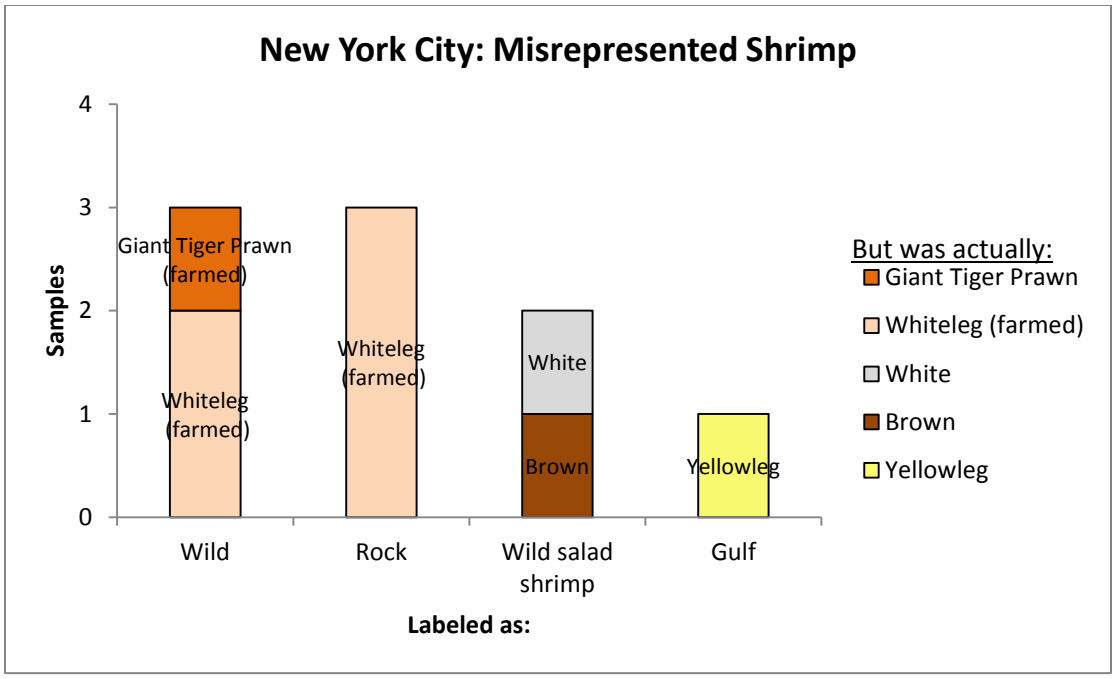

Figure 21: *Genetic identities of misrepresented shrimp in New York City. Note: Farmed shrimp was the most common substitute in New York City, standing in for "wild" and "rock" shrimp. See footnote 41. Also, not all the mixed/mystery shrimp are included in this graph.*

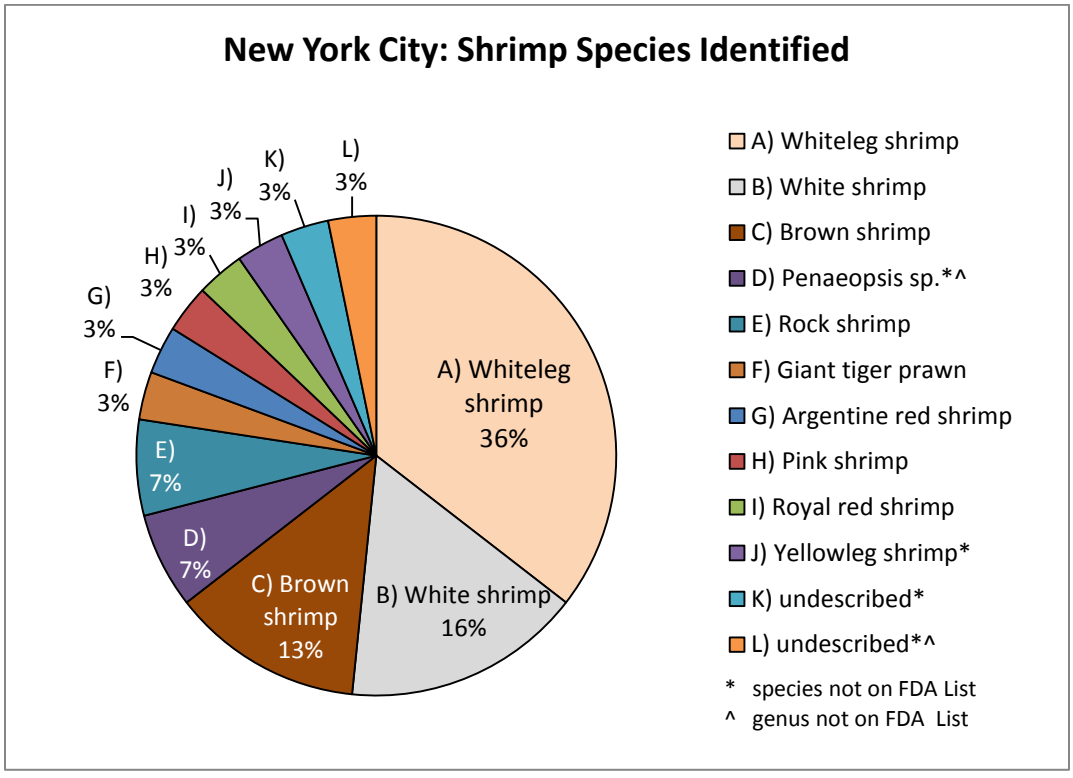

Figure 22*: Shrimp species identified in New York City in Oceana's 2013 sampling effort.*

Grocery shoppers in New York City receive the least amount of information about whether the shrimp they purchase is wild or farmed, while diners also know the least about where their shrimp hails from among the regions surveyed. The fact that many New Yorkers often grocery shop in smaller markets, most of which are exempt from COOL regulations, may partially explain this finding. New Yorkers also enjoy a higher availability of authentic and rare Gulf species, such as royal red and rock shrimp, which were not found in the Gulf region during this study. This trend follows what was found in Oceana's nationwide fish investigation: the greatest amount of authentic and rare red snapper was found in New York, rather than in states closer to the South Atlantic or Gulf red snapper fishing grounds.[48] These findings confirm that the commoditization of local or rare regional seafood may appear more frequently on the plate of the highest bidder rather than in the local fishing region.[49]

[48] Warner *et al*. (2013)
[49] *E.g*. see Greenberg, 2014

Washington, D.C. – 33% of Shrimp Misrepresented

One-third of the 30 shrimp products purchased in Washington, D.C. and the surrounding metropolitan area were misrepresented, the second highest level of the regions surveyed. Restaurants sold more than twice as many misrepresented shrimp than did grocery stores, the highest proportion (47 percent) among regions in this study.

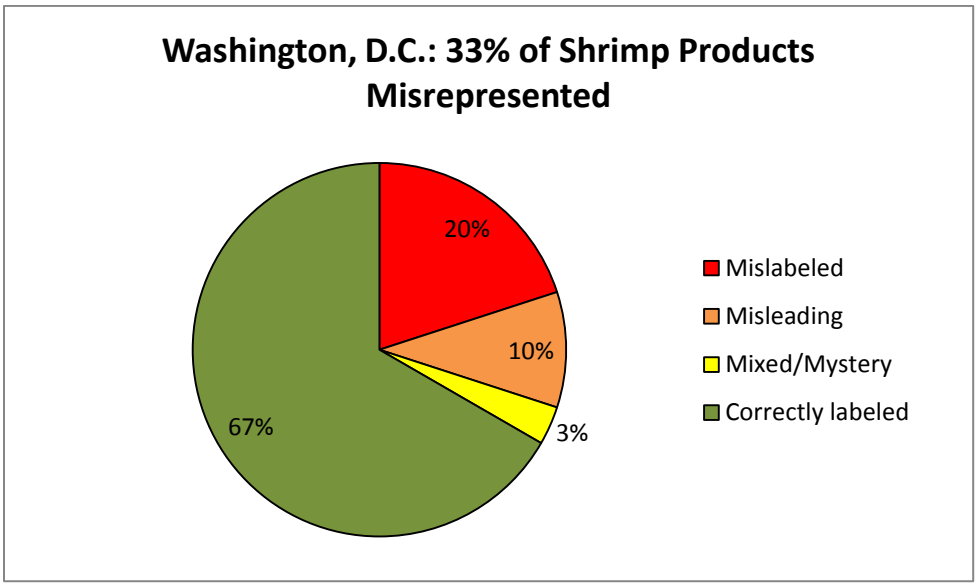

***Figure 23**: Genetic testing results for the 30 shrimp products purchased in Washington, D.C. in 2013.*

Washington, D.C. is a populous and affluent city filled with consumers who drive a diverse seafood supply. As with New York, none of the shrimp sold in Washington, D.C. is fished within the region. The metropolitan area is home to a variety of types of restaurants and grocery stores, ranging from small businesses to large regional and national chains.

Thirty shrimp products were purchased for testing from 12 restaurants and eight grocery stores in Washington, D.C., half from restaurants and half from grocery stores.

Shrimp products (102) were also surveyed in four grocery stores between June – November 2013 and both national and regional supermarket chains were included. Fifty menus in Washington, D.C. and the surrounding metropolitan area were surveyed during July – August 2013.

Highlights

- At 33%, Washington, D.C. had the second highest level of misrepresented shrimp among the regions tested (Figure 23 and 5).
    - Of the six *mislabeled* products purchased from Washington, D.C., five were labeled with the wrong species and one was labeled as "wild" but was actually farmed **(**Figure 25).
    - The misleading products purchased in Washington, D.C. were farmed whiteleg shrimp sold as "Gulf" and "Carolina."
    - The lone mixed/mystery product was a bag of imported frozen salad-sized shrimp containing at least two different species not known to be sold in the U.S.
- Almost half (47%) of the products purchased at restaurants and 20% of the products purchased from grocery stores and markets were misrepresented (Figure 24).
- Of the 20 retail outlets visited, 45% sold misrepresented shrimp, including half of the restaurants and 38% of the grocery stores.

- The rare Gulf royal red and northern (Maine) shrimp were among the 12 species identified, but all the Gulf rock shrimp tested were imposters (Figures 25 and 26).
    - For a change, wild domestic brown shrimp were the most abundant species collected and identified.
- Washington, D.C. grocery stores led the regions surveyed with the largest percentage of shrimp products with no COOL labeling (48%) (Figure 11).
- Nearly half (49%) of the products surveyed in Washington, D.C. grocery stores were labeled as farmed and 16% were labeled as wild. However, 35% of products surveyed did not provide this information.
- Seventy-six percent of the menus surveyed did not specify an origin on any of the shrimp dishes, and 82 percent of the menus failed to list the type of shrimp on any of the dishes.

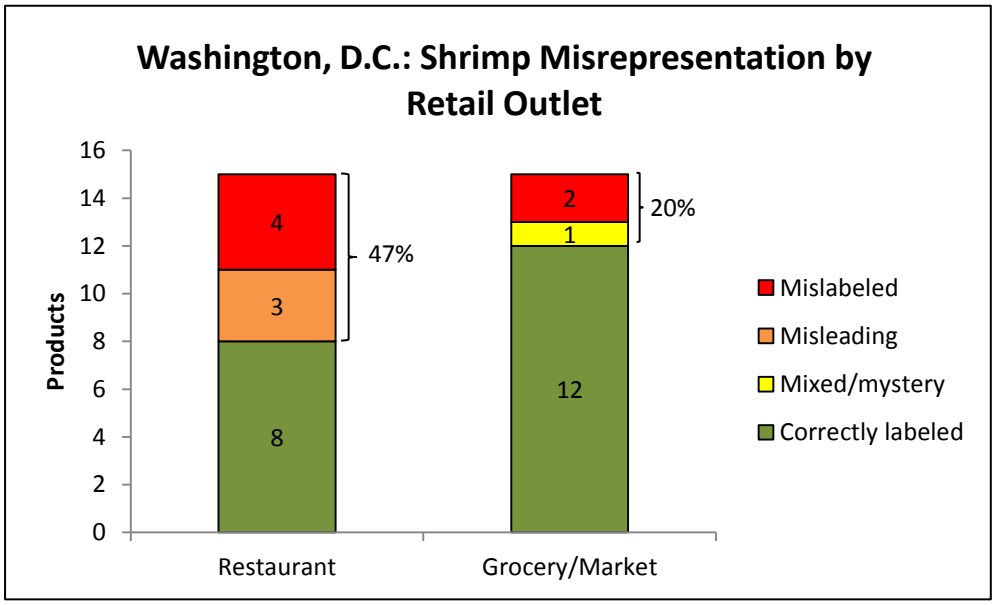

Figure 24: *Proportion and number of shrimp products misrepresented in restaurants compared to grocery stores and markets in Washington, D.C.*

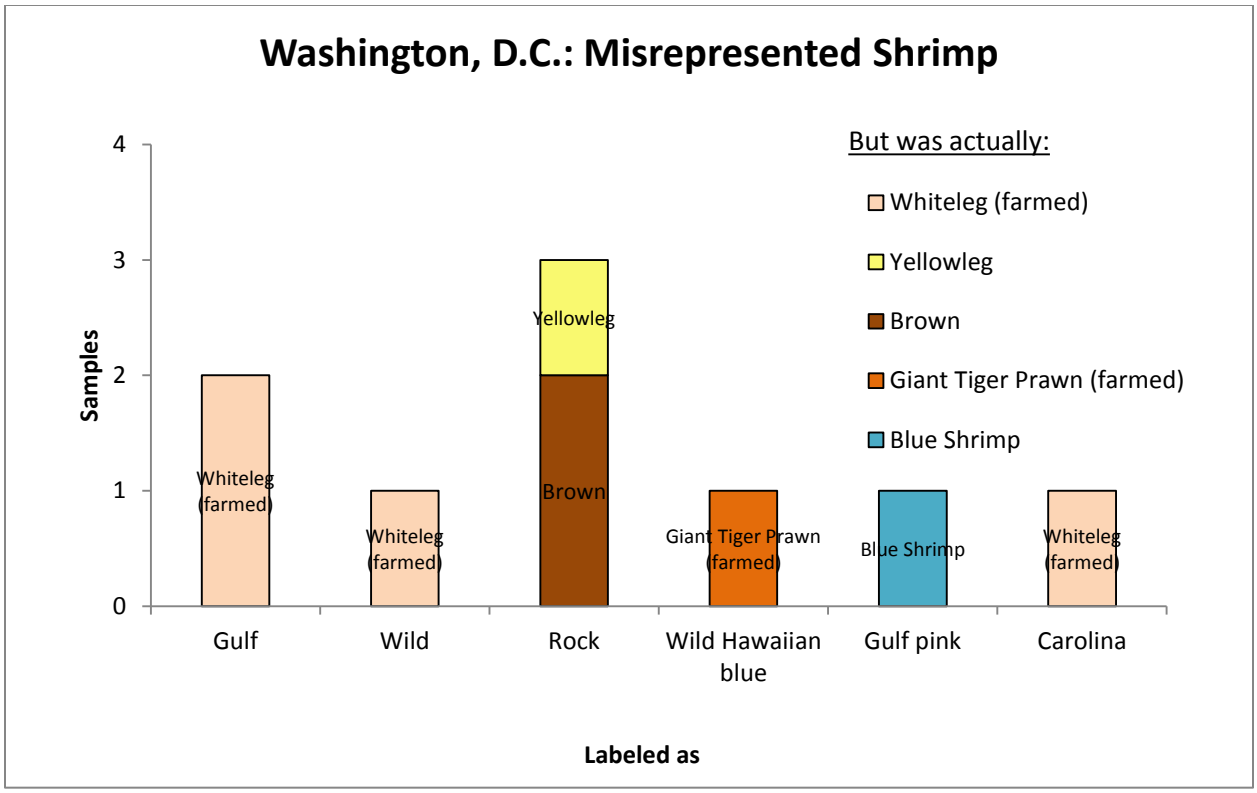

***Figure 25**: Genetic identities of misrepresented shrimp in Washington, D.C. Note: "Gulf," "wild" and "Carolina" shrimp were replaced with farmed whiteleg shrimp, the most common substitute species in the study. Also, the mixed/mystery shrimp are not included in this graph.*

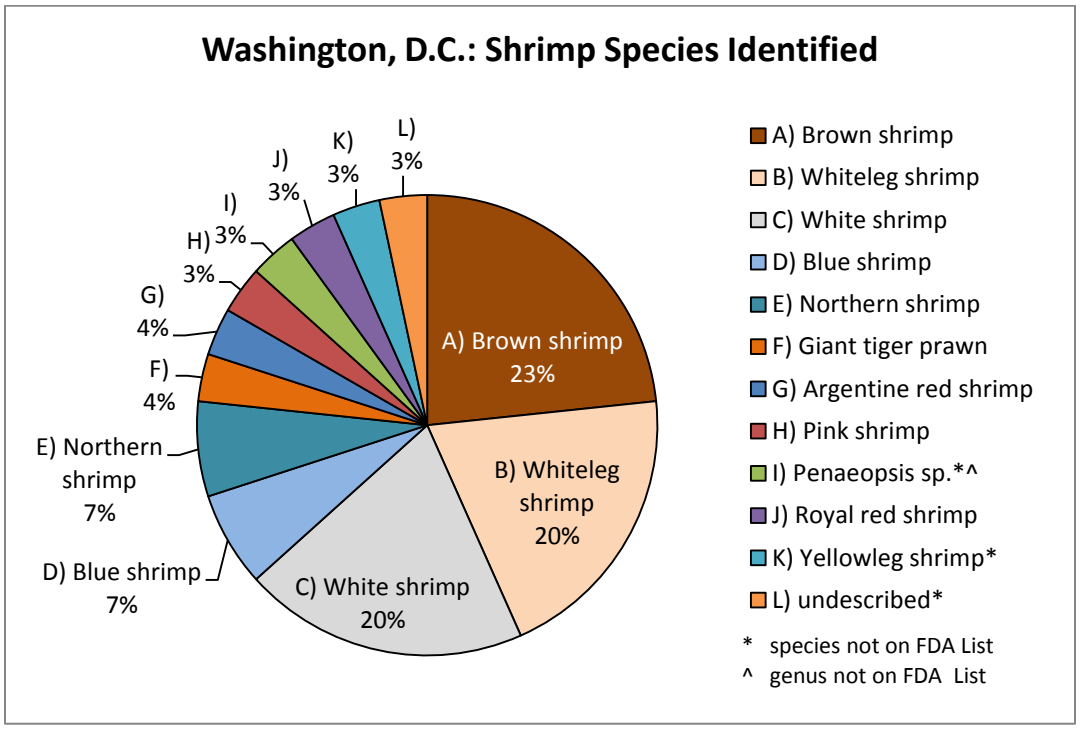

***Figure 26:** Shrimp species identified in Washington, D.C. in Oceana's 2013 sampling effort.*

Shrimp sold in our nation's capital, like much of the shrimp sold in the U.S., often lacks adequate information for consumers on the label. Grocery shoppers in Washington, D.C. are more in the dark about the country of origin of the shrimp they purchase than in other regions surveyed in this study. Washington, D.C. was the only region outside of the Gulf, however, that sold *misleading* farmed Gulf and Carolina shrimp. Washington, D.C. would have tied New York City with the highest level of shrimp mislabeling if D.C.'s farmed Gulf and Carolina products were considered mislabeled rather than misleading.

Portland, OR — 5% of Shrimp Misrepresented

Only one shrimp product of the 20 tested was mislabeled in Portland, the lowest level of the regions tested. The local ocean shrimp were the most abundant of the seven species collected and identified in Portland. Diners in Portland know more about what type of shrimp they are ordering than diners in other regions surveyed.

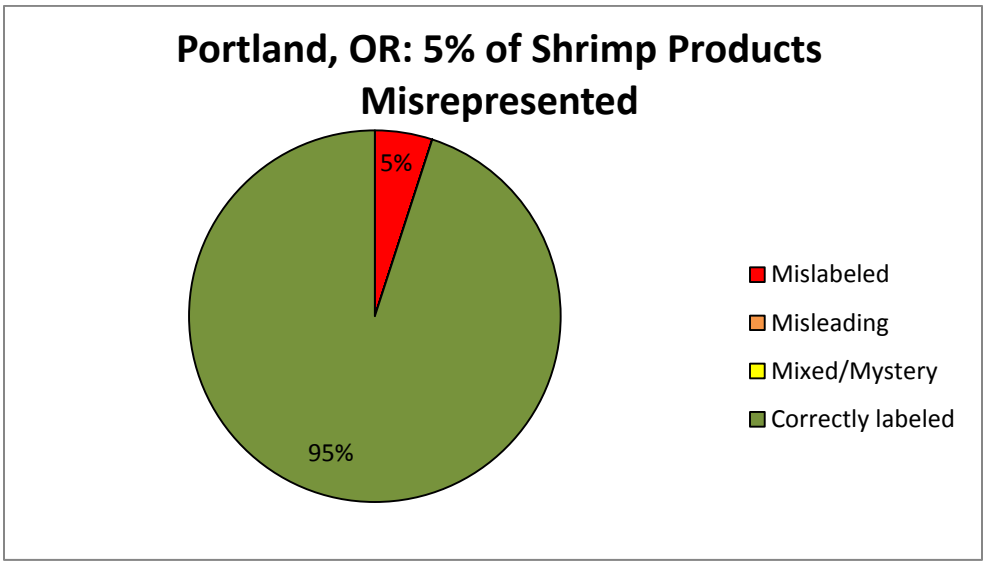

Figure 27: *Genetic testing results for the 20 shrimp products purchased in Portland, OR in 2013.*

Oregon is famous for its cold water ocean shrimp (*Pandalus jordani*), regionally referred to as "Oregon pink" or "bay" shrimp. Although ocean shrimp are caught in the wild in the cold Pacific Ocean waters off northern California up to Washington, Oregon typically lands more than half of the total catch. With a third straight year of record landings, Oregon shrimpers caught 47.6 million pounds in 2013.[50] This catch was equivalent to 41 percent of the reported 2013 Gulf shrimp landings,[51] a reflection of the record high Oregon production at a time of depressed Gulf shrimp landings. In some years, Oregon ocean shrimp make up closer to 14 percent of domestic shrimp landings.[52]

The Oregon ocean or pink shrimp was the first shrimp fishery in the world to be certified by the Marine Stewardship Council (MSC), first awarded in 2007 and recertified in 2013. The Monterey Bay Aquarium Seafood Watch ranks MSC-certified fisheries in the Good Alternatives category (Table 1). While this fishery has made big strides toward sustainability in recent years, more work is needed to protect sensitive habitat areas and to avoid the take of a threatened species of smelt called eulachon that are incidentally caught in the shrimpers' trawl nets. In 2010, approximately one million eulachon were caught as bycatch in the ocean shrimp fishery.[53]

Twenty shrimp products were collected in Portland during August 2013: 12 products from 11 restaurants and eight from four national and regional grocery stores. Fifty Portland restaurant menus were also surveyed from July – August 2013. No visual grocery surveys were conducted in Portland.

[50] Hannah, B. and Jones, S. (2014)
[51] NOAA (2013b)
[52] *E.g*. Hannah, B. and Jones, S. (2011)
[53] Al-Humaidhi *et al.* (2012)

Highlights

- Only one shrimp product of the 20 tested was mislabeled in Portland, a restaurant shrimp dish which listed “wild Pacific shrimp” on its menu, but served farmed whiteleg shrimp instead.
- Of the seven shrimp species collected and identified in Portland, the local ocean shrimp was most common, followed by farmed whiteleg and giant tiger prawn (Figure 28).
- Of the 50 menus surveyed in Portland, half listed the type of shrimp for at least one shrimp dish, the highest percentage among the menus surveyed elsewhere in this study. Thirty percent of the menus provided the state of origin (mostly Oregon) of at least one shrimp dish, another highest percentage.

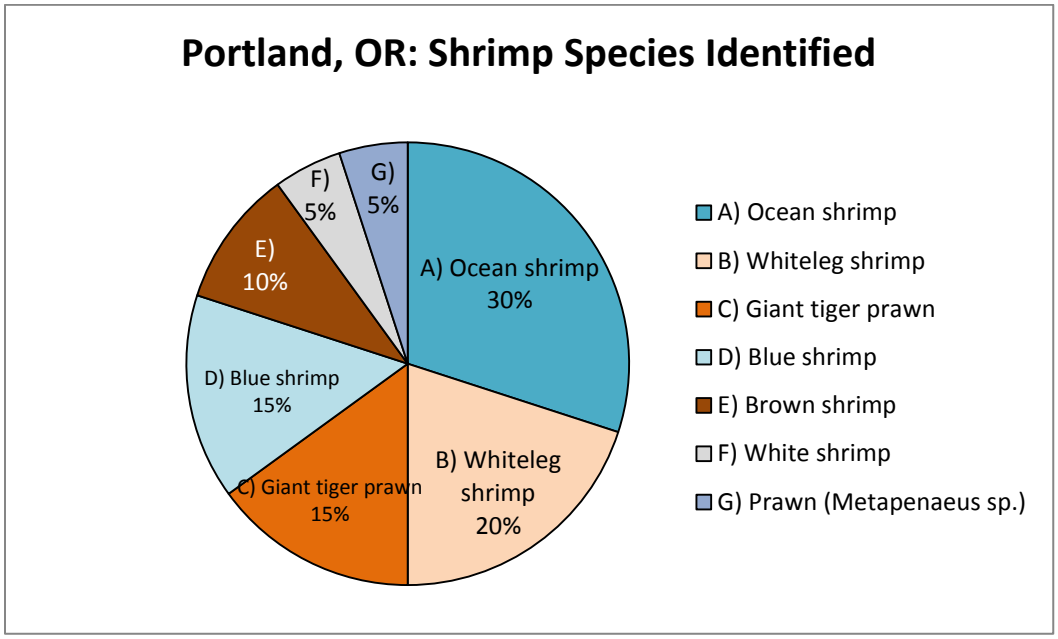

Figure 28: *Shrimp species identified in Portland in Oceana’s 2013 sampling effort.*

Portland is where consumers have a better chance that the shrimp on the menu matches the one on their dinner plate. Portland stood out as the region with the lowest level of shrimp fraud with only one mislabeled product, a finding consistent with their lower level of fish mislabeling compared to other cities surveyed in Oceana’s nationwide investigation.[54]

[54] Warner *et al*. (2013)

Summary

Most of the shrimp consumed and available in the U.S. is both farmed and imported from overseas. However, consumers are rarely given this information on the menu or enough information in grocery stores to make sustainable choices. If consumers want to support local economies such as the Gulf of Mexico seafood industry, how can they have confidence that they are truly purchasing a local product?

The solution is traceability: tracking seafood from boat or farm to plate. Traceability and better information available to consumers will help reduce seafood fraud, allow for targeted enforcement, and bring accountability and transparency to the seafood supply chain. At the same time, these measures would allow consumers to make more informed choices when feeding their families.

Without traceability and more informative labels, sustainability guidelines are difficult, if not impossible, to follow, robbing consumers of the ability to make confident choices to protect their health, the oceans or to use their consumer power to stop human rights abuses. At the same time, some shrimp fishermen that could be earning a premium on their wild, sustainably caught shrimp are missing the boat.

Consumer Health Benefits

One of the health risks of selling farmed shrimp as wild is that seafood processors are required to screen for veterinary drug residue levels in farmed products but obviously not for wild species.[55] This level of oversight and protection cannot happen if the shrimp does not carry with it information to trace back where it was caught or farmed. Little oversight of drug residues exists in properly labeled imported farmed products as it is, so mislabeling only aggravates this situation.[56] As it stands, consumers may be exposed to drug residues or other contaminants that could be avoided with a traceable supply chain.

Ocean Conservation Benefits

Consumers with conservation concerns about how and where shrimp are caught or farmed would be largely frustrated in trying to make sustainable shrimp choices. This study found no shrimp products on menus or in grocery stores which described the type of gear used to catch wild shrimp, whereas most menus even lack information on where the shrimp was caught or farmed. Consumers concerned about shrimp fishing gear and wasted catch might forgo shrimp altogether if information about fishing methods was not available. What's more, without seafood traceability, it is impossible to know whether the wild shrimp one purchased was caught in a legal fishery.

Human Rights Benefits

Recent reports have brought to light another troubling issue in the risks involved in seafood mislabeling and lack of traceability. Even consumers unconcerned with environmental abuses in shrimp fishing or farming might be troubled to know the product they purchase supports human trafficking or other human rights abuses. In response to these reports, the primary seafood supplier accused of these abuses has recently committed to seafood traceability as a solution.[57]

Strengthening Shrimper's Bottom Lines

In the Gulf of Mexico, some seafood industry members have been using traceability, or tracking seafood throughout the supply chain, for marketing purposes and to provide customers with a unique story about

[55] FDA. (2011)
[56] Government Accountability Office (GAO) (2011)
[57] Sackton (2014)

their seafood. This story not only connects consumers to the source of their seafood, but also gives them confidence that they are purchasing a local product. In the fall of 2013, restaurants in Mississippi participated in a campaign featuring traceable shrimp called “Every Shrimp has a Tale.” Diners scanned QR codes with smartphones to access a map that traced their shrimp’s journey from Gulf waters to their dinner plate. This campaign led to the successful sale of over 11,000 pounds of traceable shrimp.[58] Not only does traceability support the local economy, but it also provides consumers with transparency and a unique connection with their seafood. This further reinforces the fact that some shrimp fishermen are missing out on a premium that could be available with better labeling and traceability.

Building Consumer Confidence

Traceability will also give consumers confidence that they are actually purchasing a product of their choosing, whether it be local or wild or a Best Choice option according to Seafood Watch. For example, when choosing traceable, wild-caught Gulf shrimp from a grocery store in Mississippi, some consumers can track their shrimp from the boat to the processor to the grocery shelf. This gives them confidence that the shrimp was indeed caught in the Gulf of Mexico and not farmed in the Gulf of Thailand.

Instituting full-chain traceability and better consumer information will benefit all stakeholders in the supply chain from fishermen and seafood businesses to consumers. Traceability is an important tool to ensure that the seafood sold in the U.S. is safe, legally caught and honestly labeled, while providing consumers with the information they need to make fully informed, responsible seafood choices.

[58] Every shrimp has a tale. Accessed October 7, 2014. Retrieved from http://gulfshrimptales.com/

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Appendices

A1: Method Details:

Sampling effort varied by region. The majority of our efforts focused in the Gulf region where we collected 63 products from all Gulf states (Table A1).

City	State	Grocery stores	Restaurants	Markets	Total number of products	Notes
Fort Walton Beach	FL	2	4	0	6	
Pensacola	FL	3	6	0	8	Includes samples from Gulf Breeze, FL
Orange Beach	AL	1	3	0	4	Includes samples from Gulf Shores, AL
Mobile	AL	4	3	1	8	Includes samples from Spanish Fort, AL
Ocean Springs	MS	0	2	0	2	
Biloxi	MS	2	6	0	8	
New Orleans	LA	4	5	0	9	
Lafayette	LA	1	3	0	4	
Houston	TX	3	3	0	6	Includes samples from League City, TX
Galveston	TX	4	4	0	8	
New York	NY	14	16	4	30	Includes samples from Northern New Jersey
Washington, D.C.	DC	16	15	0	30	Includes samples from Virginia and Maryland suburbs
Portland	OR	8	13	0	20	

***Table A1**: Number of samples purchased by retailer type and by sampling location.*

Genetic Testing Methods

Duplicate shrimp from each product were collected and stored in a scintillation vial with 9ml desiccant beads for drying and preservation. The following information was recorded for each product: collection location, product name, date, method of production (wild/farmed), fresh/frozen, shrimp count,[59] country of origin, price, and any special labels (MSC,[60] BAP,[61] government inspection number, etc.).

Samples were sent to a commercial lab, Applied Food Technologies (Alachua, Florida), that attempted to identify each to species level (>99% match), using phylogenetic methods. Samples were analyzed by a DNA sequence alignment method and compared to a taxonomically validated database for shrimp. Two samples did not yield enough DNA to identify them properly.

[59] The number of shrimp per pound, usually listed as a range such as *26-30*. See Appendix Table A2
[60] Marine Stewardship Council certified, http://www.msc.org/
[61] Best Aquaculture Practices certified, http://www.gaalliance.org/bap/standards.php

After receiving preliminary identification results, we tested duplicates of five products to verify unexpected or unusual results, such as finding a species not listed on the FDA Seafood List or a sample that could not be identified to species level with >99 percent confidence. Because we re-tested the replicates of five products, we report different totals for the number of products (n = 143) and the number of samples, which includes all replicates (n = 148). Results are reported for "shrimp product" rather than by sample because of these duplicate samples.

Of the 148 sample results obtained, 138 (93 percent) were identified to the species level (>99 percent match). Seven samples were identified to genus level (>99 percent match), and four of these were >83 percent match to a known shrimp species. These four samples with >83 percent match to the species level had insufficient DNA sequences to make confident species matches, but the genera were not on the FDA Seafood List, and two were commingled with other species in the same bag. Another three samples yielded excellent DNA sequences but were completely unknown and genetically undescribed novel species. These undescribed and commingled products (including other commingled described species) were grouped into a special category we termed "mixed/mystery." See Table A3.

Grocery Store and Restaurant Survey Methods

In addition to collecting and analyzing physical samples, we also conducted a visual survey of every unique shrimp product available in grocery stores and restaurants in the same locations where samples were taken, with the exception of Portland grocery stores. To select grocery stores for sampling, we identified locations of national and regional chain grocery stores as well as small markets in each city. Restaurants were selected by searching for "seafood restaurants" in each city using Yelp and TripAdvisor, prioritizing top-rated restaurants and those which sold products providing a country of origin or other special label (e.g. "Gulf"), when available. Shrimp are usually sold in grocery stores and markets by the number or range of numbers contained in one pound (Table A2).

The 27 grocery stores surveyed included national chains, regional chains and markets. The 600 restaurant menus surveyed included large chain restaurants and local, independent businesses. For each shrimp product from a market or grocery store, we recorded the following information: store location, product name, date, method of production (wild/farmed), raw or cooked, fresh or frozen, shrimp count (number of shrimp per pound), country of origin, price, manufacturer/distributor information, and any special labels (MSC, BAP, government inspection number, etc.).

Table A2: *How shrimp are usually sold in grocery stores and markets.*

Market/Trade Name[1]	**Shrimp count (Number) per pound**[2]	**Average number of shrimp per pound**
Extra Colossal	U10	5
Colossal	U12	9
Colossal	U15	14
Extra Jumbo	16/20	18
Jumbo	21/25	23
Extra Large	26/30	28
Large	31/35	33
Medium Large	36/40	38
Medium	41/50	45
Small[3]	51/60	55
Extra Small[3]	61/70	65

Notes: 1*. Market size names may vary in different regions; some recommend relying on shrimp count rather than size description when purchasing shrimp.* ***2****."U" refers to "under";* ***3****. Salad sized shrimp are small, extra small, or even smaller. Most of the salad-sized shrimp purchased in this study were between 175 and 300 shrimp per pound (average count).*

Appendix A2: Other Results

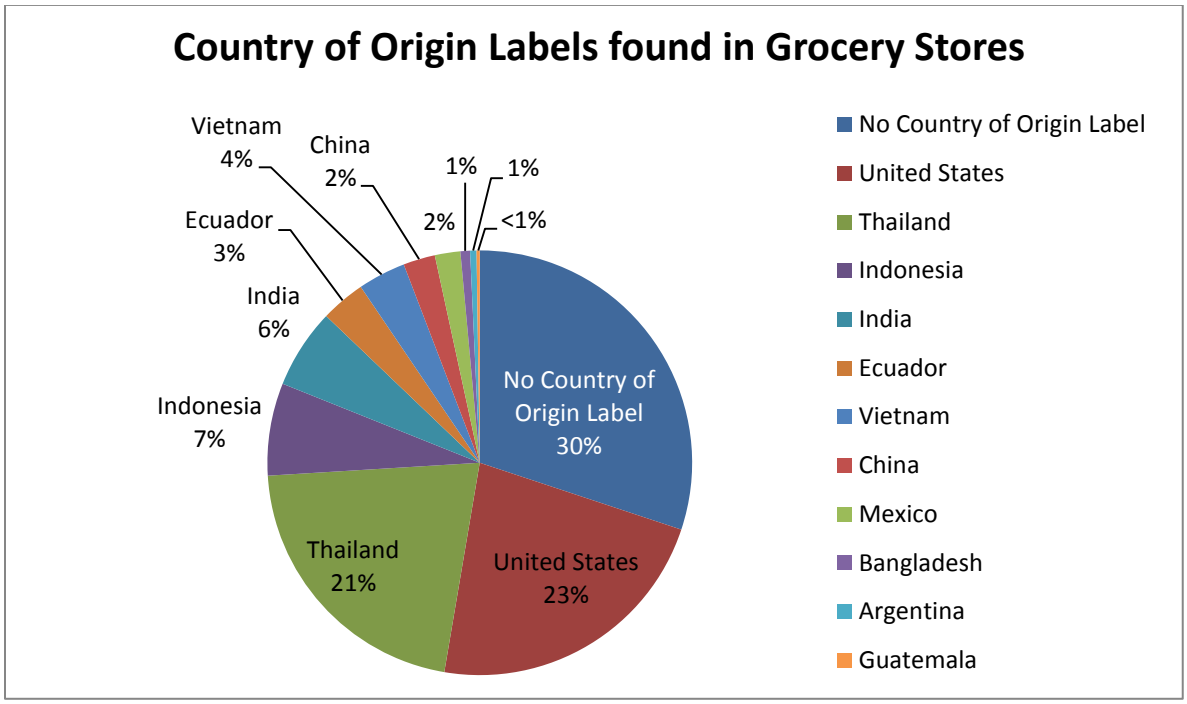

Figure A1: *Country of origin Labeling of grocery products surveyed in New York, Washington, D.C. and the Gulf Region in 2013*

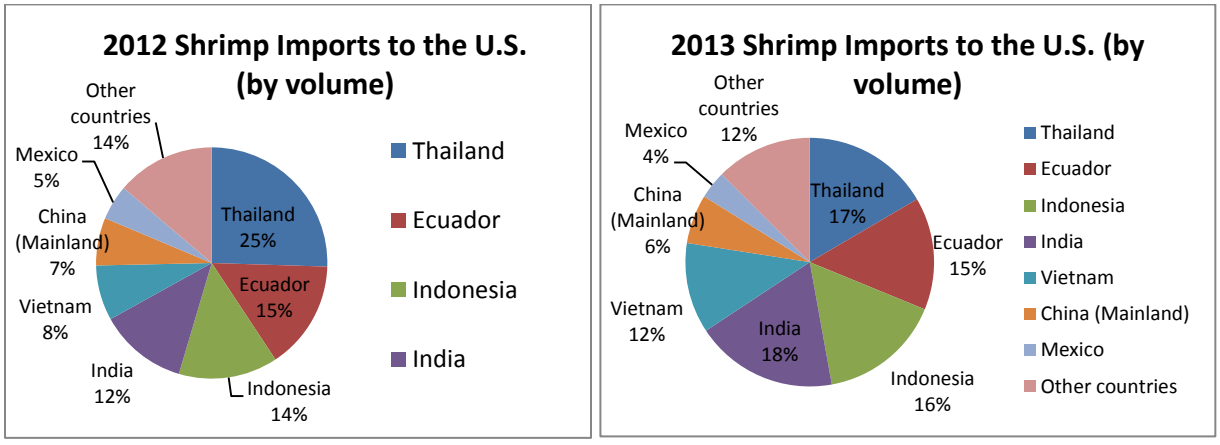

Figure A2*: Country of Orgin of shrimp imports into the U.S. in 2012 (left) and 2013 (right). Source: NMFS, Fisheries Statistics and Economics Division, Shrimp Import query*

In general, what Oceana found for COOL labeling in grocery stores in 2013 with Thailand as top import country, (Figure A1), resembled U.S. shrimp imports in 2012 more closely than shrimp imports in 2013, (Figure A2).

***Table A3**: Shrimp species and genera identified*

Species	Common Name	Gulf	NYC	Washington DC	Portland	Total
Farfantepenaeus aztecus	Brown shrimp[2]	13	4	7	2	26
Farfantepenaeus californiensis	Yellowleg shrimp*	0	1	1	0	2
Farfantepenaeus duorarum	Pink shrimp[2]	1	1	1	0	3
Farfantepenaeus species	*(Farfantepenaeus sp.[5,7])*	0	1	0	0	1
Hymenopenaeus debilis	(no common name)*^	2	0	0	0	2
Litopenaeus setiferus	White shrimp[2]	21	5	6	1	33
Litopenaeus species	*(Litopenaeus sp.[5,7])*	0	0	1	0	1
Litopenaeus stylirostris	Blue shrimp[4]	0	0	2	3	5
Litopenaeus vannamei	Whiteleg shrimp[1]	23	11	6	4	44
Metapenaeopsis rosea (87%)	*(Metapenaeopsis* sp. 87%*^[5])	1	0	0	0	1
Metapenaeus species	Prawn[5]	0	0	0	1	1
Pandalus borealis	Northern Shrimp[3]	0	0	3	0	3
Pandalus jordani	Ocean shrimp[3]	1	0	0	6	7
Parapenaeopsis coromandelica (92.97)	(undescribed*[6])	0	1	0	0	1
Penaeopsis serrata (88.74%; 83.75%; 93.88%)	*(Penaeopsis* sp.*^[5])	0	2	1	0	3
Penaeus monodon	Giant tiger prawn[1]	0	1	1	3	5
Pleoticus muelleri	Argentine red shrimp[4]	1	1	1	0	3
Pleoticus robustus	Royal red shrimp[2]	0	1	1	0	2
Plesionika spinipes (84%)	(undescribed*[6])	0	0	1	0	1
Sicyonia brevirostris	Rock Shrimp[2]	0	2	0	0	2
Solenocera comate (93.43%)	(undescribed*^[6])	0	1	0	0	1
Stenopus hispidus	Banded coral shrimp*^	1	0	0	0	1
TOTAL		**64**	**32**	**32**	**20**	**148**

***Notes: 1**: Farmed; **2**: U.S. Gulf, wild; **3**: U.S. North, wild; **4**: Imported, wild; **5**: Genera >99% certain unless otherwise stated; insufficient DNA caused low species match; **6**: Genetically undescribed species; good quality DNA sequence did not match any species in database more than stated percentage; **7**. Genera matched other unique species identified*

******: Species not on FDA list; **^**: Genus not on FDA list*