Business Guide to Sustainable Seafood

ALLIANCE for ENVIRONMENTAL INNOVATION
A PROJECT OF ENVIRONMENTAL DEFENSE

e
ENVIRONMENTAL DEFENSE
finding the ways that work

Our mission
Environmental Defense is dedicated to protecting the environmental rights of all people, including the right to clean air, clean water, healthy food and flourishing ecosystems. Guided by science, we work to create practical solutions that win lasting political, economic and social support because they are nonpartisan, cost-effective and fair. The Alliance for Environmental Innovation, a project of Environmental Defense, works cooperatively with companies to create environmental solutions that make business sense.

For more information, please visit www.EnvironmentalDefense.org/Alliance.

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THE ALLIANCE’S SEAFOOD PROJECT
The Alliance’s seafood project team works with leading businesses to identify environmentally preferable seafood products and sources that meet their specifications on price, quality, and supply. The purpose of the project is to demonstrate the business opportunities in retailing more sustainable seafood products and to build market demand for these products. For more information about the seafood project, please call Elizabeth Sturcken or Bruce Hammond at 617-723-2996.

AUTHORS
This report was written by Bruce Hammond, Mathew Elliott, Elizabeth Sturcken, and Elaine Horn. Gwen Ruta and Doug Hopkins provided guidance and editorial review.

DISCLAIMER
This report was prepared by the Alliance for Environmental Innovation to assist businesses in developing environmentally responsible seafood purchasing policies. The environmental rankings, pricing data, and other information in this report are current as of November 2002, to the best of our knowledge, and may not be accurate in the future. Any use of this report for marketing, advertising, promotional or sales purposes is expressly prohibited. The mention of any company, product, or service in this report does not imply endorsement by the Alliance for Environmental Innovation or Environmental Defense. Copyright of this report is held by the Alliance for Environmental Innovation.

Acknowledgments
With seafood, environmental sustainability and business success can go hand in hand. Retailing seafood products that are caught or raised in an environmentally sensitive manner not only benefits the health of the oceans, but it can also provide many opportunities to improve the growth and sustainability of seafood businesses.

As many people in the seafood business know first hand, the oceans are not in good shape. According to the United Nations, over 70% of world fish stocks are fully exploited or overfished and catches are declining. About 44 billion pounds of fish each year are wasted as unwanted “bycatch,” and hundreds of thousands of seabirds, marine mammals, sea turtles, and other marine life are also killed through destructive fishing practices. But for business, the fisheries crisis is also an opportunity. Armed with good information, businesses can play a powerful role in supporting sustainable fisheries and clean aquaculture operations—and in the process both respond to rising consumer concerns and invest in the long-term viability of their business.

This report represents an extensive research effort by the Alliance for Environmental Innovation on the environmental impacts, costs, and supply availability of a broad range of seafood products. Our research shows that, while some seafood products have major environmental problems, a wide variety of high quality, reasonably priced, and environmentally responsible products are available. For most of the unsustainable seafood products, alternatives exist that are similar in taste and texture, often lower in cost, and with greater supply stability.

To determine whether a fishery is environmentally preferable, our researchers looked into the following factors: how abundant a species of fish is, how many fish are being caught, what other types of animals are caught with the fish, whether endangered species are harmed, what effects the fishing gear has on ocean habitats, and how management agencies have responded to these concerns. For farmed seafood, we looked into the type of system used to farm the fish, whether the farms release pollution in the water, what types of chemicals are used, the amount of wild fish that are used as feed, and whether the farmed species is native to where it is raised.

Major findings of our research include:

• **Win-win options abound.** This report highlights a broad range of seafood products that are environmentally preferable, high quality, and a good value. Many of these products have demonstrated their consumer appeal and potential to increase seafood sales and profit margins. For example, tilapia and farm-raised mussels have both proven to be popular and profitable products at a broad range of restaurants across the country.

• **Good substitutes exist for most species in trouble.** For most of the seafood products with negative environmental impacts, alternatives are available that are similar in taste and texture but often considerably cheaper. For example, Atlantic cod, which is depleted, can be replaced in many recipes by other mild white fish such as hoki, catfish, or tilapia—at substantial cost savings.
Chilean sea bass is being overfished and caught illegally, but sablefish offers a comparable flaky white meat and high oil content at a fraction of the cost. In some cases, environmentally preferable alternatives are, from the consumer’s perspective, virtually identical to the original products. For example, while Atlantic halibut stocks are severely depleted, Pacific halibut is well-managed—and a better value.

• **More sustainable seafood is often better quality.** Seafood that is harvested or raised more carefully often has superior taste, freshness, or purity. For example, Atlantic cod caught by hook and line is fresher than most trawl-caught cod because it is caught with smaller boats that make shorter trips. Farm-raised mollusks are typically cleaner and more uniform than dredged wild shellfish. And better-managed fish farming operations use few if any antibiotics and other chemicals.

• **Sustainable seafood means sustainable business.** Almost by definition, dependence on fish stocks that are mismanaged and overexploited is a very risky way to grow your business. On the other hand, seafood products that are prudently managed often provide greater supply and price stability, and are less vulnerable to regulatory changes, consumer boycotts, and other supply or demand shocks. For example, the product quality and supply of Alaskan halibut has become much more consistent since a better management system was implemented in 1995, and halibut has become a favorite product for white tablecloth restaurants and some retailers across the country.

• **The public relations benefits of environmentally responsible seafood.** Retailing more sustainable seafood not only highlights a company’s commitment to ocean conservation, it also demonstrates its concern for sustaining local economies and communities. Clean aquaculture operations and well-managed wild fisheries provide good jobs in rural communities across the U.S. Many environmentally preferable seafood products are domestically harvested or raised and help offset our growing seafood trade deficit.

• **Promotional campaigns can help.** When environmentally sound seafood products with excellent quality, cost, and supply characteristics suffer from a lack of consumer familiarity, promotional campaigns can build demand. The most obvious example is the highly successful marketing campaign for Copper River salmon, which has sparked consumer interest across the country. But there are many other success stories. Albertson’s Supermarkets, for example, has effectively promoted U.S. farmed catfish beyond its southern base, turning it into a top seller nationally.

• **Quality frozen products expand the options.** While most consumers say they prefer “fresh” seafood, their purchasing behavior indicates that frozen seafood can be just as acceptable. Consumers already purchase many previously frozen seafood products, including shrimp, scallops and cod. Orange roughy and Chilean sea bass became very popular (too popular for the health of these fisheries) even though almost all of the product was imported frozen.
Modern freezing technologies provide businesses with high quality and environmentally preferable seafood options. Blind taste tests show that most consumers and chefs prefer frozen-at-sea Alaskan salmon over fresh fish (farmed or wild.) Often by purchasing frozen fillets and thawing them for sale, retailers can take advantage of better pricing and obtain higher margins while still passing savings on to their customers.

**Sustainable seafood—a good bet for the future**

The variety of sustainable seafood products on the market gives businesses that sell seafood the opportunity to build their strategies around products likely to be available in the future. Seafood products that are abundant and well-managed are worth a retailer’s investment of time and resources to source and market. On the other hand, while many environmentally problematic species remain on the market, their supplies are likely to remain limited and unpredictable. Because well managed fisheries are so important for the future of companies that sell seafood, and because retailers generally possess more information about their products than consumers, companies can play a critical role in protecting the marine environment.

**What your business can do**

As this report shows, seafood businesses have a variety of practical options to help protect the fishery resources on which they depend:

- Where cost, quality, and availability are competitive, switch to environmentally preferable seafood products or sources
- Promote more sustainable seafood products as a good way to grow your business and protect fisheries resources long term
- Stop selling seafood products with major environmental impacts (for example, Chilean sea bass, orange roughy, and shark)
- Help inform consumers about the overexploitation of fisheries and the environmental, economic, and quality benefits of more sustainable seafood products

**Notes**

TABLE 1
Pricing and availability for environmentally preferable and less preferable seafood

Please note: Fisheries, fisheries management, and seafood markets change; the following information and rankings reflect our research as of November, 2002, and the information will not necessarily be accurate in the future.

<table>
<thead>
<tr>
<th>Seafood product</th>
<th>Production methods</th>
<th>Product seasonality and availability</th>
<th>Most common product forms</th>
<th>Price range ($/lb)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Wholesale</td>
<td>Retail</td>
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<tr>
<td><strong>FLATFISH</strong></td>
<td></td>
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<tr>
<td>Sole/Flounder (most Atlantic)</td>
<td>Trawl net</td>
<td>Mostly fished year-round</td>
<td>Fresh, frozen fillets</td>
<td>$2.15–$5.15</td>
<td>$3.99–$7.99</td>
</tr>
<tr>
<td>Sole/Flounder (most from U.S. west coast waters)</td>
<td>Trawl net</td>
<td>Abundant but seasonal</td>
<td>Fresh, frozen fillets</td>
<td>$2.00–$4.50</td>
<td>$3.99–$7.99</td>
</tr>
<tr>
<td>Flounder, Yellowtail (Georges Bank)</td>
<td>Trawl net</td>
<td>Limited year-round supply</td>
<td>Fresh fillets</td>
<td>$3.00–$6.00</td>
<td>$4.99 and up</td>
</tr>
<tr>
<td>Flounder, Witch</td>
<td>Trawl net</td>
<td>Limited year-round supply</td>
<td>Fresh fillets</td>
<td>$4.50–$6.95</td>
<td>$6.99 and up</td>
</tr>
<tr>
<td><strong>PREMIUM FISH</strong></td>
<td></td>
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<tr>
<td>Drum, Black</td>
<td>Gillnet, hook&amp;line</td>
<td>Limited year-round quota</td>
<td>Fresh fillets, whole</td>
<td>$2.00–$2.50</td>
<td>$3.99–$6.99</td>
</tr>
<tr>
<td>Grouper</td>
<td>Longline, handline, traps</td>
<td>Very limited seasonal closures</td>
<td>Fresh whole</td>
<td>$2.15–$3.15</td>
<td>$3.99–$6.99</td>
</tr>
<tr>
<td>Halibut, Atlantic</td>
<td>Longline, trawl net</td>
<td>Limited year-round supply (imported)</td>
<td>Steaks, fillets</td>
<td>$3.25–$4.50</td>
<td>$6.00 and up</td>
</tr>
<tr>
<td>Monkfish</td>
<td>Gill net, trawl, dredge</td>
<td>Year-round but fishing limitations</td>
<td>Fresh fillets</td>
<td>$6.00–$8.00</td>
<td>$10.99 and up</td>
</tr>
<tr>
<td>Sea Bass, Chilean</td>
<td>Longline, some trawl</td>
<td>Limited quota but high illegal supply</td>
<td>Fresh, frozen fillets</td>
<td>$8.00–$10.00</td>
<td>$9.99–$13.99</td>
</tr>
<tr>
<td>Snapper, Red</td>
<td>Handline</td>
<td>Seasonal and monthly quotas plus imports</td>
<td>Fresh whole</td>
<td>$2.75–$4.00</td>
<td>$4.99–$6.99</td>
</tr>
<tr>
<td>Shark (all species)</td>
<td>Longline, gillnet, driftnet</td>
<td>Year-round from many sources/species</td>
<td>Fresh, frozen steaks</td>
<td>$3.99–$5.99</td>
<td>$6.99 and up</td>
</tr>
<tr>
<td>Fish</td>
<td>Fishing Method</td>
<td>Availability</td>
<td>Product</td>
<td>Price Range</td>
<td></td>
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</tr>
<tr>
<td>Skate</td>
<td>Trawl net</td>
<td>Limited, peak supply in late spring</td>
<td>Fresh, frozen wing fillet</td>
<td>$0.40–$1.10</td>
<td></td>
</tr>
<tr>
<td>Swordfish (Atlantic)</td>
<td>Longline</td>
<td>Year-round with seasonal peaks</td>
<td>Fresh, frozen steaks, loins</td>
<td>$6.99–$8.99 [steaks]</td>
<td></td>
</tr>
<tr>
<td>Trawl net</td>
<td></td>
<td></td>
<td></td>
<td>$10.99 and up</td>
<td></td>
</tr>
<tr>
<td>Tilefish</td>
<td>Bottom longline, trawl net</td>
<td>Limited quota, available year-round</td>
<td>Fresh whole</td>
<td>$2.00–$4.00</td>
<td></td>
</tr>
<tr>
<td>Tuna, Bluefin</td>
<td>Longline, handline</td>
<td>Year-round, peak supply in summer</td>
<td>Frozen steaks, fresh loins</td>
<td>$6.00 and up [loins]</td>
<td></td>
</tr>
<tr>
<td>Swordfish (Pacific)</td>
<td>Gillnet, longline</td>
<td>Year-round</td>
<td>Fresh, frozen steaks, loins</td>
<td>$4.00–$7.00 [loins]</td>
<td></td>
</tr>
<tr>
<td>Tuna, Bigeye</td>
<td>Longline, handline</td>
<td>Year-round, peak supply in summer</td>
<td>Frozen steaks, fresh loins</td>
<td>$3.50–$10.00 [loins]</td>
<td></td>
</tr>
<tr>
<td>Tuna, Yellowfin</td>
<td>Longline, handline</td>
<td>Year-round, peak supply in summer</td>
<td>Frozen steaks, fresh loins</td>
<td>$3.50–$10.00 [loins]</td>
<td></td>
</tr>
<tr>
<td>Bluefish</td>
<td>Gillnet, trawl net</td>
<td>Seasonally fresh (summer)</td>
<td>Fresh fillets</td>
<td>$2.50–$4.00</td>
<td></td>
</tr>
<tr>
<td>Mahi Mahi</td>
<td>Longline, handline</td>
<td>Generally good year-round</td>
<td>Fresh, frozen whole, fillets</td>
<td>$1.75–$4.00</td>
<td></td>
</tr>
<tr>
<td>Sea Bass, Black</td>
<td>Trawl net, pots</td>
<td>Very limited quota</td>
<td>Fresh whole</td>
<td>$2.00–$3.00</td>
<td></td>
</tr>
<tr>
<td>Swordfish</td>
<td>Harpooned</td>
<td>Very limited</td>
<td>Fresh steaks</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Tuna, Bigeye</td>
<td>Longline, handline</td>
<td>Year-round, peak supply in summer</td>
<td>Frozen steaks, fresh loins</td>
<td>$6.99 and up</td>
<td></td>
</tr>
<tr>
<td>Tuna, Yellowfin</td>
<td>Longline, handline</td>
<td>Year-round, peak supply in summer</td>
<td>Frozen steaks, fresh loins</td>
<td>$6.99 and up</td>
<td></td>
</tr>
<tr>
<td>Halibut, Pacific</td>
<td>Gillnet, longline</td>
<td>May-October quota limited</td>
<td>Steaks, fillets</td>
<td>$2.75–$3.50</td>
<td></td>
</tr>
<tr>
<td>Sablefish (Black Cod)</td>
<td>Mostly longline</td>
<td>Quota Limited</td>
<td>Whole (headed and gutted)</td>
<td>$3.50–$4.50</td>
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<tr>
<td>Striped Bass</td>
<td>Farmed/hook and line</td>
<td>Limited wild, good supply of farmed</td>
<td>Fresh whole, fillets</td>
<td>$4.00–$8.00</td>
<td></td>
</tr>
<tr>
<td>Tuna, Albacore</td>
<td>Troll, Handline</td>
<td>Troll fishery July-September</td>
<td>Fresh, frozen whole and loins</td>
<td>$1.50–$2.00 [loins]</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$4.99 and up</td>
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</table>
### SALMONIDS

<table>
<thead>
<tr>
<th>Seafood product</th>
<th>Production methods</th>
<th>Product seasonality and availability</th>
<th>Most common product forms</th>
<th>Price range ($/lb)</th>
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<td>Wholesale</td>
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<td></td>
<td></td>
<td></td>
<td>Retail</td>
</tr>
<tr>
<td><strong>Salmon, Farmed</strong></td>
<td>Ocean cages</td>
<td>Year-round large supply</td>
<td>Fresh, frozen fillets</td>
<td>$1.40–$2.60 (fillets)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3.99–$5.99</td>
</tr>
<tr>
<td><strong>Arctic Char (farmed)</strong></td>
<td>Tanks, ponds</td>
<td>Limited fresh year-round</td>
<td>Fresh whole, fillets</td>
<td>$6.00–$7.00 (fillets)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$8.99 and up</td>
</tr>
<tr>
<td><strong>Salmon, Alaska Chum</strong></td>
<td>Gillnet, purse seine</td>
<td>Abundant fresh late June-October</td>
<td>Fresh, frozen steaks and fillets</td>
<td>$1.20–$1.50 (fillets)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$1.99–$3.99</td>
</tr>
<tr>
<td><strong>Salmon, Alaska Coho</strong></td>
<td>Handline, gillnet</td>
<td>Best fresh supply August-October</td>
<td>Fresh, frozen whole and fillets</td>
<td>$2.00–$2.50 (fillets)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3.99–$5.99</td>
</tr>
<tr>
<td><strong>Salmon, Alaska King</strong></td>
<td>Handline, gillnet</td>
<td>Abundant fresh May-November</td>
<td>Fresh, frozen whole and fillets</td>
<td>$5.99–$7.99 (H&amp;G)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$8.99 and up</td>
</tr>
<tr>
<td><strong>Salmon, Alaska Sockeye</strong></td>
<td>Gillnet, purse seine</td>
<td>Readily available fresh May-August</td>
<td>Fresh, frozen whole and fillets</td>
<td>$1.99–$2.99 (H&amp;G)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>$5.99–8.99</td>
</tr>
<tr>
<td><strong>Salmon, Alaska Pink</strong></td>
<td>Gillnet, purse seine</td>
<td>Abundant fresh July-August</td>
<td>Fresh, frozen whole head off</td>
<td>$0.65–$1.50 (whole)</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>$0.99 – $2.99</td>
</tr>
<tr>
<td><strong>Salmon, California King</strong></td>
<td>Troll</td>
<td>Limited seasonally May-September</td>
<td>Fresh, whole and fillets</td>
<td>$4.99–$5.99</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>$7.99 and up</td>
</tr>
<tr>
<td><strong>Frozen-at-sea wild salmon (Alaska, California King)</strong></td>
<td>Troll</td>
<td>Limited supply available year-round of king, coho, chum, sockeye and pink.</td>
<td></td>
<td>$1–$2/lb. price premium over shore-frozen</td>
</tr>
<tr>
<td><strong>Trout (farmed)</strong></td>
<td>Ponds, raceways</td>
<td>Abundant year-round</td>
<td>Fresh dressed and fillets</td>
<td>$2.25–$2.50 (dressed)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>$3.99–$4.99</td>
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### WHITEFISH

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<thead>
<tr>
<th>Seafood product</th>
<th>Production methods</th>
<th>Product seasonality and availability</th>
<th>Most common product forms</th>
<th>Price range ($/lb)</th>
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<tbody>
<tr>
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<td>Wholesale</td>
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<td></td>
<td>Retail</td>
</tr>
<tr>
<td><strong>Cod, Atlantic</strong></td>
<td>Trawl net, gillnet</td>
<td>Moderate (mainly imported)</td>
<td>Fresh, frozen fillets</td>
<td>$2.40–$4.00</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$4.99–$7.99</td>
</tr>
<tr>
<td><strong>Haddock</strong></td>
<td>Trawl net</td>
<td>Moderate (imported)</td>
<td>Fresh, frozen fillets</td>
<td>$3.00–$3.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$5.99–$7.99</td>
</tr>
<tr>
<td><strong>Basa (farmed imported)</strong></td>
<td>Cages, ponds</td>
<td>Large year-round supply</td>
<td>Frozen fillets</td>
<td>$1.30–$1.60</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3.99–$4.99</td>
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### Other Fish Species

<table>
<thead>
<tr>
<th>Seafood product</th>
<th>Production methods</th>
<th>Product seasonality and availability</th>
<th>Most common product forms</th>
<th>Price range ($/lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cod, Atlantic</td>
<td>Hook &amp; line</td>
<td>Limited availability</td>
<td>Fresh whole fish, fillets</td>
<td>$4.00–$5.00</td>
</tr>
<tr>
<td>Cod, Pacific</td>
<td>Longline, trawl net</td>
<td>Large year-round supply</td>
<td>Fresh (thawed), frozen fillets</td>
<td>$2.30–$2.60</td>
</tr>
<tr>
<td>Haddock [Georges Bank]</td>
<td>Trawl net</td>
<td>Moderate</td>
<td>Fresh, frozen fillets</td>
<td>$3.00–$3.60</td>
</tr>
<tr>
<td>Pollock, Alaska</td>
<td>Midwater trawl</td>
<td>Large year-round supply</td>
<td>Frozen fillets</td>
<td>$0.90–$1.30</td>
</tr>
<tr>
<td>Tilapia [farmed imported]</td>
<td>Ponds, cages</td>
<td>Large year-round supply</td>
<td>Fresh, frozen fillets</td>
<td>$1.90–$3.00</td>
</tr>
<tr>
<td>Whiting, Pacific</td>
<td>Trawl net</td>
<td>Large, year-round supply</td>
<td>Frozen fillets</td>
<td>$0.90–$2.20</td>
</tr>
<tr>
<td>Catfish, Channel</td>
<td>Pond raised</td>
<td>Large year-round supply</td>
<td>Fresh, frozen fillets</td>
<td>$2.60–$2.90</td>
</tr>
<tr>
<td>Hoki [New Zealand]</td>
<td>Deepwater trawl net</td>
<td>Large year-round supply</td>
<td>Frozen fillets</td>
<td>$1.40–$1.80</td>
</tr>
<tr>
<td>Tilapia (U.S. farmed)</td>
<td>Ponds, cages</td>
<td>Limited year-round supply</td>
<td>Fresh, frozen fillets</td>
<td>$1.90–$3.00</td>
</tr>
</tbody>
</table>

### Crustaceans

<table>
<thead>
<tr>
<th>Seafood product</th>
<th>Production methods</th>
<th>Product seasonality and availability</th>
<th>Most common product forms</th>
<th>Price range ($/lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lobster, Spiny (Caribbean)</td>
<td>Trapped/Diver</td>
<td>Good supply, various species and areas</td>
<td>Frozen Tails</td>
<td>$12.00–$20.00</td>
</tr>
<tr>
<td>Shrimp (farmed)</td>
<td>Ponds</td>
<td>Abundant</td>
<td>Frozen shell-on and cooked</td>
<td>$3.99 and up</td>
</tr>
<tr>
<td>Warmwater Shrimp (wild-caught)</td>
<td>Trawl net (w/o TEDs or BRDs)²</td>
<td>Seasonally abundant</td>
<td>Frozen shell-on</td>
<td>$2.99 and up</td>
</tr>
<tr>
<td>Crab, King (Alaska)</td>
<td>Trap</td>
<td>Quota Limited</td>
<td>Legs</td>
<td>$7.00–$15.00</td>
</tr>
<tr>
<td>Crab, Snow</td>
<td>Trap</td>
<td>Quota Limited</td>
<td>Legs/Sections</td>
<td>$2.50–$4.00</td>
</tr>
</tbody>
</table>

1. Major environmental impacts
2. Some environmental impacts
3. Minimal environmental impacts
### CRUSTACEANS (CONTINUED)

<table>
<thead>
<tr>
<th>Seafood product</th>
<th>Production methods</th>
<th>Product seasonality and availability</th>
<th>Most common product forms</th>
<th>Price range ($/lb)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Crab, Swimming (Blue)</td>
<td>Trap (pots), trawl</td>
<td>Year-round, peak April–October</td>
<td>Whole, meat</td>
<td>$15.00–$20.00</td>
<td>(meat)</td>
</tr>
<tr>
<td>Lobster, American</td>
<td>Trapped</td>
<td>Year-round, peak supply in summer/fall</td>
<td>Live Whole</td>
<td>$5.00–$8.00</td>
<td>$7.99 and up</td>
</tr>
<tr>
<td>Warmwater shrimp (wild caught U.S.)</td>
<td>Trawl net (with TEDs and BRDs)</td>
<td>Supply varies season to season</td>
<td>Frozen tails</td>
<td>$4.00–$10.00</td>
<td>$6.99 and up</td>
</tr>
<tr>
<td>Coldwater Shrimp (Newfoundland or Oregon fisheries)</td>
<td>Trawl net</td>
<td>Seasonally abundant</td>
<td>Cooked meat (fresh ad frozen)</td>
<td>$2.00–$3.50</td>
<td>$3.99–$5.99</td>
</tr>
<tr>
<td>Crab, Dungeness</td>
<td>Trap</td>
<td>Varies by Season</td>
<td>Whole cooked</td>
<td>$3.00–$5.00</td>
<td>$5.99–$7.99</td>
</tr>
<tr>
<td>Crab, Jonah and Rock</td>
<td>Trap (lobster pot by-catch)</td>
<td>Heaviest July-October</td>
<td>Frozen cooked meat</td>
<td>$7.00–$10.00</td>
<td>$8.99 and up</td>
</tr>
<tr>
<td>Crab, Red</td>
<td>Trap</td>
<td>Year-round, quota limited</td>
<td>Cooked meat</td>
<td>$2.00–$3.50</td>
<td>N/A</td>
</tr>
<tr>
<td>Crab, Stone</td>
<td>Trap (Pots)</td>
<td>Limited fishery October to May plus imports</td>
<td>Fresh claws</td>
<td>$6.00–$12.00</td>
<td>$8.99 and up</td>
</tr>
<tr>
<td>Lobster, rock (Australia)</td>
<td>Trap</td>
<td>Moderate imported supply, Seasonal</td>
<td>Frozen tails</td>
<td>$20.00–$25.00</td>
<td>$30.00 and up</td>
</tr>
<tr>
<td>Shrimp (farmed)</td>
<td>Pond raised with environmentally preferable methods (U.S., Australia, others)</td>
<td>Moderate</td>
<td>Frozen shell-on and cooked</td>
<td>$3.99 and up</td>
<td>$7.99 and up</td>
</tr>
</tbody>
</table>

### MOLLUSKS

<table>
<thead>
<tr>
<th>Seafood product</th>
<th>Production methods</th>
<th>Product seasonality and availability</th>
<th>Most common product forms</th>
<th>Price range ($/lb)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Oysters</td>
<td>Dredged</td>
<td>Variable by area</td>
<td>Live, half-shell, meat</td>
<td>$2.50–$5.00</td>
<td>per dozen</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>$3.99–$7.99</td>
<td></td>
</tr>
<tr>
<td>Fishery</td>
<td>Production Method</td>
<td>Abundance</td>
<td>Type</td>
<td>Price Range</td>
<td></td>
</tr>
<tr>
<td>-------------------------</td>
<td>----------------------------</td>
<td>--------------------</td>
<td>-----------------------</td>
<td>----------------------</td>
<td></td>
</tr>
<tr>
<td>Quahogs, Ocean</td>
<td>Dredged</td>
<td>Abundant</td>
<td>Meat</td>
<td>$12.00–$15.00 per gallon $15.99–$18.99</td>
<td></td>
</tr>
<tr>
<td>Scallops, Sea</td>
<td>Dredged</td>
<td>Variable by area</td>
<td>Fresh, frozen meat</td>
<td>$2.99–$8.00 $4.99–$10.99</td>
<td></td>
</tr>
<tr>
<td>Squid, Market (Calif.)</td>
<td>Trawl, purse seine</td>
<td>Abundant year-round</td>
<td>Fresh whole, cleaned tubes</td>
<td>$1.20–$1.50 t tubes $2.99–$3.99</td>
<td></td>
</tr>
<tr>
<td>Clams</td>
<td>Farmed</td>
<td>Abundant year-round</td>
<td>Live</td>
<td>$0.13–$0.30 (each) $0.25 and up</td>
<td></td>
</tr>
<tr>
<td>Mussels</td>
<td>Farmed on ropes</td>
<td>Abundant year-round</td>
<td>Live, frozen</td>
<td>$0.80–$0.90 $1.99–$3.99</td>
<td></td>
</tr>
<tr>
<td>Oysters</td>
<td>Farmed on ropes</td>
<td>Abundant year-round</td>
<td>Live, meat, half-shell</td>
<td>$2.50–$5.00 per dozen $3.99 and up</td>
<td></td>
</tr>
<tr>
<td>Scallops, Bay</td>
<td>Farmed</td>
<td>Imported, good supply</td>
<td>Frozen meat</td>
<td>$1.60–$3.00 $3.99–$5.99</td>
<td></td>
</tr>
<tr>
<td>Scallops, Sea</td>
<td>Dredged with multi-beamed mapping</td>
<td>Limited</td>
<td>Meat</td>
<td>$6.00–$7.00 $6.99–$12.99</td>
<td></td>
</tr>
<tr>
<td>Scallops, Sea</td>
<td>Diver caught</td>
<td>Limited availability</td>
<td>Fresh meat</td>
<td>$4.50–$8.00 $7.99 and up</td>
<td></td>
</tr>
</tbody>
</table>

Sources: Market Reports, National Marine Fisheries Service; Price Reports, Urner Barry Publications, Inc.; and interviews with industry representatives.

1 This column lists common production methods and is not a complete listing of production methods for a given fishery.

2 TEDs (Turtle Excluder Devices) and BRDs (Bycatch Reduction Devices) both help to reduce bycatch in the shrimp fishery and are required under U.S. law.
<table>
<thead>
<tr>
<th>Species</th>
<th>Production methods</th>
<th>Environmental impacts</th>
<th>Substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Most Atlantic Sole/Flounder</td>
<td>Trawl net</td>
<td>Many stocks overfished, Habitat damage from trawling, High bycatch</td>
<td>Pacific flatfish can be substituted for their Atlantic cousins in many recipes, and are comparable in price. Pacific stocks of English, Dover, Petrale, and Sand soles are not considered overfished. Two better east coast options are witch flounder, a premium flatfish that has not been overfished, and Georges Bank yellowtail, which is recovering strongly; both can be slightly more expensive than other Atlantic flatfish. Other whitefish such as pollock, catfish, and tilapia can be substituted for flatfish in many applications and are cheaper.</td>
</tr>
</tbody>
</table>

**FLATFISH**

**PREMIUM FISH**

<table>
<thead>
<tr>
<th>Species</th>
<th>Production methods</th>
<th>Environmental impacts</th>
<th>Substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic Halibut</td>
<td>Longline, trawl net, gillnet</td>
<td>Overfished, High bycatch, Habitat damage from trawling</td>
<td>On both taste and texture, Pacific halibut is an excellent substitute for Atlantic halibut and is also less costly. Other fish with the flaky texture of halibut include Pacific cod, pollock, or striped bass.</td>
</tr>
<tr>
<td>Black Drum</td>
<td>Gillnet, hook and line</td>
<td>Overfished</td>
<td>Black drum is a relatively mild-tasting white-fleshed fish. Whitefish such as catfish and tilapia can be substituted in many recipes and are less expensive.</td>
</tr>
<tr>
<td>Bluefin Tuna</td>
<td>Longline, handline</td>
<td>Overfished, High longline bycatch</td>
<td>Bluefin tuna can be replaced in many recipes by other tunas such as albacore or yellowfin, or by mahi mahi. These substitutes are all less costly.</td>
</tr>
<tr>
<td>Chilean Sea Bass</td>
<td>Longline, some trawl</td>
<td>Overfished, Illegal fishing, High longline bycatch of birds and marine life</td>
<td>Because of its white, flaky meat and high oil content, there are few other fish that taste like Chilean sea bass. Black cod (sablefish) from the West Coast of North America is one less costly exception. Striped bass is more mild but can be substituted in some recipes, and is also less expensive.</td>
</tr>
<tr>
<td>Species</td>
<td>Production methods</td>
<td>Environmental impacts</td>
<td>Substitutes</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Grouper</td>
<td>Longline, trawl net</td>
<td>• Several species overfished or endangered • High bycatch</td>
<td>Some groupers have a delicate, rich, and buttery taste comparable to rainbow trout. Other groupers have a mild, sweet flavor similar to mahi mahi and striped bass. Mild whitefish such as Alaska pollock, catfish, and tilapia can also be substituted in some applications. Grouper is comparably priced or more expensive than these substitutes.</td>
</tr>
<tr>
<td>Orange Roughy</td>
<td>Deepwater trawl</td>
<td>• Overfished • Habitat damage from trawling</td>
<td>Orange roughy is a white meat with a moderate flavor and texture similar to pollock, mahi mahi, and rainbow trout. At $7 to $9 retail, orange roughy is easily replaced at lower cost with a range of other fish.</td>
</tr>
<tr>
<td>Red Snapper</td>
<td>Handline</td>
<td>• Overfished • Other species in trouble sold as red snapper • Fishing can damage coral reefs</td>
<td>Red snapper has a unique nutty flavor with a firm, dense flesh. Mild whitefish such as tilapia, catfish, and Alaska pollock can replace snapper in many recipes and are less expensive. Mahi mahi and striped bass are also potential alternatives, though the latter is sometimes more expensive.</td>
</tr>
<tr>
<td>Shark</td>
<td>Longline, gillnet, driftnet</td>
<td>• Overfished • Shark finning • High longline bycatch</td>
<td>Generally, shark has a firm, dense flesh similar to swordfish or tuna. Its citrus-like flavor is bolder than swordfish, and closer to skipjack tuna. Shark steaks are in the same price class as Pacific halibut and many tunas.</td>
</tr>
<tr>
<td>Skate</td>
<td>Trawl net</td>
<td>• Overfished • Habitat damage from trawling</td>
<td>The taste and texture combination of skate is unique. Skate wings have an almost scallop-like consistency, but the flesh is softer like mahi mahi or trout. Skate’s sweet, even flavor is closer to that of Pacific halibut. At $0.40 to $1.10 a pound, skate is cheaper than most other options.</td>
</tr>
<tr>
<td>Tilefish</td>
<td>Bottom longline, trawl net</td>
<td>• Overfished • Habitat damage from trawling</td>
<td>Tilefish has a mild taste that takes on the flavor of its sauce. It is similar to mahi mahi, tilapia, striped bass, or pollock. Tilefish are relatively inexpensive and are seasonally in the same cost range as mahi mahi or pollock.</td>
</tr>
</tbody>
</table>

**Salmonids**

<table>
<thead>
<tr>
<th>Species</th>
<th>Production methods</th>
<th>Environmental impacts</th>
<th>Substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmed Salmon</td>
<td>Ocean net pens</td>
<td>• Water pollution • Damage to coastal habitats • Threats to wild salmon stocks • Chemical use • Toxics in farmed fish</td>
<td>Arctic char and rainbow trout are both good substitutes for farmed salmon. Many chefs prefer char because it has a cleaner flavor and a more delicate texture. Wild Alaskan salmon, including quality frozen product, is considered by many to have better flavor than farmed Atlantic salmon. While Atlantic salmon is currently inexpensive due to the glut on the world market, wild coho and chum salmon as well as farmed trout are comparably priced.</td>
</tr>
</tbody>
</table>
### WHITEFISH

<table>
<thead>
<tr>
<th>Species</th>
<th>Production methods</th>
<th>Environmental impacts</th>
<th>Substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic Cod</td>
<td>Trawl net, gillnet</td>
<td>• Overfished • Habitat damage from trawling • High bycatch</td>
<td>Any mild tasting whitefish can substitute for cod in many applications. Alternatives include Pacific halibut, Alaska pollock, striped bass, and New Zealand hoki. At $5 to $8 retail, Atlantic cod costs as much or more than most of these alternatives. As another option, hook &amp; line caught Atlantic cod is consistently high quality, only moderately more expensive, and does not cause damage to ocean habitat.</td>
</tr>
<tr>
<td>Haddock</td>
<td>Trawl net</td>
<td>• Overfished • Habitat damage from trawling • High bycatch</td>
<td>Haddock from Georges Bank is an environmentally preferable and a cost-neutral option. With haddock at $6 to $8 retail, Alaska pollock, hoki, and Pacific whiting are all considerably less expensive than haddock and have similar tastes and textures. Pacific halibut is another white fish with a similar sweet flavor.</td>
</tr>
</tbody>
</table>

### LOBSTER

<table>
<thead>
<tr>
<th>Species</th>
<th>Production methods</th>
<th>Environmental impacts</th>
<th>Substitutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spiny Lobster (Caribbean)</td>
<td>Trapped/Diver</td>
<td>• Many stocks overfished</td>
<td>American lobsters are considerably less expensive, though they are typically sold as whole animals instead of frozen tails. Australian rock lobster and California or Florida spiny lobster are also better alternatives.</td>
</tr>
<tr>
<td>Species</td>
<td>Production methods</td>
<td>Environmental impacts</td>
<td>Substitutes</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>--------------------</td>
<td>---------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Most Imported Farmed Shrimp</td>
<td>Pond raised</td>
<td>• Damage to mangroves and other coastal habitats</td>
<td>Shrimp farmed with environmentally preferable methods (including most U.S. farmed-shrimp) are comparable or better quality than typical farmed shrimp and priced competitively. Wild northern shrimp, which have a delicious sweet flavor but a softer texture and smaller size, are often cheaper than farmed shrimp and make excellent substitutes in some applications. Crab or scallops can also be substituted for shrimp in some recipes.</td>
</tr>
<tr>
<td>Most imported wild-caught shrimp</td>
<td>Trawl net</td>
<td>• High bycatch (including endangered sea turtles</td>
<td>As described above, good substitutes include shrimp farmed with environmentally preferable methods and northern shrimp. Farmed shrimp are sometimes more expensive than wild caught, while northern shrimp are usually cheaper.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Turtle Excluder Devices (TEDs) and Bycatch Reduction Devices (BRDs) help but are often not used</td>
<td></td>
</tr>
</tbody>
</table>
Key to environmental rankings

- Minimal environmental impacts
- Some environmental impacts
- Major environmental impacts

Please note: In the following profiles of seafood products, only those fisheries listed in the “Environmental impacts” section have been researched and ranked on their environmental impacts. The Alliance has not researched the environmental impacts of other fisheries mentioned in the profiles. Please note also that fisheries, fisheries management, and seafood markets change; the following information and rankings reflect our research as of November 2002, and the information will not necessarily be accurate in the future.
Arctic char, a member of the salmonid family closely related to brook and lake trout, is found worldwide in Arctic and sub-Arctic waters. Like rainbow trout, some strains of Arctic char (it can also be spelled charr) remain in freshwater, while others migrate from fresh water rivers to the ocean and back to spawn. Unlike Pacific salmon, they do not die after spawning. Char that are caught shortly after leaving the ocean will have a silvery skin with shades of pink along its body. Char caught (or farmed) in fresh water will have darker coloration and large areas of red and orange on their stomachs. Depending on their diet, char can have a flesh color that varies from almost white to red, but the taste is quite similar and it has a finer flake than salmon or trout. Arctic char can grow quite large, reaching a size of 35 pounds, and may live up to 25 years.

FISHERIES
Natural stocks of Arctic char support very small fisheries in Canada and Greenland. These fish are caught primarily by gillnet in the summer, after the lakes become ice-free. Arctic char are farmed in increasing quantities in a number of countries, including Iceland, Canada, Norway and the U.S. Most of the farms are land-based farms that use either tanks, raceways or ponds, although a few farms use net cages. It takes almost twice as long to grow Arctic char as it does Atlantic salmon.

PRODUCT FORMS
Wild Arctic char are sold whole, either as fresh or frozen fish. Farmed Arctic char are sold fresh whole, and as fresh or frozen boneless fillets, skin-on or skin-off.

WHOLESALE PRICE/SUPPLY HISTORY
Because they are more costly to grow and are available in relatively limited quantities, Arctic char are considerably more expensive than salmon or trout. Fresh, farmed whole char normally sell for about $3 to $3.50/lb., while fillets will average about $6 to $7/lb. Fresh and frozen whole wild Arctic char sell for between $2 and $3/lb., depending on quality.

Wild Arctic char is not widely available, as landings in Canada are less than 50 metric tons a year and the fishery lasts only a few months in the summer. Supplies of farmed Arctic char, however, are steadily increasing and are available year-round.

BUYING GUIDE/SOURCING
Farm-raised Arctic char have a very consistent pinkish-orange meat color (a synthetic carotenoid pigment is added to their feed) and the quality is normally very high. The quality of wild Arctic char, on the other hand, can be inconsistent due to both natural variations in skin and meat color and the manner in which the fish were handled. As a rule, larger char are preferred as they have a higher oil content and a higher yield. Because wild char spawn in the summer, fish caught later in the summer will have inferior meat quality.
MARKETS
Arctic char are marketed mainly to high-end restaurants and some gourmet grocery stores in large urban centers.

PRODUCT SUBSTITUTION
Arctic char are an excellent substitute for farm-raised salmon. Many chefs prefer char because it has a cleaner flavor and a more delicate texture.
**Bluefish (Pomatomus saltatrix)**

A voracious migratory predator, bluefish are found in most waters of the world with the exception of the eastern Pacific. Along the East Coast, bluefish migrate inshore in the spring and move up the coast from Florida to Maine. In the fall, bluefish move southward and spend the winter offshore. Bluefish are a prime target of sport fishermen off the East Coast, as they aggressively take bait. Approximately 80 percent of the total U.S. catch of bluefish is landed by sport fishermen. Bluefish are a fast-growing fish and can reach a size of more than 20 pounds, but most of the commercial catch is under 12 pounds.

**FISHERIES**

Bluefish are caught by both trawl net and gillnet. In North Carolina, which produces about half of the annual U.S. bluefish harvest, bluefish are landed mainly by gillnet, while off the Northeast bluefish are landed primarily by trawlers, primarily as a bycatch. More than half the annual commercial bluefish catch is landed between June and September.

**PRODUCT FORMS**

Bluefish are primarily sold fresh, both as fillets and as whole fish. Filets are normally sold skin-on, pinbone in and average between 1 and 2 pounds.

**WHOLESALE PRICE/SUPPLY HISTORY**

As with all seasonal fresh fish, bluefish prices will fluctuate widely, depending on landings. The price of whole bluefish normally fluctuates from a low of $.40/lb. during periods of peak summer availability to a high of about $.80/lb. in the spring and fall. Bluefish fillets normally sell between $2.50 to $4/lb. Although more than 50,000 metric tons of bluefish were landed by sport and commercial fishermen in the 1980s, catches have declined significantly since then. In recent years, commercial landings of bluefish have averaged about 3,500 metric tons. While overall landings have declined, fresh bluefish remains widely available during the warm weather months.

**BUYING GUIDE/SOURCING**

Because they have a high oil content, bluefish are highly perishable and need to be quickly cleaned and iced. However, during periods of peak landings and low prices, fishermen do not always handle bluefish as carefully as they should. When buying fresh bluefish pay extra attention to the quality, as this fish can have a short shelf life. Further information on bluefish can be found at the New York seafood web site www.nyseafood.org.

**MARKETS**

Fresh bluefish are sold primarily in markets near where they are caught. For that reason, most bluefish is sold along the East Coast, from North Carolina to Maine. Bluefish are sold to both retail and food service markets.

**PRODUCT SUBSTITUTION**

Bluefish are a full-flavored fish that are excellent grilled and broiled. They are a potential alternative to other high-oil content fish like farmed salmon.

<table>
<thead>
<tr>
<th>Fresh fillet price range ($/lb)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Wholesale</td>
<td>$2.50–$4.00</td>
</tr>
<tr>
<td>Retail</td>
<td>$4.99–$6.99</td>
</tr>
</tbody>
</table>

Mainly spring and summer, limited supply

**Environmental impacts**

- Some

---

*Fresh fillet price range ($/lb)*

| Wholesale | $2.50–$4.00 |
| Retail    | $4.99–$6.99 |

Mainly spring and summer, limited supply

**Environmental impacts**

- Some
Numerous species of the Pangasiidae family of catfish are found in Southeast Asia and two are farmed, primarily in the Mekong Delta region of southern Vietnam. Both of these species, *Pangasius bocourti* and *Pangasius hypophthalmus*, are marketed in the U.S. collectively as “basa,” although *P. bocourti* is the species correctly called basa. Most of the basa exported to the U.S. is *P. hypophthalmus*, which is called “tra” in Vietnam. Of the two, basa is considered more desirable because its meat is slightly whiter when raw.

Both basa and tra have mild-tasting meat that is very similar to the channel catfish farmed in the Mississippi Delta. However, Vietnamese fish farmers have significant cost advantages over U.S. catfish farmers. Tra, for example, can be grown to a market size of two pounds in just six to eight months, less than half the time it takes to grow a channel catfish.

**FISHERIES**

Most tra and basa are grown in cages that are suspended under floating barges in many parts of the Mekong River. Both species are also grown in earthen ponds; however, fish grown in ponds are more prone to acquiring an off flavor from types of algae. Tra, the hardier of the two species, are easier to spawn in captivity and can be raised in higher densities, which is why they dominate production. Both fish are raised on a diet that includes both grain-based manufactured feed and locally caught inexpensive fish that is ground up.

**PRODUCT FORMS**

Basa and tra are most often exported as frozen, skinless, boneless fillets, although very small quantities of fresh basa fillets are exported to the U.S. Vietnamese processors remove more of the fat layer than U.S. catfish processors, which results in a whiter fillet with a lower-fat content. Increasing amounts of dressed (skinned, head-off) tra are also being exported.

**WHOLESALE PRICE/SUPPLY HISTORY**

Although the first frozen basa fillets exported to the U.S. sold at a wholesale price of about $2.50/lb., prices have declined significantly as Vietnamese farmers switched to growing tra and production increased. Wholesale prices for tra fillets currently range between a low of $1.30/lb. to $1.60/lb.

Supplies of tra have increased significantly as Vietnamese farmers develop new export markets. Exports of fillets to the U.S., for example, have grown from just 260 metric tons in 1998 to almost 8,000 metric tons in 2001. As the Vietnamese government has placed a high priority on developing its export-based aquaculture industry, U.S. supplies of tra and basa will continue to grow at a very rapid rate.

**BUYING GUIDE/SOURCING**

Both basa and tra are usually delivered live to processing plants and processed immediately, so the quality is normally very high. However, some fish that are harvested in ponds can have an off flavor, so buyers need to buy from reliable importers. Some processors will also soak their fillets in a sodium tripolyphosphate
solution, which can result in an inferior product. Frozen basa and tra is available from most major seafood wholesalers and distributors or from leading importers. Additional information can be found at the Vietnam Association of Seafood Exporters and Producers (www.vasep.vn.com).

MARKETS
Much of the basa sold in the United States has been labeled as catfish. New regulations prohibit the fish from being labelled as catfish. However, it is likely that some restaurants and supermarkets are still offering basa as catfish and taking advantage of the lower wholesale price. Basa is an excellent fish for both retail and foodservice in its own right.

PRODUCT SUBSTITUTION
White, bland and boneless, basa and tra fillets have a medium-firm texture that makes them an excellent substitute for flounder and sole, as well as firmer-fleshed whitefish such as rockfish or snapper.
Once considered a lowly scavenger, the channel catfish, which is native to the southeastern U.S., is the basis for the largest aquaculture industry in the U.S. In the early 1980s, soy and cotton farmers in Mississippi began converting their fields to shallow ponds to grow catfish and they never looked back. Today, catfish farming is a major industry not only in Mississippi, but also in Alabama and Arkansas. Annual production of farmed catfish in the U.S. has reached almost 300,000 metric tons (660 million pounds), which is more than four times the total harvest of groundfish caught off the East Coast of the U.S.

FISHERIES
Catfish are farmed in large clay ponds, each of which can cover 10 to 20 acres. Water is pumped from wells to fill the ponds to an average depth of 4 to 6 feet. It takes about 18 months to raise a catfish to a harvestable size of about 1.5 pounds. Catfish are raised on a grain-based diet that also includes as much as 8 percent fishmeal.

PRODUCT FORMS
Catfish is sold both fresh and frozen in a wide variety of product forms. The most popular products include whole dressed fish (eviscerated, skinned and head-off), steaks, skinless, boneless fillets and fillet strips. Catfish processors also produce a number of value-added products, including marinated and breaded fillets.

WHOLESALE PRICE/SUPPLY HISTORY
Catfish prices normally fluctuate within a fairly narrow range, as opposed to the wide price swings of many wild-caught fish. The wholesale price of fresh and frozen fillets, for example, typically moves in a narrow price range between $2.60–$2.90/lb. Whole dressed catfish will sell for prices that average between $1.80–$2.20/lb. most of the time. Catfish prices tend to be at their highest point of the year in February or March, when the stocks of fish in the pond are normally at their low point. The growth in U.S. catfish production has begun to slow down in recent years after almost 20 years of sharp increases. Given the huge volume of catfish currently farmed in the U.S., however, that is not surprising. Supplies of catfish are plentiful throughout most of the year, though supplies may be tight in late winter (because catfish don't grow in the cold weather months, farmers are reluctant to harvest fish that will rapidly put on weight after the weather gets warmer).

BUYING GUIDE/SOURCING
Catfish processors conduct taste tests on fish before they harvest them to ensure they do not have an “off-flavor,” which is caused by a type of algae in the water. As a result, the quality of catfish is very consistent, as the fish are delivered live to the processing plant and processed within a few minutes. Although catfish processors will soak their fillets in a sodium tripolyphosphate solution to prevent moisture loss, some processors will abuse this to gain moisture and add weight. Fresh and frozen catfish is available from all major seafood distributors. Further information is available from The Catfish Institute at www.catfishinstitute.com.
MARKETS
Catfish is now widely marketed throughout the U.S., although consumption is still heaviest in traditional southeastern markets. As catfish is increasingly served in many fine restaurants, its market appeal has broadened considerably.

PRODUCT SUBSTITUTION
Catfish is a mild, white fish that has wide applications, as it is suited for most culinary applications from sautéing to deep-frying. It is an excellent substitute for other white fish such as flounder, rockfish, grouper or snapper. West coast retailers are using more and more catfish to replace rockfish and Pacific red snapper, which are now in short supply.
The U.S. is a major producer of clams, harvesting more than 50,000 metric tons of meats each year from a variety of species. The largest single clam fishery is for surf clams (*Spisula solidissima*), a large clam that is dredged off the East Coast from Virginia to Massachusetts. A closely related species, the Arctic surf clam (*Mactromeris polynyma*) is landed in deep water off the Canadian Maritimes.

The next largest U.S. clam fishery is for ocean quahogs (*Arctica islandica*), which are found further offshore than surf clams. Small ocean quahogs are harvested closer to shore off New England by small boats with dredges. These small clams are sold live as either “golden little necks,” “golden necks” or “mahogany clams” because of their light brown shells.

Although production is only about a fifth that of surf clams, the Atlantic hard clam (*Mercenaria mercenaria*) is the most valuable clam resource in the U.S. in terms of the monetary value of the total harvest. Hard clams are dug by hand with tongs and rakes and small amounts are dredged from small boats. In Florida and Massachusetts, a large percentage of the hard clam harvest comes from leased beds, which shellfish farmers plant with clam seed. Depending on their size, hard clams are sold under a variety of names such as Little Necks, Cherrystones, Top Necks and Quahogs.

Soft clams (*Mya arenia*), which are harvested from Maryland to New Brunswick, produce an annual harvest of about 1,200 metric tons of meats. Soft shells, which are dug by hand, are consumed steamed or fried in the Northeast.

Geoduck clams (*Panopea generosa*) are a very unique-looking species of clam that is harvested by divers from Puget Sound in Washington state to Southeast Alaska. The biggest of the burrowing clams, geoducks can live almost 150 years and reach a size of 20 pounds. They have an elongated siphon, which is sliced and served raw as sashimi in Japanese and Chinese restaurants in the U.S. and abroad. On a per pound basis, geoducks are the most valuable clam harvested in the U.S. Production of farmed geoducks is expected to increase U.S. harvests well above their current levels of approximately 700 metric tons of meats a year in the near future.

In Washington state, approximately 400 metric tons of meats from Manila clams (*Tapes philippinarum*) are produced each year, most of which is dug from farmed beds. Manilas are also produced in British Columbia, mostly from wild beds. Manilas are harvested by hand diggers.

**FISHERIES**

The fishery for surf clams and deepwater ocean quahogs, which is conducted by large boats using hydraulic dredges, is managed under an individual transferable quota (ITQ) system that gives vessel operators their own quota that they can harvest at their discretion. The introduction of the ITQ system to this fishery in 1990 has led to a significant reduction in the size of the fleet as vessels can fish more efficiently.

There is no specific quota for most of the other U.S. clam fisheries, as they rely on seasonal closures to regulate harvests. Most of these clam resources are harvested by diggers who use either rakes or tongs. Geoducks are an exception. In Washington, companies bid on the right to harvest clams from designated underwater tracts controlled by the state. In the case of hard clams, Manilas and geoducks, farmed production is growing significantly.
PRODUCT FORMS
Both surf clams and ocean quahogs are processed into strips and minced meats for use in clam chowders and fried clam strips. These meats are mostly canned, but a significant amount is also frozen. Most hard clams, soft clams, geoducks and Manila clams are sold live.

Large quantities of a variety of clams are imported into the U.S. from all over the world. These product forms include live, canned and frozen.

WHOLESALE PRICE/SUPPLY HISTORY
Clam prices vary widely depending on the product form, species, size and time of year. In recent years, the New York wholesale price of Little Necks, the smallest and most valuable size of hard clam, has fluctuated from a low of $.24 per clam in the winter to almost $.30 per clam in the summer, when demand is highest. The New York wholesale price of other sizes of hard clams have ranged between $.20–$.26 for Top Necks, $.16–$.19 for Cherrystones and $.13–$.16 for Chowders.

Minced surf clam meats sell for about $12–$14/gallon, while strips sell for between $14–$17/gallon. Ocean quahog meats, which are darker than surf clam meats, normally sell for about 15% less. Soft clams are sold by the bushel and wholesale prices typically range from a low of $95/bu. in the winter to $115/bu. in the summer months, when demand from coastal resorts is at its peak.

Live geoducks typically sell for between $8 to $10/lb. Larger geoducks with lighter colored siphons sell for the highest prices. Live Manila clams sell to distributors at prices that range between $2.30–$2.50/lb.

U.S. supplies of clams have increased significantly in recent years. The surf clam quota, for example, was raised 11 percent in 2001 and another 10 percent in 2002, which will produce the highest landings since 1975. Due to increased farmed production, the harvest of hard clams has increased to more than 5,500 metric tons, the highest level since 1980. On the West Coast, farming is also leading to higher harvests of both Manila and geoduck clams.

U.S. imports of clams have also increased significantly. From 1995 to 2001, U.S. imports of clams have grown from approximately 8,000 to 14,000 metric tons a year.

BUYING GUIDE/SOURCING
Buying clams can be a challenge as they are sold both by volume and weight. For example, the number of hard clams contained in a bushel, a common measure used on the East coast, can vary from supplier to supplier. Buyers need to check shipments frequently to make sure they get what they are paying for.

MARKETS
Clams are consumed throughout the U.S., but per capita consumption of live clams is highest in the Northeast, where small hard clams are also consumed raw. Consumption of live clams also tends to be regional. For example, soft clams are consumed only in the Northeast, while most Manila clams are consumed on the West Coast. Processed clam products such as clam chowder and clam strips are consumed nationwide.

PRODUCT SUBSTITUTION
Clams have a unique taste and texture that are not duplicated. Mussels, though, have become an increasingly popular substitute as they are about half the price.
Sablefish/black cod (*Anoplopoma fimbria*)

One of the market names for sablefish—butterfish—says it all. Exceptionally rich and flavorful, sablefish can reach a size of 30 pounds, but most fish caught commercially are in the 6 to 10 pound range. Although more than 80% of the U.S. sablefish catch is exported to Japan, increasing quantities are being consumed in the U.S., where it is a substitute for Chilean sea bass. Sablefish are found in the eastern North Pacific, from the Bering Sea to central California. Although they are also called black cod, sablefish do not belong to the cod family. They belong to the unique Anoplopomatidae family.

**FISHERIES**

Most sablefish are caught by longline; however, smaller quantities are caught by pot and trawl nets. In Alaska, where most of the sablefish catch is frozen, the season runs from mid-March through mid-November. Fresh sablefish are available throughout the year. The sablefish season off the West Coast runs from April 1 to October 31, while B.C. fishermen can fish year-round. Sablefish fisheries in B.C. and Alaska are managed under an IFQ (Individual Fishing Quota) system, which allows fishermen to land their quota at their own discretion during the season.

**PRODUCT FORMS**

Sablefish is most often available frozen headed and gutted (H&G), however fresh H&G is also available throughout much of the year. Some West Coast processors will also offer fresh, bone-in sablefish fillets on a periodic basis. Sablefish is also available smoked, either cold smoked or hot smoked.

**WHOLESALE PRICE/SUPPLY HISTORY**

Because of high demand, sablefish is an expensive fish, priced very similar to Chilean sea bass. H&G sablefish normally sell between $3.50–$4.50/lb FOB Seattle, with larger fish, over 7 pounds, receiving the highest price. When they are available, sablefish fillets will sell to distributors at prices between $7 and $10 a pound.

Sablefish is a good-sized resource, with U.S. landings averaging about 25,000 metric tons in most years. About 75 percent of the U.S. catch comes from Alaska waters, with the remainder relatively evenly divided between Washington, Oregon and California. Approximately 2,500 metric tons of sablefish are landed by fishermen in British Columbia.

**BUYING GUIDE/SOURCING**

Buyers pay a premium for larger sablefish from Alaska because they are widely regarded as having a higher oil content than smaller sablefish, which make up a high percentage of the catch of the West Coast. Although fresh Alaskan sablefish is only available at certain times of the year, frozen sablefish makes an excellent substitute.

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**Fresh/frozen price range ($/lb)**

*Frozen wholesale*

$3.50–$4.50

*Fresh wholesale*

$3.50–$4.50

*Fresh/thawed retail*

$9.99 and up

**Available fresh year-round, supplies steady but moderate**

**Environmental impacts**

☐ Minimal
MARKETS
Japan, which is the largest market for sablefish, buys approximately 75 percent of the U.S. sablefish catch each year. Significant quantities are also shipped to Korea and China. In the U.S., sablefish is most often marketed to Asian restaurants in large cities, although it is becoming increasingly popular in mainstream markets. Smoked “sable” has been a traditional favorite in delicatessens in U.S. cities.

PRODUCT SUBSTITUTION
Sablefish is very similar in taste and texture to Chilean sea bass.
Pacific cod (Gadus macrocephalus)

The Pacific cod is very similar to Atlantic cod, except that the resource is considerably smaller. Landings of Pacific cod range between 400,000 to 450,000 metric tons a year, about one-third the landings of Atlantic cod in recent years. The U.S. is the largest producer of Pacific cod, catching between 200,000 to 250,000 metric tons annually off Alaska.

FISHERIES
Cod are fished both in the Gulf of Alaska and the Bering Sea by U.S. fishermen, with the Bering Sea producing about 80 percent of the catch. About half of the U.S. cod catch is made by longline vessels and half by trawl vessels. A small amount of cod is caught by vessels using modified crab pots. The Alaska cod fishery lasts about 6 to 8 months a year for longline boats, while trawl boats catch their cod in just a few months.

PRODUCT FORMS
Most of the cod caught by Alaska fishermen is sold frozen. About two-thirds of the Alaska cod is frozen at sea (FAS) on board fishing boats and one-third at shore-based plants. The bulk of the Alaska production is headed and gutted (H&G fish); only about 5,000 metric tons of skinless, boneless cod fillets are produced annually in Alaska. Significant quantities of Russian cod is frozen at sea and reprocessed into skinless boneless fillets in China. In 2001, approximately 10,000 metric tons of twice-frozen Pacific cod fillets were imported into the U.S. from China.

WHOLESALE PRICE/SUPPLY HISTORY
H&G Pacific cod normally sells between $0.60–$1/lb., depending on size and how it was caught. The most expensive cod is large, longline-caught FAS fish. The price of skinless, boneless Alaska cod fillets (8–16 ounces) normally fluctuates between $2.30–$2.60/lb.

Catches of Pacific cod have been relatively stable at high levels for more than 10 years. The 2002 cod quota in Alaska was raised slightly to 244,000 metric tons. U.S. imports of Pacific cod filets have doubled from 1997 to 2001 to more than 10,000 metric tons.

BUYING GUIDE/SOURCING
The best Pacific cod is caught by longline boats which sell it at a premium price. The best trawl-caught cod, however, can be almost as good. Pacific cod has a higher moisture content than Atlantic cod and for that reason is not considered as good for breaded and battered fried applications. Some Pacific cod caught near to shore will have a higher percentage of parasites. The Alaska Seafood Marketing Institute (ASMI) maintains a directory of suppliers at www.alaskaseafood.org.
MARKETS
Alaska cod is sold to a variety of markets. Large quantities are exported to Japan, where it is consumed in soups, and Norway, where it is salted and exported to Brazil. Seafood processors in New England buy H&G Alaska cod, thaw it out and fillet it, a procedure known in the industry as “refreshing.” Frozen Alaska cod fillets are sold throughout the U.S., primarily to foodservice operators.

PRODUCT SUBSTITUTION
Pacific cod is a substitute for any mild, white-fleshed fish and is often used to replace scarce Atlantic cod or ling cod.
Dungeness crab *(Cancer magister)*

**Whole cooked price range ($/lb)**
- Wholesale: $3.00–$5.00
- Retail: $5.99–$7.99

**Seasons peaks in early winter with supplies good to moderate**

**Environmental impacts**
- Minimal

Named after a small fishing village on the Strait of Juan de Fuca in Washington State, Dungeness crabs have been fished commercially since the 1800s. Dungeness, which range from central California to Alaska’s Aleutian Peninsula, are a good-sized crab, reaching a size of two to three pounds at an age of about four years. Dungeness is the only crab harvested commercially off the West Coast. It is a medium-size resource that can produce landings of about 20,000 metric tons in a typical year. Dungeness have a high meat yield (about 25%) and are highly regarded for their sweet meat. Large quantities of Dungeness are exported live to markets in China.

**FISHERIES**
Dungeness are fished with baited pots that can weigh anywhere from 60 to 100 pounds. Boats that fish for Dungeness are smaller than the boats that fish for king and snow crab and average between 40 and 70 feet. About half of the annual Dungeness catch is landed in the months of December and January, during the peak of the ocean fishery off the Pacific Northwest. Dungeness are landed year-round in various seasonal fisheries in the inside waters of Puget Sound, Alaska and British Columbia. Although, there is no set quota for Dungeness, only male crabs above a minimum size can be harvested.

**PRODUCT FORMS**
Dungeness products include: live, fresh and frozen whole cooks, fresh and frozen cooked crabmeat, frozen cooked sections and frozen cooked individual legs. Whole crab are graded 1½–2 lbs., 2–2½ lbs., 2½–3 lbs. and 3 ups.

**WHOLESALE PRICE/SUPPLY HISTORY**
As demand from Chinese buyers for live Dungeness has grown, prices for this prized crab have steadily increased. Live crab sells between $2 and $4/lb. FOB West Coast, depending upon time of year. Fresh and frozen whole cooks typically sell between $3 to $5/lb., depending on size and time of year. Dungeness crabmeat normally sells between $14 to $16/lb., while frozen sections normally sell for about $5/lb.

Supplies of Dungeness can vary considerably from year to year, as catches will range from a low of 18,000 metric tons to a high of 35,000 metric tons. The best time to buy Dungeness is in the early winter when catches and supplies are at their annual peak.

**BUYING GUIDE/SOURCING**
The best buys on Dungeness are in December and January, when landings from the ocean fishery are high. Even at this time of the year, though, prices can quickly jump up and down as storms rolling in off the Pacific can keep crabbers tied to the dock. Crab landed in January also tends to have a higher meat yield. Most of the “fresh” crabmeat sold by processors from March through November is actually picked from frozen sections. It is good, but technically it is not really fresh. Most processors will “rob” their pack of some of the merus meat and sell them as fry legs.
The industry standard is 5 percent. The best combo meat packs will have 55 percent leg and claw meat, but 50 percent is more common.

MARKETS
Dungeness are marketed mainly on the West Coast and in China, where buyers are willing to pay a premium price.

PRODUCT SUBSTITUTION
Dungeness have a unique taste that is highly prized. Dungeness legs, however, can be used as an alternative to large shrimp in some recipes.
Jonah and rock crab are two species of crab found on the East Coast. Jonah crab, *Cancer borealis*, the larger of the two crabs, are found from Nova Scotia to South Carolina. The Atlantic rock crab, *Cancer irroratus*, which is also called “peekytoe crab,” is found from Labrador to South Carolina. Traditionally, both crabs were considered a pest by lobstermen who saw them as bait robbers. Over the years, though, both crabs have gone from being a nuisance to a source of cash, as markets have been developed for their meat and claws.

**FISHERIES**

Although attempts have been made to develop directed fisheries for these crabs in the Canadian Maritimes, they are still mostly landed as a bycatch by U.S. and Canadian lobstermen. As a result, in the U.S., landings are heaviest from July to October. Canadian landings are more spread out due to the staggered lobster seasons in the Maritimes. Jonah crabs are more available in the winter, as they are also landed as a bycatch in the offshore lobster fishery.

**PRODUCT FORMS**

Fresh and frozen cooked meat is the main product from both Jonah and rock crab. The meat is available in a variety of packs with different ratios of leg and body meat (the higher the leg meat percentage, the more expensive the pack). The meat from the rock crab is darker, with reddish brown coloring similar to the West Coast Dungeness crab. The Jonah meat is a creamy white. The claws from Jonah crab are often sold as cooked frozen claws that average about 6 to 9 claws per pound.

**WHOLESALE PRICE/SUPPLY HISTORY**

Compared to the price of other crab meat, the meat from Jonah and rock crab is a bargain. Depending on the ratio of leg to body meat, fresh Jonah and rock crab meat sells between $7 and $10/lb., while frozen meat runs $5 to $7/lb. (this is about half the price of blue crab lump meat and Dungeness meat). Cooked Jonah claws sell for about $3.50 to $4/lb., approximately half the price of Florida stone crab claws.

The supplies of Jonah and rock crab have increased in recent years as markets have been developed for their meat. U.S. fishermen now land about 3,000 metric tons a year, while Canadian landings are up to 10,000 metric tons. If you are looking for fresh crab meat, the summer is the best time as lobster landings are heavy. Frozen meat and claws are readily available year-round.

**BUYING GUIDE/SOURCING**

Many buyers will blend rock crab meat with more expensive Dungeness crab meat in order to offer their customers a more reasonably priced alternative. In most culinary preparations, it is very difficult to distinguish between a blended product and straight Dungeness meat. Jonah crab meat is often blended with blue crab body meat to make value-added seafood products such as crab cakes and stuffed flounder.
Make sure you have a clear understanding of the leg to body meat ratio and check it periodically, as it will have an impact on the price.

MARKETS
Meat from Jonah and rock crab is most widely consumed in the Northeast, but it is gaining market acceptance in other parts of the U.S. as more buyers learn to appreciate its value.

PRODUCT SUBSTITUTION
Cooked crabmeat from Jonah and rock crab can be substituted or blended with more expensive crabmeat. It can also be used as an alternative to shrimp in some recipes.
The largest members of the spider crab family (legs on spider crabs are jointed backwards), king crab are found on both sides of the North Pacific, from Southeast Alaska to Russia’s Kamchatka Peninsula. In the U.S., whether it comes from Russia or Alaska, the name king crab is synonymous with “Alaska king crab.” Three species of king crab are fished commercially.

Red king crab, *Paralithodes camtschaticus*, is both the largest species and the largest resource, accounting for more than 70% of the king crab catch. Red king crab can weigh more than 20 pounds, although 8 to 10 pounds is the most common size landed. Blue king crab, *P. platypus*, which can be distinguished from red king crab by the more pronounced dark coloring on the tip of their legs, are almost as large as red king crab and typically sell for the same price as red king crab.

Brown, or “golden,” king crab, *Lithodes aequispinus*, are smaller, normally weighing less than 6 pounds. Golden king crab can easily be distinguished by their uniform red/orange color on their legs (the underside of red and blue king crab legs are a creamy white). Brown king crab typically sells at a discount because it’s smaller and often has a lower meat content. In most years, golden king crab account for about 25% of Alaska’s king crab harvest.

**FISHERIES**
King crab are fished with large baited steel pots that can weigh more than 500 pounds each. Fishing can be extremely hazardous and it is not unusual for at least one boat to be lost each season. In Alaska, quotas are set for each species and with the exception of brown crab the seasons are very short, usually lasting less than a week in the fall. In Russia, king crab are fished both in the spring and fall.

**PRODUCT FORMS**
In the U.S., king crab are almost always sold cooked and brine frozen as legs and claws, which are graded according to the number of walking legs per 10 pounds. For example, a 20-pound box (the industry standard) of 9–12 legs should have 18 to 24 walking legs and the corresponding number of claws. Very small amounts of live and fresh king crab are available for a few days each year. Split legs, which are legs that are bandsawed down the middle, are also available.

**WHOLESALE PRICE/SUPPLY HISTORY**
King crab prices will vary considerably depending upon the size of the leg. The price of the largest legs (6/9s and 9/12s) can be twice the price of smaller legs (20/24s and 24 ups). The price of large legs normally runs about $12–$15/lb., while the smallest legs sell between $7 and $9/lb.

King crab catches in Alaska in recent years have been a fraction of the huge catches in the late 1970s and early 1980s, when more than 75,000 metric tons of crab were landed a year. In recent years, catches have stabilized at between 7,000 and 10,000 metric tons. Although Russian catches are also declining, they are about twice as large as Alaska’s. In spite of the reduced supplies, king crab is available year-round in adequate quantities.
BUYING GUIDE/SOURCING
There are several things to keep in mind when buying king crab legs. First, make sure you’re paying for net—not gross—weight. This is easy to check: Simply rinse off the glaze and weigh the crab to determine the net weight. Second, make sure the count is accurate since there’s a big difference in price based upon the size. To do this, open the box, separate the legs from the claws, count the number of legs (including broken legs that can be reconstructed) and divide by two. With very few exceptions, each box of legs will contain some “broken” pieces. One and a half pounds per box is the industry standard, so make sure there’s not more. Light meat fill is another consideration. As a general rule, crab caught later in the year will have a higher meat fill, which should be 80 percent or higher.

MARKETS
The biggest crab you can buy, king crab are very popular throughout the U.S.

PRODUCT SUBSTITUTION
King crab are a good alternative to other expensive shellfish such as the largest sizes of warmwater shrimp and lobster.
The name snow crab is the marketing name used for two closely related species of crab, *Chinoecetes opilio* and *Chinoecetes bairdi*, found in northern waters. Snow crab are a very large resource and can produce landings in some years well in excess of 200,000 metric tons. The fishery for bairdi is very small and takes place only off Alaska.

*Opilio*, which accounts for more than 95% of the snow crab landings, is fished in both the North Atlantic and North Pacific oceans. In Canada, where *opilio* are fished only off the country’s Atlantic Coast, snow crab is also called “queen crab.” In Alaska, *opilio* are fished only in the Bering Sea and *bairdi* are fished in the Bering Sea and southeast Alaska. The smaller of the two species of snow crab, *opilio* average about two pounds in size. The meat yield from snow crab is about 17%, compared to a meat yield of about 25% in king and Dungeness crab.

**FISHERIES**

In Alaska, snow crabs are fished using the same pots fishermen use for king crab. In Canada, fishermen use smaller pots. In most years, the *opilio* season in Alaska starts in January, however, the season can be delayed because of ice conditions. Depending on the quota, the season may last anywhere from two weeks to three months. As is the case with king and Dungeness crab, only male crabs can be landed. In Canada, the snow crab season begins in the spring and lasts through the summer.

**PRODUCT FORMS**

Snow crabs are delivered live to processing plants, where they are cleaned, cooked and frozen. They are usually sold as sections or “clusters” (4 walking legs and a claw arm), typically graded 3/5 oz., 5/8 oz. and 8 ups, with 5/8 oz. sections the predominant size for *opilios*. Cocktail claws and scored “snap ‘n eat” legs are also offered by many processors. Canadian processors also offer a variety of packs of crabmeat.

**WHOLESALE PRICE/SUPPLY HISTORY**

Snow crab prices will fluctuate, depending on the amount of crab being landed. The typical price range for 5/8 oz. sections is between $2.50 to $4/lb. Snow crab meat sells between $4.50–$7.50/lb., depending on the ratio of leg to body meat.

As is frequently the case with crab fisheries, landings of snow crab vary widely from year to year. Alaska *opilio* landings in 1998, for example, were 110,000 metric tons, but by 2000 they had plummeted to just 13,000 metric tons. Landings in Canada, however, have been more stable at about 80,000 to 90,000 metric tons in recent years. As a result, frozen snow crab is readily available year-round.

**BUYING GUIDE/SOURCING**

When snow crab get older they stop molting and the shells can get a dirty brown color and they may have barnacles. Although it may not look as appetizing, this crab usually has a higher meat content and it often sells at a discount, making it...
a very good value. Most snow crab sections will be packed with some broken legs in the box. The industry standard is 10% broken, so make sure that is not exceeded.

MARKETS
Snow crab is consumed throughout the U.S., but consumption is highest in the Southeast.

PRODUCT SUBSTITUTION
Snow crab is very popular in seafood buffets and is a good alternative for all-you-can-eat shrimp specials.
Claws from several species of crabs are marketed as stone crab claws in the U.S. Most of this product is from the Florida stone crab, *Menippe mercenaria*, which get their name from their thick, hard shell. The Florida fishery for stone crab is a renewable resource, as one claw is twisted from the crab, which is then returned to the sea to regenerate a new claw. In a normal year, between 2,500 and 3,000 metric tons of stone crab claws are landed by Florida fishermen. Limited quantities of claws that resemble Florida stone crab are imported from Chile and Mexico. These fisheries harvest the whole crab.

**FISHERIES**

Stone crabs are caught using baited pots that are placed in coastal waters along the coast of southern Florida and the Keys. The season runs from October 15 to May 15. Only crab with a claw that is at least 2 3/4 inches can be harvested.

**PRODUCT FORMS**

Most Florida stone crab claws are sold as fresh, cooked claws graded by size. The grades are Medium (less than 3 ounces per claw and 6 to 8 claws per pound), Large (3 to 6 ounces and 3 to 5 per pound) and Jumbo (over 6 ounces and typically 2 to 3 per pound.) Some Florida stone crab and all imported stone crab claws are sold as frozen, cooked claws.

**WHOLESALE PRICE/SUPPLY HISTORY**

Florida stone crab claws typically sell between $6 and $12/lb., depending on size (larger sizes are more expensive). Frozen imported claws sell between $4 and $7/lb., depending on size.

Supplies of Florida stone crab claws are relatively stable, as landings fluctuate within a fairly narrow range compared to other crab fisheries. Fresh stone crab claws are available between late October and early May, but supplies are best from October to January when landings are heaviest.

**BUYING GUIDE/SOURCING**

Fresh cooked stone crab claws have a shelf life of just three to five days, so plan to sell them quickly. If the claws are past their shelf life, they will have a slippery shell and an ammonia odor. The meat should be white to off-white and any black discoloration indicates poor handling. If you get a claw that does not have good meat fill, reject it. Make sure you do not pay Florida prices for imported stone crab claws. Florida stone crabs have a smooth, bright creamy and orange shell with a distinctive black tip. Imported claws have a rougher shell and the colors are not as bright.

**MARKETS**

Stone crab claws are mostly marketed in Florida and along the East Coast.

**PRODUCT SUBSTITUTION**

Served as an appetizer, stone crab claws make an excellent alternative to a shrimp cocktail.
A number of species of small crabs, which have flat swimming paddles instead of rear legs, from the Portunidae family are found in shallow warmer waters of the world. In the U.S., the largest swimming crab resource is the blue crab, *Callinectes sapidus*, which is fished commercially from New York to Texas. The fishery for blue crab is quite large, producing landings as high as 100,000 metric tons in good years. More than 80 percent of the catch comes from Louisiana, Maryland, North Carolina and Virginia. Blue crabs migrate from low salinity water in river mouths and bays to higher salinity open ocean waters. They are very aggressive predators (other blue crabs make up 13% of their diet).

Large quantities of crabmeat picked from several swimming crabs in other parts of the world are exported to the U.S. Several species closely related to blue crab are fished in Mexico and Venezuela, for example. In Southeast Asia, there is a large fishery for *Portunus pelagicus*, which is sometimes marketed as “blue swimming crab” even though it is a brownish-green color.

**FISHERIES**

Most swimming crab are fished using baited pots, although in some areas fishermen use a baited line called a “trotline.” In the winter, some U.S. fishermen use dredges to catch crabs that have burrowed under the mud. In the spring, when crab are mating, some fishermen put a male crab (males are called “jimmies”) in a pot to attract females (called “sooks”). Although blue crab are landed year-round, most of the catch is made between April and October. Swimming crabs that are shedding prior to molting are caught and put in tanks in “peeler sheds.” After they molt, they are marketed as softshell crabs. There is no set quota for swimming crabs. Both males and females are caught, however, in the U.S. they must be above a minimum size.

**PRODUCT FORMS**

Blue crab are marketed as live crab (normally by the bushel, which may contain six to eight dozen crab, depending on size), fresh and frozen whole cooked crab and frozen claws. Swimming crabmeat is sold fresh, frozen, pasteurized and canned in a variety of packs. Blue crabmeat is graded as jumbo or jumbo lump (the largest, whitest pieces of meat typically from the backfin) lump or backfin (large, white pieces or chunks of meat which can include backfin), special, flake or deluxe (smaller, white pieces or chunks of meat), claw (dark meat from the claw) and minced (meat shaken from the shell by a machine). Softshell crab are graded by the width of carapace as follows: Mediums (3½–4 inches), Hotels (4–4½ inches), Primes (4½–5 inches), Jumbos (5–5½ inches) and Whales (over 5½ inches).

**WHOLESALE PRICE/SUPPLY HISTORY**

Live crab prices will fluctuate widely depending upon the volume being harvested. The price of male crab, which are preferred because they are larger, can range from $50 to $70 per bushel, while females will range from $30 to $50 per bushel in most years. Fresh jumbo lump meat will sell for about $20/lb., while lump sells for about $15. Imported jumbo lump sells for about $15–$18/lb., depending on quality. Fro-
zen imported swimming crabmeat can be purchased for $6 to $8/lb. U.S. softshell prices will range from about $15/dzn for smaller sizes and up to $35/dzn for the largest sizes. Imported frozen softshells can sell for as much as $3/dzn less.

Supplies of U.S. blue crab will fluctuate from year to year, depending on landings. In recent years, landings have declined to about 60,000 to 75,000 metric tons due to a decline in production from Chesapeake Bay. Supplies of imported crabmeat, however, have increased substantially in recent years to more than 13,000 metric tons a year. The best time to buy live blue crab and fresh softshells is in the summer, when supplies are most available. Frozen and pasteurized swimming crabmeat and frozen softshells are readily available year-round.

BUYING GUIDE/SOURCING
Buying swimming crabmeat can be a challenge due to the variety of packs, grades and prices. One packer’s lump, for example, can be another packer’s special. Get to know what the grades are and check regularly—even after you find a brand you trust. Fresh crabmeat and pasteurized crabmeat (after it’s opened) have a short shelf life of just three days. Check carefully for ammonia odors, which are a sign of spoilage. For the best prices, try timing your buys to the peak summer production season. The quality of imported swimming crab products can be quite high, making them a very good value.

MARKETS
Swimming crab and swimming crabmeat are marketed primarily in the eastern part of the U.S.

PRODUCT SUBSTITUTION
Swimming crabmeat has a mild taste that can be used in many applications, including as an alternative to shrimp in some recipes.
The massive continental shelf off Alaska has the world's largest population of fish that belong to the Pleuronectiformes family, which includes large numbers of fish that are marketed as either flounder or sole. (Even though many of the flatfish fished commercially in the U.S. are sold as soles, none belong to the true family of soles, Solidae.)

The largest flatfish fishery in Alaska is for yellowfin sole, *Limanda aspera*, a small flounder that averages about one pound. Factory trawlers fishing in the Bering Sea off Alaska land between 75,000 and almost 200,000 metric tons of yellowfin sole each year. Almost all of this catch is exported whole to China, where it is filleted and re-exported back to the U.S. Because it is small and typically yields fillets of just 2 to 4 ounces, yellowfin sole sells for a relatively low price, even though it is a good eating fish. The yellowfin sole fishery normally takes place in the late spring and summer.

Rock sole, *Pleuronectes bilineatus*, which is also fished in the Bering Sea, is the second largest Alaska flatfish fishery, with average annual catches of about 60,000 metric tons. Rock sole are fished from mid-January to March prior to spawning. The female catch is exported to Japan, where it is sold with the roe in retail stores. Male rock sole are exported to China, where they are filleted and exported back to the U.S. Although they can reach a size of 3 pounds, most rock sole are also small fish that weigh between a pound and a pound and a half. Rock sole is considered a better eating fish than yellowfin sole.

Flathead sole, *Hippoglossoides elassodon*, is another popular flatfish, with annual catches of about 25,000 metric tons. Flathead are a desirable fish, because their white fillets have a firmer texture than many other flatfish. A medium-sized fish, flathead average between one and two pounds, which yields fillets between 4 and 6 ounces.

Although landings are not very large, the rex sole, *Errex zachirus*, is one of the most sought after flatfish landed off Alaska. Rex sole, which are fished in the Gulf of Alaska, produce annual landings of about 3,000 metric tons. A medium-sized flounder, rex average between a pound and a half and two pounds. In the U.S., rex are often sold whole to Chinese restaurants, which steam them. The fillets of rex sole are very similar in taste and texture to the gray sole, the most desirable flatfish caught off the East Coast.

Although it is caught almost exclusively as a bycatch in other fisheries, Alaska plaice, *Pleuronectes quadrituberculatus*, is produced in significant quantities. A larger-sized flounder, Alaska plaice produces fillets that average between 6 to 8 ounces. It is considered one of the better quality flatfish caught off Alaska. The skin of Alaska plaice, though, has a bacterium that can generate an undesirable odor. As a result, this fish is most suited for use in the production of skinless fillets.

Dover sole, *Microstomus pacificus*, the largest flatfish resource off the West Coast, is also fished off Alaska. Because it has a slimy skin, almost all Dover is always filleted. Dover soles can reach 8 pounds, but most are under two pounds. Although they share the same name, this fish is not related to the much more desirable Dover sole, *Solea solea*, which is caught in European waters.
FISHERIES
Flatfish are fished year-round off Alaska by trawl vessels, although landings volumes will fluctuate throughout the year, depending on the species.

PRODUCT FORMS
Most Alaska flatfish are sold as frozen whole fish and frozen skinless, boneless fillets; however, fresh fillets and fresh whole fish are available at certain times of the year in limited quantities. Significant volumes of whole Alaska flatfish are purchased by New England processors who thaw the fish out and fillet it, a process known as “refreshing.”

PRICE/SUPPLY HISTORY
Prices for Alaska flatfish vary, depending on the species. The price of frozen yellowfin sole fillets, for example, averages about $2/lb., about the same price as frozen whole rex sole. Prices for most frozen Alaska flatfish fillets run between $2 and $3/lb., while fresh fillets run between $3 and $4/lb.

Alaska’s flatfish catches are by far the largest in the world and supplies are readily available.

BUYING GUIDE
Because larger flatfish fillets sell for a substantial premium, smaller fillets can be an exceptional value, often selling for at least 30 percent less than larger sizes. In the right application, whole flatfish cooked “on-the-bone” will provide a superior eating experience. Because it can have a high percentage of soft-fleshed fish, which is not detectable until after the fish has been filleted, it is not recommended that buyers buy whole fish (other than rex sole) unless they have a clear understanding of how to negotiate with their supplier if problems occur.

MARKETS
Alaska flatfish are sold primarily in the Eastern U.S., where consumption of flounder and sole is highest.

PRODUCT SUBSTITUTION
Alaska flatfish, which are in very good supply, are excellent substitutes for most Atlantic flatfish species.
More than a dozen species from the Merluccidae family, which are closely related to cod, are found around the world. Outside the U.S., most species belonging to this family are called hake. However, in the U.S., because the name hake has long been synonymous with inexpensive white fish, some fish from this family are marketed as whiting.

Pacific whiting (*Merluccius productus*), which is fished each summer off the coast of the Pacific Northwest, is one of the largest whiting fisheries in the world with annual landings of about 250,000 metric tons. Silver whiting (*Merluccius bilinearis*) is a medium-sized fishery off the Northeast U.S. that typically produces annual catches between 10,000 and 15,000 metric tons. Both of these species are small, usually under 2 pounds. Small quantities of red hake (*Urophycis chuss*) and white hake (*Urophycis tenuis*) are also landed off the Northeast U.S., mostly as a bycatch by groundfish boats.

Some hakes can grow relatively large, reaching a size of up to 10 pounds. One of these species, Cape hake (*Merluccius capensis*), which is caught off South Africa and Namibia, is exported to the U.S., where it is marketed as Cape capensis.

**FISHERIES**

Most hake are caught by trawl nets. About half of the Pacific whiting harvest is made by factory trawlers with the remainder processed by shore-based plants. Off the East Coast, hake are caught by trawlers and gillnetters and sold fresh. Some larger species of hakes in other fisheries around the world are caught by longline.

**PRODUCT FORMS**

Pacific whiting are mostly sold frozen, as headed and gutted (H&G) fish and skin-on boneless fillets, with some fresh H&G fish available in the summer. Hakes caught off the East Coast are almost always sold fresh, with smaller fish sold H&G and larger fish sold both H&G and fillets. Imported hake is usually imported as skinless, boneless fillets and portions.

**WHOLESALE PRICE/SUPPLY HISTORY**

Prices for Pacific whiting are relatively stable, averaging about $.90/lb. for frozen fillets and about $.40/lb. for H&G fish. Prices for fresh whole silver whiting fluctuate between $.40–$.60/lb., depending upon the volume of landings. Fresh whole white hake average about $1/lb., while whole red hake normally wholesale for $.40–$.60/lb. Frozen Cape capensis fillets sell for prices between $1.80 and $2.20/lb., depending on the size of the fillet.

The Pacific whiting resource is quite large and good supplies of frozen products are readily available. Because it is highly perishable, fresh Pacific whiting is not widely marketed. The fishery for Cape capensis is also quite large and supplies of frozen fillets are quite good. In most years more than 4,000 metric tons of capensis fillets are exported to the U.S. each year.

Supplies of hake from the East Coast are seasonal and have declined as groundfish catches have been reduced. Supplies of Argentine hake, *Merluccius hubbsi*,

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**Hake/whiting**

<table>
<thead>
<tr>
<th>Frozen fillet price range ($/lb)</th>
<th>Pacific whiting</th>
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</thead>
<tbody>
<tr>
<td>Wholesale</td>
<td>$0.90–$2.20</td>
</tr>
<tr>
<td>Retail</td>
<td>$1.99–$3.99</td>
</tr>
</tbody>
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Available frozen year-round, abundant world-wide supply

Environmental impacts

- Some (Pacific whiting)
- No other fisheries mentioned in this profile have been ranked.
which is another large hake fishery, have been greatly reduced as catches have declined significantly as stocks have been overfished.

BUYING GUIDE/SOURCING
The quality of hake varies greatly depending upon the species and how the fish was handled. The best hake is a mild, flaky white fish with slightly more flavor than other whitefish like cod. The worst hake can be very soft and flavorless. In general, it pays to pay a premium when buying hake to ensure you get the best quality product.

MARKETS
Most Pacific whiting is sold mainly to ethnic markets that purchase large quantities of frozen whole fish. Cape capensis, on the other hand, is sold to more mainstream markets in the Northeast where it is a popular substitute for more expensive whitefish like cod and haddock.

PRODUCT SUBSTITUTION
Hake can be substituted for other lean whitefish such as cod and haddock.
Pacific halibut (*Hippoglossus stenolepis*)

**Price range ($/lb)**

*Wholesale*

$2.75–$3.50 (fletches)

*Retail*

$5.99–$8.99 (steaks/fillets)

Fresh from March through November, frozen year-round.

**Steady supply**

**Environmental impacts**

- Minimal (US-Canada)

No other fisheries mentioned in this profile have been ranked.

Pacific halibut is the largest member of the flatfish (average up to 200 pounds). Most of the catch comes from Alaska (83%) and British Columbia (16%).

**FISHERIES**

Pacific halibut are caught in a longline fishery that extends from Alaska to California. The International Pacific Halibut Commission, whom sets annual catch quotas, regulates the season, which runs from March 15 through November 15. There is also a trawl fishery for halibut off parts of Russia and Japan.

**PRODUCT FORMS**

Available headed and gutted and as steaks or fillets (called “fletches” in larger sizes). Sold fresh, frozen or “refreshed” (portions cut from frozen fish and sold thawed) during the off-season.

**WHOLESALE PRICE/SUPPLY HISTORY**

Pacific halibut has been fished under an individual quota (IFQ) since 1995 and, as a result, price and supply have stabilized. However, halibut prices are affected by the size of the quota, prices of competitive products (such as swordfish or mahi mahi) and frozen inventories. Typically, halibut prices start high in the beginning of the season and fall when landings increase. The Pacific halibut catch off North America has been relatively stable the past 10 years, fluctuating between 44 million pounds (1995) and 74 million pounds (2002). Frozen fillets (approximately 4 million pounds in 2002) are being imported from China, where whole Russian halibut is filleted and refrozen.

**BUYING GUIDE/SOURCING**

Fresh halibut is available in season from major seafood distributors throughout the United States. Frozen halibut can also be purchased from large wholesalers and processing companies. A directory of halibut processors is available from the Alaska Seafood Marketing Institute at www.alaskaseafood.org.

**MARKETS**

Pacific halibut is a popular menu item, particularly on the West Coast of the United States, and appears on approximately 41 percent of fine dining menus nationally. Halibut is also one of the more popular retail items on the West Coast, but less so in other regions. Some retail stores in Seattle will sell more than 500 pounds of fillets a week.

**PRODUCT SUBSTITUTION**

From a culinary standpoint, halibut is a lean, white fish that has a taste and texture that is similar to European turbot (*Psetta maxima*), haddock or cod. Halibut steaks and fillets, however, are considerably thicker and meatier. Price wise, halibut competes with ahi tuna, swordfish and Chilean sea bass on menus.
A large number of species of small, plankton-feeding fish, which may be marketed locally as herring or sardines, are found around the world. The largest single fishery is for Atlantic herring, *Clupea harengus*, which is fished throughout much of the North Atlantic. This fish is a traditional delicacy in many European cultures. In Maine and New Brunswick, small Atlantic herring 5 to 7 inches in length are canned and marketed as sardines.

The Pacific herring, *Clupea pallasi*, which is found from California to the Sea of Japan, supports a large fishery from northern California to Alaska. Pacific herring are fished in the spring when they move inshore to spawn. The Pacific herring fishery is primarily for the female eggs, which are brined and sold in Japan as the delicacy called kazunoko.

The fishery for the Pacific sardine, *Sardinops sagax*, which is found from Mexico to British Columbia, was once the largest fishery in North America with catches of almost 800,000 metric tons in the 1930s. A large number of canneries operated in places like Monterey, California up until the 1950s, when stocks collapsed. In recent years, however, this resource has recovered and it now can support landings of more than 100,000 metric tons.

The European sardine, *Sardina europa*, is the target of a large fishery from Spain to Morocco. This species is canned and is also eaten fresh in many coastal areas of southern Europe.

**FISHERIES**

On the East Coast, Atlantic herring migrate inshore in the spring and summer along the Gulf of Maine, where they are caught by seine or fixed traps, which are called weirs. Offshore, Atlantic herring are landed primarily by trawlers. On the West Coast, Pacific herring are caught inshore by purse seine and gillnet. Pacific sardines are caught primarily by purse seine.

**PRODUCT FORMS**

Because they are highly perishable, most herring and sardines are sold either frozen or canned, both as whole fish and as skin-on, bone-in fillets. Small amounts of fresh whole Atlantic herring are also available in wholesale markets in large East Coast cities. Because of their high oil content, Atlantic herring make excellent smoked products.

**WHOLESALE PRICE/SUPPLY HISTORY**

Herring are relatively inexpensive fish. Large fresh Atlantic herring normally sell for about $.20/lb. in New York’s Fulton Fish Market. Because they have to be air freighted, fresh Portuguese sardines sell for about $2 to $2.25/lb. Frozen sardines and herring are readily available for $.20–$.40/lb., depending on size and oil content. Supplies of herring and sardines are excellent, as market demand, not size of the resource, normally dictates the amount of fish fishermen catch. U.S. catches of Atlantic herring, for example, could easily be doubled if there was market demand.
BUYING GUIDE/SOURCING
The most valuable herring and sardines have a high fat content, which gives them more flavor. Depending on the time of year, fat content will vary considerably, so buyers will want to know when and where their fish was caught. Fresh herring and sardines have a very short shelf life (5 days from time of capture), so they should be sold immediately after purchasing.

MARKETS
Most of the fresh and frozen herring and sardines sold in the U.S. are consumed in ethnic markets in large cities. A growing number of white tablecloth restaurants, however, feature fresh grilled sardines.

PRODUCT SUBSTITUTION
Herring and sardines are very good as a substitute for other small fish such as black sea bass that are normally sold whole.
New Zealand hoki (*Macruronus novaezealandiae*)

A member of the whiting family of fish, hoki is found off New Zealand and both coasts of southern South America. The New Zealand resource, though, is the largest by far and hoki is the country’s largest and most valuable fishery. Because they have a long thin tail, hoki are also called “whiptail.” Hoki can reach a size of more than 15 pounds, but most fish caught are between three and four pounds. About 300,000 metric tons of hoki are landed a year, more than two-thirds of which is landed off New Zealand.

**FISHERIES**

Hoki are fished by trawlers off New Zealand and the bulk of the catch is made in the austral winter (our summer), when they form large spawning schools off the west coast of the South Island. Hoki is processed at sea by factory trawlers or delivered to shore-based processing plants. Some hoki is landed year-round by factory trawlers who follow the fish as they disperse and migrate back offshore. The Marine Stewardship Council has certified the New Zealand hoki fishery.

**PRODUCT FORMS**

Hoki is sold frozen as boneless fillets, either skin-on or off. Because it has a noticeable brown fat line, most of the hoki exported to the U.S. is deep-skinned. Most New Zealand processors also offer premium center cut hoki loins, which are more desirable because they do not have the thin tail. Small quantities of twice-frozen hoki fillets from China are exported to the U.S. Hoki fillets are mostly in the 6-to 10-ounce size range.

**WHOLESALE PRICE/SUPPLY HISTORY**

Hoki normally sells at a price between Alaska pollock and cod. Depending on product and trim, skinless, boneless hoki fillets usually wholesale between $1.40 and $1.80/lb. Lower quality grades of twice-frozen product, though, can be purchased for prices closer to $1/lb.

Hoki is one of the more widely available U.S. whitefish imports and is carried by most seafood distributors. However, as demand for hoki has grown in Europe, U.S. imports of hoki fillets have declined slightly from about 12,000 metric tons a year to just under 10,000 metric tons.

**BUYING GUIDE/SOURCING**

The quality of hoki can vary considerably, so buyers need to make an extra effort to make sure they are getting the best quality. The best hoki is caught from January to June by factory trawlers, which fillet and freeze at sea. This fish will have slightly whiter flesh (although hoki flesh is off-white, it cooks up white) than shore-frozen hoki, which may not be frozen until several days after it is caught. Frozen hoki is available from most seafood distributors. Further information can be found at the web site of the New Zealand Seafood Industry Council www.seafood.com.nz.

**MARKETS**

In the U.S., most hoki is sold to quick service restaurants, which deep fry it and
serve it as an inexpensive substitute for cod. Consumption is strongest in the southeastern U.S. and the Midwest.

PRODUCT SUBSTITUTION
Hoki has a bit more flavor than most other whitefish (it has almost twice as much fat as cod, for example) but it can be easily substituted in any recipe for higher-priced fish, such as cod, haddock, snapper, rockfish, grouper, flounder and sole. It can be cooked in a wide variety of ways, including poaching, baking and deep-frying.
American lobster (*Homarus americanus*)

Although in Colonial times they were used as fertilizer, the American lobster (or Maine lobster as it is often called) is now the most prized crustacean found in North American waters. Found from Newfoundland to North Carolina, the American lobster is a slow-growing animal, which may take up to eight years to reach a pound in size. Lobsters are found both inshore, where they hide in rocks, and offshore to depths of 400 fathoms where they can burrow in the mud for protection from predators, including other lobsters. Like most crustaceans, lobsters periodically shed their shells as they grow.

Lobster fishing is managed by the use of size restrictions, rather than set quotas. Off New England, lobsters must have a minimum carapace size of 3 1/4 inches (as measured from the eye socket to the beginning of the tail). In Canada, the minimum carapace size is smaller, although live Canadian lobsters with a carapace size below 3 1/4 inches cannot be exported to the U.S. In Maine, which produces about two-thirds of the U.S. lobster catch, a maximum carapace size of 5 inches requires that large lobsters also be returned to the sea. The possession of “berried” female lobsters, which are carrying eggs outside their shell, is also illegal.

With more than 6,000 lobstermen fishing more than 1.5 million traps off the coast of Maine alone, it’s not surprising that lobstermen are very territorial. If a newcomer tries to set traps in someone else’s area, he will likely find that he will lose his traps as his buoys will be cut off.

**FISHERIES**

Lobsters are landed primarily by the use of baited traps, however, a small amount are landed by trawl nets off New England. In the U.S. and Canada, lobster are landed by small boat fishermen who fish inshore and larger boats that fish well offshore. Traps are identified by a specific color pattern on the buoy. In recent years, fishermen in Canada and the U.S. have each harvested approximately 40,000 metric tons of lobster a year.

Lobster are always delivered live to buyers and processors. There is no set season in U.S. waters, but landings decline dramatically in the cold weather months. In Canada, lobstermen fish during set seasons, which vary from area to area. Large quantities of lobsters that are landed in the warm weather months are held in pounds, which can be enclosed coves or land-based facilities which hold lobsters in tanks.

**PRODUCT FORMS**

Most lobsters are sold live by size grade. Typical grades are: chickens (1/4–1 lb.), heavy chickens (1–1 1/4 lbs.), quarters (1 1/4–1 1/2 lbs.), selects (1 1/2–1 3/4 lbs.), deuces (1 3/4–2 lbs.), heavy selects (2–2 1/4 lbs.), small jumbos (2 1/4–2 1/2 lbs.) and jumbos (2 1/2–4 lbs.). Lobsters are also sold frozen as whole cooks, frozen raw tails and as meat.

**WHOLESALE PRICE/SUPPLY HISTORY**

Lobster prices will vary significantly, depending on the size of the lobster and when it was caught. Prices of 1 1/4-lb. lobsters in the winter, for example, can reach
$8/lb., compared to less than $5/lb. in September. The larger the lobster, the more expensive it becomes. The difference between a chicken and a jumbo lobster can be more than $3/lb. Frozen lobster tails normally sell between $12 and $14/lb.

The supply of lobster has been excellent in recent years due to very strong inshore landings in Maine. Lobster supplies are best from July through October, when two-thirds of the U.S. catch is landed. More than 30,000 metric tons of lobsters are imported from Canada each year, an amount almost equal to the U.S. catch.

BUYING GUIDE/SOURCING
September and October are the best months to promote lobsters. Catches are still very good while demand from summer resorts falls off rapidly, driving prices down to their annual lows. Prices in May are also quite good, as the opening of Canada's Prince Edward Island fishery drives prices down from their winter highs. Lobsters typically shed their shells in the late spring, which results in a high percentage of softshell lobsters in the summer. These lobsters will have a much lower meat yield, as they are still filling out their shell and they are much more fragile.

MARKETS
Although consumption is highest in the Northeast, lobster are a well-known seafood, popular throughout the U.S. in both retail and foodservice markets.

PRODUCT SUBSTITUTION
American lobster are in a league of their own, however, they can be used as an alternative to other expensive shellfish such as shrimp in many recipes.
Some 30 species of spiny lobsters are found in both warm and cold waters extending from France and southern Japan in the north to New Zealand and South Africa in the southern hemisphere. Depending on where they’re caught, spiny lobsters are also called rock lobsters, crayfish, langouste or langosta. About half of the world spiny lobster catch comes from warm waters (a rule of thumb is that any spiny lobster caught between 30 degrees north or south of the equator is a warmwater lobster). Worldwide, about 80,000 metric tons of spiny lobsters are harvested a year.

The single largest spiny lobster fishery is for the Caribbean spiny lobster, *Panulirus argus*, which can produce catches of up to 40,000 metric tons. Cuba, Brazil, Honduras, Nicaragua and the Bahamas are the major producers. On the coldwater front, the Australian spiny lobster, *Panulirus cygnus*, is the leading commercial species, with landings that average about 14,000 metric tons.

In a good year, U.S. fishermen will harvest up to 4,000 metric tons of spiny lobster. Florida fishermen typically harvest between 2,500 to 3,500 metric tons of Caribbean spiny lobsters, while California fishermen harvest up to 400 metric tons of the California spiny lobster, *Panulirus interruptus*.

**FISHERIES**
Most spiny lobsters are caught in baited traps, although in warmer waters large quantities can be landed by divers. Depending on the fishery, divers will land only the tail or the whole animal. In the U.S., the season for California spiny lobsters normally runs from October to March, while the Florida fishery for Caribbean spiny lobster runs from August to March. Elsewhere in the Caribbean, seasons will vary, but some lobsters are always landed year-round.

**PRODUCT FORMS**
Although spiny lobsters are available live and as fresh and frozen whole cooks, most of the spiny lobsters sold in the U.S. are raw frozen tails. These tails are sold by size grades, typically graded by the ounce. The sizes can range anywhere from 4 ounces to almost two pounds.

**WHOLESALE PRICE/SUPPLY HISTORY**
The price of Caribbean spiny tails normally range from $12–$15/lb., although periodic shortages can drive prices higher. Coldwater tails, which are considered to be of significantly higher quality than warmwater tails, normally sell between $20 and $24/lb.

Spiny lobsters are in good supply, as the U.S. imports between 12,000 to 14,000 metric tons of frozen spiny tails a year from more than 20 countries. More than two-thirds of the U.S. imports, though, come from Australia, the Bahamas, Brazil,
Honduras and Nicaragua. U.S.-caught spiny lobsters are also in good supply as landings have been very stable in recent years.

**BUYING GUIDE/SOURCING**

There are two things to keep in mind when buying spiny lobster: Don’t pay $15 a pound for water and don’t pay coldwater prices for a warmwater tail. Buying coldwater tails is more straightforward as the producing countries have rigorous quality control standards and their tails are always packed “dry” (without a glaze). Warmwater tails, on the other hand, can be tricky because the quality and texture of the meat can vary considerably from firm to mushy, depending on how the tail was handled. Some warmwater producers will also soak their tails in a tripoly solution or add excessive glaze to add weight. If you’re buying warmwater tails, find a brand you can rely on and don’t be tempted by a bargain price.

**MARKETS**

A very popular seafood, spiny lobster tails are consumed throughout the U.S.

**PRODUCT SUBSTITUTION**

Australian rock lobster is a good substitute for Caribbean spiny lobster.
Mackerels are a diverse family of pelagic fish found in warm and temperate waters around the world. A number of mackerel are fished commercially in U.S. waters. Atlantic mackerel, *Scomber scombrus*, is fished on both sides of the North Atlantic. This species migrates up and down the East Coast of North America from North Carolina to Newfoundland and as a result the fishery is highly seasonal. The premium, high oil content mackerel are landed in the late summer and fall off New England and Canada. A small fish, they normally weigh about one pound.

Several mackerel species are fished commercially off the southeastern U.S. coast. Hook-and-line fishermen off North Carolina and Florida catch king mackerel, *Scomberomorous cavalla*, a large species that can reach 90 pounds, but averages about 20 pounds. A smaller species that averages about two pounds, Spanish mackerel, *Scomberomorous maculatus*, is fished in the same waters by gillnet fishermen.

The largest U.S. mackerel fishery takes place off California for Pacific mackerel, *Scomber japonicus*, which is also called chub mackerel or Japanese mackerel. Found in both the Atlantic and Pacific oceans, this fish can reach a size of almost 5 pounds, however, the average size in the commercial catch is closer to one pound.

**FISHERIES**

Pacific mackerel, which are fished mostly in the summer, are caught by seine nets. Catches of Atlantic mackerel are mostly caught by trawl nets and the heaviest landings by U.S. fishermen are in the late spring, when the fish have schooled to spawn. Smaller quantities of Atlantic mackerel from New England and Canada are landed in the summer and early fall by seine nets and traps.

King mackerel are caught year-round, but landings can fluctuate significantly from one month to the next. Spanish mackerel are caught primarily in the fall and early winter.

**PRODUCT FORMS**

Atlantic and Pacific mackerel are usually marketed as whole round frozen fish, although fresh whole fish is available seasonally. Frozen, pinbone-in Atlantic mackerel fillets are also available from some processors. Atlantic mackerel is also popular for hot smoking because of its high oil content. Spanish and king mackerel are normally sold fresh. In the case of king mackerel, steaks and fillets are available in addition to whole fish.

**WHOLESALE PRICE/SUPPLY HISTORY**

The price of mackerel will vary considerably, depending on its oil content and size. Whole king mackerel, which is the most expensive mackerel, sells between $1.75 and $3/lb. Whole Atlantic mackerel sells between $.25 and $.75/lb., with larger fish with high oil content receiving the highest price. Whole Spanish mackerel typically sells between $1 and $1.50/lb., while frozen whole Pacific mackerel normally sell for less than $.20/lb.

Mackerel landings will fluctuate considerably from year to year, depending both on migration patterns and market demand. U.S. landings of Atlantic mackerel, for example, have fluctuated between 5,000 and 15,000 metric tons in recent years.
although biologists say almost 100,000 metric tons could be landed on a sustainable basis. Pacific mackerel landings have ranged from 9,000 metric tons to more than 30,000 metric tons. King mackerel catches average about 2,000 metric tons, slightly more than catches of Spanish mackerel.

BUYING GUIDE/SOURCING
The best mackerel are exceptionally flavorful fish that are excellent for grilling or broiling as many fine chefs will attest. As a result, buyers should be prepared to pay more for fish with higher oil content. Most mackerels are also excellent both smoked and in raw applications such as sashimi. When buying mackerel, either fresh or frozen, it pays to buy the highest quality. Because landings of mackerel can be very seasonal, prices for fresh product will decline significantly when supplies are abundant.

MARKETS
Mackerel are normally consumed in markets near where they are caught. Spanish and king mackerel, for example, are most popular in the Southeastern U.S., while Atlantic mackerel is most popular in the Northeast. As mackerel are most often marketed whole, they are widely marketed to ethnic groups which are more comfortable preparing and serving whole fish.

PRODUCT SUBSTITUTION
Mackerel are an alternative to other high oil content fish such as salmon.
An open ocean species found in warm waters around the world, mahi mahi is the Hawaiian name for this highly regarded fish (it means strong, a reference to the fish's fighting ability). Along the East Coast of the U.S., mahi mahi is often called dolphinfish, which leads to confusion with the marine mammal. The name dorado, a reference to the fish's golden skin color when it comes out of the water, is widely used outside the U.S. (dorado in Spanish means “golden”). Mahi mahi are highly migratory and catches will vary greatly depending upon the time of year. Mahi mahi can grow to more than 50 pounds, but most of the commercial catch is from 8 to 25 pounds. Annual landings of mahi mahi by U.S. fishermen are relatively small at about 750 metric tons, about half of which is landed in Hawaii. The U.S. appetite for mahi mahi, however, is considerably larger, as imports of fresh and frozen fillets have increased to more than 10,000 metric tons a year.

**FISHERIES**
Mahi mahi are caught by hook and line, with most of the catch being landed as a bycatch by tuna longline boats. In countries such as Ecuador and Costa Rica, however, handline fishermen using small boats catch mahi mahi in directed fisheries. Mahi mahi fishing tends to be very seasonal. In Ecuador, for example, the fishery runs from December through March.

**PRODUCT FORMS**
Mahi mahi is available both fresh and frozen. Fresh product is sold as both headed and gutted (H&G) fish and skin-on fillets. Frozen mahi mahi is sold as whole fillets or as skinless, boneless portions.

**WHOLESALE PRICE/SUPPLY HISTORY**
The price of fresh mahi mahi fluctuates widely, depending primarily on time of year. The wholesale price of fresh H&G mahi mahi, for example, can range from more than $3/lb. in the summer to just $1/lb. in January and February, at the peak of the Ecuador season. Prices for fresh mahi mahi fillets can range from $1.50 to $5/lb. Frozen mahi mahi prices are somewhat more stable, ranging from $2 to $3/lb., depending on product specifications.

Fresh mahi mahi is available through the year, but supplies are most abundant in the early winter when catches from Ecuador peak. Frozen mahi mahi fillets are exported in large quantities from Taiwan and Singapore and are available all year.

**BUYING GUIDE/SOURCING**
Like other scombroid fish, mahi mahi can produce toxic histamines when not iced quickly. When buying skin-on fillets, look for firm, pinkish colored meat and nice bright skin colors to get the highest quality. Faded skin and soft gray meat indicates poor quality. The best time to promote this fish is in January and February when mahi prices are at their seasonal lows and the price of many other fresh fish is at their seasonal highs.
MARKETS
Fresh and frozen mahi mahi are sold throughout the U.S. by both retail and food-service operators.

PRODUCT SUBSTITUTION
Mahi mahi is a very mild, sweet-tasting fish that is excellent broiled or grilled. It is a good substitute for more expensive fish like grouper, red snapper and sea bass.
Mussels

Bivalve mollusks, mussels are found along many of the world’s coasts. The common blue mussel, *Mytilus edulis*, is found on both sides of the North Atlantic and is the most widely consumed mussel in North America. Most of the mussels consumed in the U.S. are farmed, either by bottom culture or rope culture. Most of the blue mussels consumed in the U.S. are grown on ropes (mussels attach themselves to the bottom or to ropes with their beard or byssus). Most of this production comes from farmers in the Canadian Maritime provinces, especially Prince Edward Island.

Substantial quantities of blue mussels are dredged off New England from natural beds. Some of these mussels are purged in tanks for several days and their shells are scrubbed. Some producers will misrepresent these mussels as bottom-cultured mussels to get a higher price than regular wild mussels.

Growers in Washington State produce relatively small quantities of the Mediterranean mussel, *Gallo provincialis*. Larger than blue mussels, Mediterranean mussels are also grown on ropes.

Large quantities of greenshell mussels, *Perna canaliculus*, are grown on ropes in New Zealand. About twice the size of a blue mussel, greenshell mussels are exported in large quantities to the U.S., primarily as frozen product.

FISHERIES

Mussels are produced by a variety of methods, including rope-grown, bottom cultured and by dredging or dragging nets across natural beds. Mussel farmers in Europe and Maine use a bottom-culture method, where they dredge small mussels from the bottom and seed them over leased beds in prime grow out areas. Rope culture of mussels, where mussels are grown on ropes suspended from rafts or buoys, is the primary production method in Canada, Washington State, New Zealand and parts of Europe. The dredging of wild mussels is common off New England.

PRODUCT FORMS

Mussels are sold in a variety of ways, including live, frozen whole cooked, frozen cooked meats and frozen cooked on the half shell. Most of the mussels produced in North America are sold live, while most New Zealand greenshell mussels are sold frozen on the half shell.

WHOLESALE PRICE/SUPPLY HISTORY

The price of a mussel depends on the species and how it was grown. Rope-grown mussels have a higher meat content, so they sell for a higher price. Rope-grown blue mussels sell for about $0.80–$0.90/lb., while bottom-cultured blue mussels sell for about $0.60/lb. Wild blue mussels can be purchased for as little as $.25/lb. Rope-grown Mediterranean mussels sell for $1.50/lb. Live and frozen greenshell mussels sell for about $2/lb. Frozen whole cooked mussels sell between $1.20–$1.50/lb., depending on size and meat content.

Mussels are in very good supply, as the volume of mussels sold in the U.S. has increased considerably in recent years due to a sharp increase in imports from Canada and New Zealand. Future increases, however, will not be as large, as har-
vests from the primary production areas in those two countries are close to their peak. Supplies of frozen whole cooked mussels from Chile and China, however, can be expected to increase. U.S. production of mussels is not expected to grow significantly due to the inability of growers to get new site permits.

BUYING GUIDE/SOURCING
It is the meat that matters when it comes to mussels. When buying mussels, buyers should adopt a seasonal strategy, as the meat content of a mussel will decrease significantly after it spawns. Some buyers, for example, will switch to a frozen whole cooked mussel in the summer, when the meat content of mussels from New England and Prince Edward Island are lower than normal.

MARKETS
Mussels have become very popular in markets throughout the U.S. As a rule, however, consumption of blue mussels is highest among mainstream foodservice and retail markets, while consumption of larger species, such as greenshell and Mediterranean mussels, is higher among Asian markets.

PRODUCT SUBSTITUTION
Rope-grown mussels are very meaty most of the year and they make a good substitute for dredged mollusks.
Raw oysters are seafood delicacies that have long been rumored to have amorous properties. Casanova, for example, was reported to have consumed 50 oysters a day with his mistress in a bathtub built for two. By the turn of the 20th century, oysters were so popular New Yorkers were consuming a million a day. Two species of oyster are widely consumed in the U.S.: the Eastern oyster, *Crassostrea virginica*, and the Pacific oyster, *Crassostrea gigas*. Depending upon where they are harvested, oysters are marketed by dozens of geographical names such as Blue Points (Long Island Sound), Malpeques (Prince Edward Island), Fanny Bays (British Columbia), Wellfleets (Cape Cod) or Hama Hamas (Puget Sound) to name a few.

Although the Chesapeake Bay region once dominated production, today more than 75 percent of the U.S. harvest of Eastern oysters comes from Louisiana and Texas. More than 80 percent of the U.S. harvest of Pacific oysters comes from Washington State.

**FISHERIES**

Eastern oysters are primarily produced by dredging them from the bottom, although small amounts are produced in racks suspended from buoys in the Northeast. In some areas, such as Long Island Sound, oysters are moved from nursery beds to growout beds by oystermen. On the West Coast, Pacific oysters, which were introduced to the U.S. from Japan, are grown both on the bottom and off the bottom on pipes or in racks. Eastern oyster producers rely on wild spat (oyster seed), while Pacific oyster producers rely heavily on spat purchased from oyster hatcheries.

**PRODUCT FORMS**

Fresh shucked meats and live oysters are traditionally the two primary oyster products. Shucked oyster meats are marketed by sizes such as small, extra small and medium. As concern over the harmful bacteria *vibrio vulnificus* has grown, Gulf of Mexico oyster producers have begun offering frozen oysters on the half shell, pasteurized oysters and oysters that have been killed using pressure. All of these processing methods kill the vibrio.

**WHOLESALE PRICE/SUPPLY HISTORY**

The price of a gallon of shucked oyster meats typically ranges from $45 to $65/gallon, depending on size, with a premium being paid for smaller sizes. Live oysters will wholesale anywhere from $2.50 to almost $5 a dozen, depending on size and geographic origin.

Oysters are in very good supply as harvests have been relatively stable for a number of years. In a typical year, U.S. oyster producers harvest about 13,000 metric tons of Eastern oyster meats and about 4,000 metric tons of Pacific oyster meats.

**BUYING GUIDE**

The quality of Pacific oysters declines much more in the summer after spawning than does the meat quality of Eastern oysters. Because of this, Pacific oyster growers now produce a high percentage of triploid (sterile) oysters that maintain their meat...
quality year-round. Since oysters can be sold under a variety of confusing volume measures, including gallons and bushels, which can vary greatly from producer to producer, buyers should insist on easily quantifiable units such as by the piece or by the pound.

MARKETS
Oysters are most popular along the Pacific and Atlantic coasts as well as the Gulf region.

PRODUCT SUBSTITUTION
The meat content of oysters grown off the bottom is normally higher and they make a good substitute for oysters that are dredged from the bottom.
Alaska pollock, a member of the Gadidae family of fishes, which also includes cod and hake, supports the largest single species food fishery in the world. (It is important not to confuse Alaska pollock with Atlantic pollock (*Pollachius virens*), which is fished off the Northeast coast of the U.S. and throughout the North Atlantic. Alaska pollock are smaller and have noticeably whiter flesh and lower oil content than Atlantic pollock.)

Alaska pollock are found throughout the North Pacific, from the Pacific Northwest to the Sea of Japan. Most of the catch, though, comes from fisheries in the Bering Sea and the Sea of Okhotsk, off Russia’s Kamchatka Peninsula. Although Alaska pollock can grow to 15 pounds or more, most of the fish landed are less than 2 pounds.

**FISHERIES**

Alaska pollock are always caught by trawlers. About half of the U.S. pollock quota is caught, processed and frozen at sea by factory trawlers. The rest of the quota is caught by trawlers, which deliver fresh fish to shore-based processing plants. The U.S. Alaska pollock fishery is split into two seasons. The winter fishery—or roe fishery—lasts from January to March. During this fishery, the valuable roe is extracted from the fish and exported to Japan. The remainder of the quota is taken in the fall.

**PRODUCT FORMS**

Alaska pollock is almost always sold frozen, either as skinless, boneless fillets or as surimi, the fish paste that is widely used to make imitation shellfish products—especially imitation crab. Most of the fillets produced from Alaska pollock are used to make fish blocks. These blocks are then processed into breaded and battered fish portions for frying. Individually quick frozen (IQF) fillets, most of which are twice-frozen fillets produced in China from Russian headed and gutted (H&G) pollock, are also widely available. Pollock fillets are normally in the 2–4-ounce size range.

**WHOLESALE PRICE/SUPPLY HISTORY**

Single-frozen pollock fillet blocks normally sell between $.90 and $1/lb., although temporary shortages can drive prices as high as $1.50/lb. for brief periods. Single-frozen pollock fillets typically fluctuate in a range between $1 and $1.30/lb. Twice-frozen fillets from China normally sell for about $.10–$.20/lb. less than single-frozen product.

U.S. supplies of Alaska pollock are at their all-time highs, as catches from the Bering Sea fishery are more than 1.3 million metric tons, which is about half of all the food fish caught by U.S. fishermen. The Russian pollock fishery used to be more than twice the size of the U.S. fishery, however, Russian catches have declined sharply in recent years due to overfishing. As a result of the decline in Russian pollock landings, U.S. imports of twice-frozen pollock fillets are declining significantly.

**BUYING GUIDE/SOURCING**

As a rule, the highest quality Alaska pollock fillets come from factory trawlers that freeze their fish shortly after it is caught. However, buyers do not always have to...
pay a premium price for frozen at sea (FAS) pollock as it often sells for about the same price as shore-frozen product. If you need a larger fillet, look for product produced by shore-based processors in the Gulf of Alaska where the average size of the fish caught is much larger. The Alaska Seafood Marketing Institute (ASMI) maintains a directory of suppliers on their web site www.alaskaseafood.org.

MARKETS
Alaska pollock is consumed throughout the U.S., although most consumers don’t know what kind of fish they are eating when they eat it. All the major fast-food chains use Alaska pollock for their fried fish sandwiches and fish and chips.

PRODUCT SUBSTITUTION
White, bland and boneless, Alaska pollock is a good substitute for many higher-priced whitefish such as cod, haddock, snapper, rockfish, grouper, flounder and sole. It can be cooked in a wide variety of ways, including poaching, baking and deep-frying.
The most widely distributed of all the Pacific salmon, chums are found on both sides of the Pacific, from Washington state to north of the Arctic Circle and south to Japan. Chums produce the highest volume of landings, accounting for about half of the total catch of Pacific salmon. (In the U.S., chums account for 25 percent of the Pacific salmon harvest). Each spring, hatcheries in Alaska, Russia and Japan release billions of young chum smolts into the ocean. After spending their life in the ocean, these fish return anywhere from three to six years later. Chums average between seven and 18 pounds in size. Although some runs such as the Yukon River fall chum will swim as far as 2,000 miles upriver, most chums spawn near the river mouths so they have a lower oil content than sockeye, king or coho salmon. The eggs from the chums are highly valued in Japan, where they are sold as ikura.

**FISHERIES**

Chums are caught using purse seine nets and gillnets, however, a small amount are landed by trollers. The Marine Stewardship Council has certified the Alaska chum salmon fishery as sustainable and well managed.

**PRODUCT FORMS**

Chums are sold both fresh and frozen. Fresh chums are primarily available as headed and gutted (H&G) fish, although some processors produce fillets. Chums are marketed according to their skin and meat color. The highest quality, silver fish are sold as “silver-brites.” Other grades are “semi-brite” and dark. Because they are relatively inexpensive, chums are the raw material for a wide variety of frozen value-added products including skinless, boneless portions. Many of these products are processed in China using whole chums from Alaska and Japan.

**WHOLESALE PRICE/SUPPLY HISTORY**

The price of a chum is largely a function of its meat color, which can vary widely, from a deep red to a pale orange. Fresh and frozen H&G silver brite chums with good meat color sell for about $.70–$.90/lb. FOB Seattle, depending on size (bigger fish bring a premium). Dark chums with pale meat color, on the other hand, may sell for as little as $.30/lb. Frozen chum fillets and portions typically sell between $1.20 and $1.50/lb., depending on product specification.

Chums are another example where there are almost more fish than markets. The low salmon prices, which have resulted from the huge growth in the production of pen-raised salmon, have driven the cost of chums down to the point where the eggs are more valuable than the fish. Fresh chums are readily available from late June through October. Frozen chums are available year-round.

**BUYING GUIDE/SOURCING**

Over the years, it has not been uncommon for some seafood suppliers to try and pass chums off as more expensive cohos, since both fish are about the same size. Buyers should know how to spot the difference: chums have a much thinner caudal peduncle (the area just in front of the tail) than cohos. Since meat and skin
color dictate the value of a chum, order a free meat and skin color guide form the
Alaska Seafood Marketing Institute (www.alaskaseafood.org) to make sure you are
getting what you pay for. The Institute also has a directory of suppliers.

MARKETS
Because they are relatively inexpensive and a good value, chums are popular in
retail markets throughout the U.S.

PRODUCT SUBSTITUTION
Even though they have a lower oil content than most Pacific salmon, chums can
still be substituted in recipes for more expensive Pacific salmon and for farmed
salmon.
Coho salmon (*Oncorhynchus kisutch*)

Also called silver salmon, cohos are found from Oregon to the Bering Sea Coast of Alaska. Cohos, which have bright red meat and about twice the oil content of the leaner pink and chum salmon, average about eight to 12 pounds. Cohos are one of the smaller salmon resources, accounting for just 5 percent of the U.S. landings of Pacific salmon. Like king and sockeye salmon, cohos will spend several years in fresh water before migrating to the ocean. Coho grow rapidly and usually spend just 18 months in the ocean, feeding voraciously and growing rapidly. Some coho will return prematurely. These fish, which can weigh as little as two pounds, are called jacks.

**FISHERIES**

Trollers fishing off southeast Alaska, British Columbia and Washington land about half of the commercial coho catch. Cohos are also caught using gillnets and a small quantity by purse seine. The coho fishery normally runs from August to early October. More than 75,000 metric tons of cohos are farmed in net pens in Chile a year, about five times the typical annual North American production of wild cohos. The Marine Stewardship Council has certified the Alaska coho salmon fishery.

**PRODUCT FORMS**

Cohos are sold both fresh and frozen. Fresh cohos are available as both H&G fish and fillets. Some processors also produce limited quantities of skinless, boneless coho portions.

**WHOLESALE PRICE/SUPPLY HISTORY**

Cohos are more expensive than chums or pinks, and less expensive than kings or sockeyes. Troll-caught cohos typically sell between $1.50–$2/lb. FOB Seattle, while net-caught fish run about $1.25–$1.75/lb., depending on size and quality. Fresh and frozen fillets from net-caught coho typically sell for between $2–$2.50/lb.

The supply of cohos has been relatively consistent in recent years. Fresh cohos are available from August through early October, while frozen fish is most available from October through March.

**BUYING GUIDE/SOURCING**

As is the case with all wild salmon, the quality of coho will vary from run to run and fishery to fishery. Some of the best cohos are caught in September in the Copper River fishery in Alaska. These fish are usually over 10 pounds and they have a higher fat content. Troll-caught cohos that are frozen at sea are a very high quality product, although you will have to pay a premium over shore-frozen cohos. Cohos that start to show watermarks are sometimes sold as red cohos or even red salmon. Don’t confuse them with more expensive sockeyes. A color guide to cohos is available from the Alaska Seafood Marketing Institute (www.alaskaseafood.org).

**Fresh fillet price range ($/lb)**

- **Wholesale**
  - $2.00–$2.50
- **Retail**
  - $3.99–$5.99

Fresh April–October with supply varying year-to-year

**Environmental impacts**

- Minimal (Alaskan)

No other fisheries mentioned in this profile have been ranked.
MARKETS
Cohos are marketed primarily on the West Coast in both foodservice and retail markets.

PRODUCT SUBSTITUTION
High-quality cohos are a very good, flavorful fish with attractive red meat color. As a result, they can be substituted for any wild or farmed salmon.
King, or chinook, salmon are the largest and most prized of the five species of Pacific salmon. A wide-ranging species, kings are fished from central California to the Yukon River on Alaska's Bering Sea coast. Like all Pacific salmon, kings die after spawning. Because they mature sexually at an age anywhere between three and seven years, the size of the king salmon caught by fishermen will vary from under 10 pounds to more than 30 pounds. Of all the Pacific salmon, kings have the highest average oil content, but the amount of oil will vary depending upon the fish's river origin. Kings that swim up the Yukon, for example, have to swim 2,000 miles upriver to spawn without eating (mature salmon stop eating once they enter the mouth of a river), so their oil content is the highest of any king salmon run.

FISHERIES
King salmon are fished by trollers, who tow hooks behind their boats, and gillnetters. Troll-caught kings sell for a premium over gillnet fish, because they are bright fish caught in the ocean and they are normally bled, gutted and iced immediately after they are landed. Most troll kings are landed in the summer from April to October off the coasts of California, Oregon, Washington, British Columbia and southeast Alaska (where a small winter troll fishery also takes place). King salmon are also farmed in limited quantities in net pens in both British Columbia and Chile. The Marine Stewardship Council has certified the Alaska king salmon fishery.

PRODUCT FORMS
King salmon are available both fresh and frozen as whole fish (head-on or off) and fillets (skin-on or off, bone-in or boneless). Fresh wild kings are readily available from April through September. Because of their high oil content, kings are also often smoked.

WHOLESALE PRICE/SUPPLY HISTORY
The price of kings will vary considerably depending on how, where and when the fish was caught. The most expensive, high oil content kings, such as Copper River, Columbia and Yukon kings, will bring more than $5/lb. for fresh whole fish and up to $15/lb. for skin-on fillets. Lower oil content net-caught kings, on the other hand, can be purchased for less than $1.50/lb. for whole fish. As a rule, good quality whole fresh troll kings sell for about $2–$3/lb. FOB Seattle.

Although king salmon account for less than 3 percent of the Pacific salmon catch, supplies are still adequate to meet existing demand. In a typical year, about 7,500 metric tons of kings are landed by U.S. fishermen, about half of which is caught by Alaska fishermen. Keep in mind, though, that catches off the California and the Pacific Northwest catch can vary considerably from year to year, depending on ocean conditions.

BUYING GUIDE/SOURCING
Buying any wild salmon is tricky because the quality can vary from river to river and fisherman to fisherman. When buying kings, take the time to learn about the quality variations between the various runs and make sure you know where your

King salmon *(Oncorhynchus tshawytscha)*

**Fresh steak/fillet**

**price range ($/lb)**

*Wholesale*

$5.99–$7.99

*Retail*

$8.99 and up

Fresh April–September with supplies variable year-to-year

**Environmental impacts**

☐ Minimal (wild Alaska and California)

No other fisheries mentioned in this profile have been ranked.
fish was caught and how it was caught. Also, make sure you and your supplier have a clear understanding of your quality expectations so you won't have any unpleasant surprises. Some of the best values on kings are the troll kings landed off California and Oregon. These fish are generally quite large and ocean bright. Some Alaska trollers, who freeze their kings at sea immediately after catching them, produce an outstanding quality fish, which is an excellent alternative at times of year when fresh kings are not available.

A directory of Alaska king salmon suppliers can be found at the Alaska Seafood Marketing Institute site www.alaskaseafood.org.

MARKETS
Wild king salmon are primarily marketed along the West Coast, where it is a widely sought after fish. As more buyers seek an alternative to farmed salmon, however, kings are gaining wider market acceptance.

PRODUCT SUBSTITUTION
As their oil content is similar, wild kings are an excellent substitute for farmed salmon.
Pink salmon (*Oncorhynchus gorbuscha*)

The smallest of the Pacific salmon, pinks are also the most prolific. In a good summer, almost 150 million pink salmon will be landed in Alaska, yielding a catch of more than 200,000 metric tons. Also called “humpies,” because of the distinctive hump they develop shortly before spawning, pinks average between three and four pounds. Pinks are landed from Washington state to Norton Sound in Alaska, but more than 95 percent of the U.S. pink catch comes from Alaska, where large pink fisheries are found in southeast Alaska, Prince William Sound and Kodiak Island. Because most pinks spawn within a few miles of the coast, they have the lowest oil content of the Pacific salmon.

**FISHERIES**

Because of the high-volume of the runs, most pinks are landed using purse seine nets. Smaller quantities, however, are caught using gillnets and by trollers. Most pink salmon are caught in July and August. The Marine Stewardship Council has certified the Alaska pink salmon fishery.

**PRODUCT FORMS**

Because the pink fishery lasts only a few weeks in Alaska, processors can most of the catch. Increasing quantities of frozen pinks are being produced, however, many of which are shipped to China, where they are processed into a variety of value-added skinless, boneless salmon products for the U.S. market. Limited quantities of pinks are landed by trollers and frozen at sea. These fish, which are of very high quality, are sold whole. Only small quantities of pinks are sold fresh, as they are more delicate and perishable than other salmon species.

**WHOLESALE PRICE/SUPPLY HISTORY**

Most frozen whole pink salmon sell between $.65–$.75/lb. FOB Seattle, while frozen, skinless, boneless portions sell for about $1.40–$1.60/lb., depending on the product specification. Troll-caught pinks sell between $1.25–$1.50/lb. for whole fish.

In the case of pink salmon, there are more fish than markets. As the market for canned salmon has declined, Alaska processors have started limiting the volume of pinks they process. As market demand for frozen pink salmon products grows, there will be ample supplies of pinks available for buyers.

**BUYING GUIDE/SOURCING**

When buying pinks, it’s best to pay a premium to make sure you get the best quality. Also, try and buy your pinks from a processor who freezes as well as cans. Because canning is a more forgiving process, these processors will high grade their fish and freeze only the highest quality pinks. No. 1 quality pinks should have minimal scale loss, the fish should not be water marked (as salmon near fresh water their silver skins starts to turn colors as they mature sexually) and the belly walls should be firm and elastic.

**Frozen whole price range ($/lb)**

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<th></th>
<th>Wholesale</th>
<th>Retail</th>
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<td>$0.65–$1.50</td>
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Volume peaks in July and August but large frozen supply most years.

**Environmental impacts**

- Minimal (Alaskan)

No other fisheries mentioned in this profile have been ranked.

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MARKETS
Canned pink salmon are sold throughout the U.S., but consumption is highest in the Southeastern U.S. Frozen pink salmon are sold on the West Coast, Europe and in large East Coast cities, primarily to retail markets.

PRODUCT SUBSTITUTION
Pinks are a delicate, relatively lean salmon (pinks have a fat content of 4.4 grams per 3.5 ounces, compared to 13.3 grams for kings) and have a trout-like texture. They are a good substitute for delicate white fish such as orange roughy or flounder.
Sockeye salmon (*Oncorhynchus nerka*)

Sockeye, or red, salmon have traditionally been Alaska’s money fish. Prized for their ruby red meat color and high oil content, sockeyes are also very plentiful. In good years, more pounds of sockeyes are harvested in Alaska than any other salmon. Although sockeye are caught from Puget Sound in Washington State to Bristol Bay on Alaska’s Bering Sea coast, more than 95 percent of the harvest is landed in Alaska. The river system in Bristol Bay, which is located in the southwest corner of Alaska, typically produces about two-thirds of the state’s total sockeye catch each July. Young sockeye will spend up to four years in freshwater lakes and anywhere from two to four years in the ocean. They range from four to eight pounds in size.

**FISHERIES**

Most sockeyes are caught by gillnet, the only legal fishing gear in Bristol Bay. Elsewhere in Alaska, sockeye are caught by purse seine and gillnet. Trollers off the West Coast of Vancouver Island catch small quantities of sockeyes. The sockeye fishing season begins in mid-May in Copper River and ends in mid-August in Puget Sound. The Marine Stewardship Council has certified the Alaska sockeye salmon fishery.

**PRODUCT FORMS**

Sockeyes are sold fresh, frozen, canned and smoked. Fresh and frozen sockeyes are available as both headed and gutted (H&G) fish and fillets. Some processors also produce limited quantities of skinless, boneless sockeye portions.

**WHOLESALE PRICE/SUPPLY HISTORY**

The price of sockeyes is largely a function of the condition of the Japanese salmon market, the primary market for this fish. In recent years, as that market has been flooded with farmed cohos from Chile, the ex-vessel price of sockeyes has been reduced by about half. As a result, fresh H&G Alaska sockeyes can now be purchased for about $2–$2.50/lb. FOB Seattle during the summer. The highest oil content sockeyes, such as Copper River reds, will sell for a premium. Frozen sockeyes sell for between $1.75–$2.25/lb., depending on size and quality FOB Seattle. Fresh and frozen sockeye fillets sell for $3.50–$5/lb., depending on the quality and whether they are boneless or bone-in.

Sockeye runs—and supply—will vary considerably from year to year, depending on ocean survival conditions. Over the past 10 years, for example, U.S. sockeye catches have fluctuated between a low of 58,000 metric tons and a high of almost 180,000 metric tons. Nevertheless, fresh sockeyes are readily available much of the summer from May to August. Availability of frozen sockeyes depends on the Japanese market. Generally, most processors will ship all their frozen fish to Japan by the end of the year.

**BUYING GUIDE/SOURCING**

Not all sockeyes are the same and even within the same run quality will vary. Copper River reds caught in May, for example, will have bright silver skin and rich, fat

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**Fresh whole H&G price range ($/lb)**

**Wholesale**

$1.99–$2.99

**Retail**

$5.99–$8.99

Fresh sockeye is available from May through August with supplies varying from year to year.

**Environmental impacts**

- Minimal (Alaskan)

No other fisheries mentioned in this profile have been ranked.
meat. Fish caught late in the run in mid-June, though, are called “greenies,” as they have dark skin and lower oil content because they do not swim as far up the river to spawn. Some of the best sockeyes are caught by seiners off Kodiak Island or by gillnetters off False Pass on the Alaska Peninsula. Because these fish are intercepted a long distance from their natal river, they are a very high quality, bright fish. A directory of Alaska sockeye salmon suppliers can be found at the Alaska Seafood Marketing Institute web site www.alaskaseafood.org.

MARKETS
Sockeyes are most popular in the Pacific Northwest, in the Northeast and in the upper Midwest.

PRODUCT SUBSTITUTION
Sockeyes have almost as much fat (i.e., flavor) as king salmon and are a very good substitute for farmed salmon. They are excellent grilled, broiled or smoked.
Several small species of scallops are marketed in the U.S. under the name bay scallops. The true bay scallop, *Argopecten irradians*, is found in shallow waters of the northeastern and mid-Atlantic U.S., where it lives in eel grass beds. A short-lived species, bay scallops die right after they spawn at the age of 2 years. There have been years where more than 1,000 metric tons of bay scallop meats have been harvested by U.S. fishermen; however, recent harvests have dropped below 25 metric tons.

Less than three dozen live U.S. bay scallops were flown from the U.S. in 1982 to see if they could be farmed. Today, bay scallops are an important part of China’s big scallop aquaculture industry, which is located on the Gulf of Bohai in northeastern China. In recent years, Chinese scallop farmers have harvested more than 200,000 metric tons annually and large quantities of frozen bay scallop meats are now exported from China to the U.S. The Chinese also farm large quantities of their native small scallop, *Chlamys ferrari*, which is also widely sold in the U.S. as a bay scallop.

The calico scallop, *Argopecten gibbus*, is a small scallop that is dredged off the coast of Florida and is sometimes marketed as a “bay” scallop. Harvests of calicos are highly variable from year to year and can range from more than 3,000 metric tons of meats to less than 100 metric tons.

**FISHERIES**

In the U.S., bay scallops are fished in the fall using hand-operated dredges operated from small boats. Small amounts of bay scallops are farmed in Massachusetts using the same lantern nets that are used by Chinese scallop farmers. Chinese scallop farmers harvest bay scallops twice a year, in the late spring and in the fall, when the main harvest takes place. Calico scallops are harvested using large mechanical dredges.

**PRODUCT FORMS**

U.S. bay scallops are almost always sold fresh, in one-gallon plastic tubs, which contain about 8 pounds of raw meats. Bay scallops from China are imported as frozen raw meats, most of which range in size from 100 to 200 meats per pound.

**WHOLESALE PRICE/SUPPLY HISTORY**

Because the supply is so limited, fresh bay scallop meats from the Northeast will sell for prices as high as $12/lb. Frozen meats from China will sell from between $2 to $4/lb., depending on the size of the meat and the size of the harvest.

U.S. bay scallop harvests have been very poor for more than a decade and supplies are extremely limited. Supplies of China bay scallops, on the other hand, are excellent, as between 5,000 to 10,000 metric tons of meats are exported to the U.S. each year.

**BUYING GUIDE/SOURCING**

Scallops are tricky to buy and bays are no exception. Most China bays are purchased by New Bedford scallop processors who soak the meats in a sodium tripolyphosphate solution to add moisture. Good quality bays will have a moisture
content of less than 80 percent. In most years, the price of China bays generally declines in the late fall, after the first Chinese production starts arriving in the U.S.

MARKETS
Bay scallops are a popular seafood throughout the U.S., although consumption is highest in the Northeast.

PRODUCT SUBSTITUTION
Farmed bay scallops are an excellent substitute for dredged scallops or clams. They can also be substituted for shrimp in many recipes.
Sea scallops

Sea scallops are fished and farmed in several parts of the world. The American sea scallop, *Placopecten magellanicus*, is one of the largest sea scallop resources. Found from Newfoundland to North Carolina, this species is fished by both U.S. and Canadian fishermen. Sea scallops grow quickly and by the time they reach five years of age, their adductor muscle—the scallop meat—weighs about 23 meats per pound.

The largest sea scallop harvest in the world takes place in northern Japan, where aquaculturists farm more than 250,000 metric tons (live weight) of the giant Japanese scallop, *Patinopecten yessoensis*. Meats from the Japanese scallop can reach a size of fewer than 10 per pound and are exported to the U.S. in significant quantities.

A fishery off Alaska produces small quantities of weathervane scallops, *Patinopecten caurinus* each year. These scallops, which have more of a cream color, average about 30 meats per pound.

FISHERIES

In the U.S., almost all sea scallops are fished using dredges that are towed across the bottom. Although sea scallops are fished year-round, peak landings take place from May through August. Divers who work shallow waters along the Maine coast harvest small amounts of sea scallops by hand. Japanese scallops grow in lantern nets that are suspended from buoys.

PRODUCT FORMS

American sea scallop meats are sold both fresh and frozen, while Japanese and weathervane scallops are sold frozen. Fresh scallop meats are normally sold in one-gallon or half-gallon plastic tubs. Some diver-caught scallops are sold live in the shell. Frozen sea scallops are sold both block frozen and individually quick frozen (IQF). Scallop meats are sold by count per pound, with a premium being paid for large size meats. Sea scallop meats are sold either “wet” or “dry.” Wet meats are soaked in a sodium tripolyphosphate solution and will have a moisture content of 80 percent or higher.

WHOLESALE PRICE/SUPPLY HISTORY

Depending upon the size and whether they are wet or dry, the price of sea scallops normally range from $4.50 to $8/lb. The same size wet scallop meat typically sells for about 20 percent less than dry meat comparable in size. The difference between large (under 10 meats per pound) and medium (30/40 per pound) meats is usually about $1.50 to $2/lb.

The U.S. supply of sea scallop meats is at record levels, as the stocks have recovered following years of strict conservation measures. As U.S. harvests of sea scallops have increased, imports of Japanese scallop meats have declined, although Japanese harvests have remained stable.

BUYING GUIDE/SOURCING

The trick to sea scallops is to not pay $5 a pound for water. Buyers should periodically perform moisture content tests to make sure they are getting the moisture
content their supplier says they are. One easy way to test to see if your scallop meats have been soaked: Dry meats will feel sticky, as opposed to the soapy or slick feel of a soaked scallop. The best time to buy American sea scallops is in the late summer, when prices are still low and the quality of the scallops has improved following their spring spawn.

MARKETS
Sea scallops are a popular seafood throughout the U.S., although consumption is highest in the Northeast.

PRODUCT SUBSTITUTION
Diver-caught sea scallops or scallops dredged with multibeam mapping are an excellent substitute for typical dredged sea scallops.

ENVIRONMENTAL INFORMATION
With sea scallops, the best environmental choice is diver-caught scallops, the production method that has the lowest impact on bottom habitat. Among dredged sea scallops, those produced using multibeam mapping technology are an environmentally preferable choice. This technology, currently used by some Canadian boats, helps draggers locate scallop beds and dramatically reduces the area of seafloor that is dredged.
About a dozen species of shrimp are fished commercially in cold waters around the world belonging to the family Pandalidae. The largest single fishery by far is for *Pandalus borealis*, the northern shrimp, a species that is found in both the North Atlantic and North Pacific. The North Atlantic fishery, however, is much larger, producing catches of more than 300,000 metric tons, compared to less than 5,000 metric tons in the North Pacific. U.S. catches of this species, most of which is caught by Maine fishermen, is less than 10,000 metric tons a year.

A similar but smaller species, *Pandalus jordani*, is fished off the coast of the Pacific Northwest. Landings of this species can range from less than 5,000 metric tons during El Niño years to more than 30,000 metric tons in years of peak abundance. Both *P. borealis* and *P. jordani* are sold under the names pink shrimp or bay shrimp (although they are landed in deepwater).

Several other species of coldwater shrimp are landed in small quantities off the Pacific Northwest coast and Alaska. The biggest of these fisheries is for spot shrimp (*P. platyceros*), which is fished off British Columbia and Alaska. Spot shrimp are the largest species of coldwater shrimp fished commercially and landings are normally between 2,000 and 2,500 metric tons.

Compared to warmwater shrimp, which can reach a harvestable size in just two or three months, coldwater shrimp are very slow growing, taking up to three years to mature. Pandalid shrimp are unique as they mature first as males, mate and then change to females.

**FISHERIES**

Most coldwater shrimp are caught using otter trawls, mostly in seasonal fisheries. The pink shrimp off the Pacific Northwest opens April and normally lasts until October. The New England fishery for northern shrimp takes place in the winter and can last for a few weeks or several months, depending on the abundance of shrimp. Shrimp that are cooked and peeled are delivered fresh to freezing plants. Off Greenland, large quantities of northern shrimp are frozen whole at sea, both raw and cooked.

Spot shrimp are fished primarily using baited traps, although small amounts are landed by B.C. trawlers. The B.C. fishery for spot prawns normally runs from early May to July, while the Alaska season opens October 1 and lasts for three or four weeks.

**PRODUCT FORMS**

In the U.S., most coldwater shrimp are consumed as fresh or frozen cooked, peeled meats. *P. borealis* meats mainly fall in the size range of 125 to 250 meats per pound, while *P. jordani* meats usually average 350 to 500 meats per pound. Fresh shrimp meats are normally sold ungraded. Spot shrimp are marketed both as frozen raw, whole shrimp and raw, shell-on tails. Spot shrimp can reach a size similar to warmwater shrimp and the larger shell-on tails can run 25 to 30 per pound.

**WHOLESALE PRICE/SUPPLY HISTORY**

Heavy landings of *P. borealis* by Newfoundland fishermen have driven the price of cooked and peeled coldwater meats to very low levels in recent years, with smaller
sizes selling for about $2/lb. Larger sizes (125–150) sell for $2.50 to $3/lb. The price of spot shrimp, which are primarily sold to Japanese markets, are considerably higher. Large tails will sell for $10 to $12/lb., while smaller tails normally sell for $8 to $10/lb. Whole spot shrimp sell for prices between $5 to $7.50, depending on size.

Landings of coldwater shrimp are at record levels the past few years and prices have fallen to the point where fishermen do not catch as many shrimp as they could. Fresh coldwater shrimp is readily available from April through September and frozen product is available year-round. Availability of spot shrimp, however, is limited as most of the production is exported or consumed locally on the West Coast.

BUYING GUIDE/SOURCING
The bigger the coldwater shrimp, the better the flavor. The larger sizes of cooked and peeled meats are generally considered to have a much sweeter flavor than the smaller sizes and are well worth the extra money. Frozen cooked and peeled meats are always sold glazed (a five percent glaze is the industry average). If you are buying fresh spot shrimp, you may want to think twice. The shelf life is extremely short, so it is much safer to stick with frozen.

MARKETS
Coldwater shrimp are increasingly popular throughout the U.S., although consumption is highest in the Pacific Northwest and the Northeast.

PRODUCT SUBSTITUTION
Cooked and peeled coldwater meats are best used in cold applications such as salads and sandwiches, where they can be substituted for small warmwater shrimp. Spot shrimp can be served in almost any recipe that calls for larger shrimp, although keep in mind they have to be cooked very quickly or their texture turns very soft.

ENVIRONMENTAL INFORMATION
Among coldwater shrimp, trap-caught spot prawns are the best environmental choice, because this fishing method causes the least bycatch and habitat damage. Among trawled northern shrimp, the fisheries in Newfoundland (where stocks appear healthy) or Oregon (which requires bycatch reduction devices) are preferred.
Dozens of species of shrimp are fished and farmed in warm and temperate waters around the world. The U.S. has a large warmwater shrimp fishery in the Gulf of Mexico. The primary species fished are the northern white shrimp, *Penaeus setiferus*, the brown shrimp, *Penaeus aztecus*, and the pink shrimp *Penaeus duorarum*. In a good year, U.S. fishermen will catch more than 100,000 metric tons of warmwater shrimp, more than 90% of which will be white and brown shrimp. Texas and Louisiana account for more than 80% of the landings.

The U.S. imports warmwater shrimp from countries around the world, most of which is now farmed. In recent years, these imports have reached a level of more than 400,000 metric tons (tail weight) a year. The dominant farmed shrimp species are the black tiger shrimp, *Penaeus monodon*, which is produced in Southeast Asian countries such as Thailand, Vietnam, Indonesia, India and Bangladesh, and the Pacific white shrimp, *Penaeus vannamei*, which is farmed in Latin America and now in Asia. Both of these species can be raised at various salinity levels.

Most shrimp is farmed intensively, which means that farmers use manufactured feeds to feed their shrimp, which are raised in high-density ponds in coastal areas. In some parts of the world, though, farmers capture young shrimp simply by letting tidal waters run into enclosed ponds through installed gates. These shrimp are then raised on naturally occurring feed found in the water. This is called “extensive” shrimp farming.

Countries exporting wild shrimp to the U.S. must be able to certify that they are not catching shrimp in a manner that is harmful to sea turtles (42 nations have been certified). In the U.S., shrimp fishermen must use turtle excluder devices (TEDS) and bycatch reduction devices (BRDS) to minimize the capture of non-target marine turtles and fish.

### FISHERIES
Most shrimp are caught using trawl nets towed behind boats. However, in coastal waters shrimp are caught in a variety of ways. In the inshore waters of Louisiana, for example, shrimpers use small boats that have “butterfly” nets. These boats, which fish at night when the shrimp are close to the surface, lower flat nets that are in a frame. The nets are then raised and lowered vertically to catch shrimp. In other shrimp fisheries, especially in developing countries, shrimp are caught using hand seine nets, which are thrown by fishermen who either stand in shallow water or use small boats. In many countries, shrimp fishing is seasonal. In the U.S., for example, 90 percent of the brown shrimp are caught between May and August, while 80 percent of the white shrimp catch is made from August to November.

In the warmest countries, shrimp farmers can raise three crops a year and production is year-round. However, in some countries, farmed shrimp production is seasonal as farmers will not harvest in the colder months. Even in countries along the Equator, weather patterns can affect production. In Ecuador, for example, production is lower in the summer, when the ocean temperature drops.
PRODUCT FORMS
Warmwater shrimp is primarily available as frozen tail meat, which comes in a variety of product forms. Traditionally, most warmwater shrimp have been marketed as shell-on tails. However, in recent years more of the production has gone into the production of cooked and peeled meats, which is the most common product for black tigers. Raw, peeled meats are also increasingly available. Shrimp are graded by the count per pound.

WHOLESALE PRICE/SUPPLY HISTORY
Increased production from shrimp farms has led to a decrease in prices for most shrimp, with the exception of the largest sizes, such as U-16s and larger, which cannot be farmed economically. Prices for medium-sized shrimp typically range from $4 to $6/lb., while the largest sizes wholesale for more than $10/lb.

Supplies of medium-sized warmwater shrimp are growing rapidly due to continued increases in farmed production. With the exception of the largest sizes, frozen warmwater shrimp is available year-round.

BUYING GUIDE/SOURCING
Since there is a difference in shrimp prices depending on the size, getting accurate counts is important. If you buy 41/50 shrimp, you should get 45 pieces of shrimp per pound, not 49. Make sure you run random tests to make sure you are getting what you pay for. When buying cooked shrimp, mention a specific moisture content. Processors will tend to undercook their shrimp since they will have more weight to sell. Almost all cooked and most raw shrimp is treated with sodium tripolyphosphate. If triply is abused, the shrimp will have a soapy feel and a translucent appearance. Many shrimp fishermen will use bisodium sulfites to prevent the appearance of black spots on the shrimp shell. If sulfites are abused, the shrimp will have pitting on its shell.

MARKETS
Frozen warmwater shrimp are the most popular seafood in the United States and available in almost every supermarket and restaurant.

PRODUCT SUBSTITUTION
Shrimp farmed using environmentally preferable methods or caught using bycatch minimization gear can be readily substituted for other shrimp.

ENVIRONMENTAL INFORMATION
With warmwater shrimp, the best environmental choice is shrimp farmed with low-impact methods. Most U.S. shrimp farmers and some farms abroad use farming methods that reduce damage to coastal habitats, water pollution, chemical use, and other environmental impacts. Among wild caught shrimp, shrimp that are caught with Turtle Excluder Devices (TEDs) or Bycatch Reduction Devices (BRDs) are environmentally preferable. All U.S. shrimpers are required to use this equipment, although compliance varies among fisheries; compliance appears to be good in the U.S. southeast Atlantic coast fishery.
A univalve mollusk (its shell is on the inside of its body), squid are fished in most oceans of the world. The world’s appetite for squid is prodigious, which is why fishermen around the world catch more than 2.5 million metric tons of squid a year. Although Americans are not known as large consumers of squid, calamari, as it is commonly called, has caught on. Since 1990, U.S. imports of squid have grown from 11,000 to 45,000 metric tons.

The U.S. has several squid fisheries. The largest is for California squid, *Loligo opalescens*, a small squid (the average size runs about 2–3 ounces) that is fished off central and southern California. Large quantities of California squid are exported to China, where they are processed into cleaned tubes and tentacles and re-exported back to the U.S.

Off the East Coast, fishermen land two larger squid. The largest is the northern shortfin squid, *Illex illecebrosus*, a highly migratory species found from Florida to Newfoundland. Since it is landed primarily in the summer, this species is widely known as summer squid. As the summer progresses, it grows quickly in size from less than 3 ounces each to almost 12 ounces.

Longfin inshore squid, *Loligo pealeii*, are found from Newfoundland to the Caribbean. As it is fished mainly from January to May, it is called winter squid, or sometimes Boston squid. Of all the squid caught off the U.S., this species is the most expensive as it is considered more tender, especially by Europeans who buy most of the U.S. catch. It averages about 3.5 to 7 ounces in size.

**FISHERIES**

Off California, squid are harvested using purse seine nets. The largest fishery takes place in the winter off Southern California. A smaller fishery in Monterey Bay takes place in the late spring and summer. Off the East Coast, squid are landed by trawlers. Around the world, squid are caught by a variety of additional methods including gillnets and jigging.

**PRODUCT FORMS**

Most of the squid sold in the U.S. is frozen, however, some fresh squid is available in the Northeast much of the year. Whole squid are available, as well as cleaned tubes and tentacles. Squid rings are also widely marketed, either breaded or unbreaded. The mantle from larger species of squid (some commercially caught species will weigh more than 10 pounds) is often sold as tenderized steaks.

**WHOLESALE PRICE/SUPPLY HISTORY**

Squid are one of the most reasonably priced seafoods around. Cleaned tubes normally sell between $1.20 and $1.50/lb., depending on size, while packs of cleaned tubes and tentacles can be purchased for about $1/lb. Fresh whole squid can range in price from $.80 to $1.50 a pound, depending on the size and volume of landings.

Squid is increasingly available, due to a large increase in imports from more than a dozen countries (China is the largest single supplier). U.S. supplies of squid will fluctuate widely from year to year, as landings from squid fisheries will vary considerably from year to year, depending on ocean conditions. During El Niño...
years, for example, the catch of California squid can drop from over 80,000 metric tons to less than 3,000 metric tons.

BUYING GUIDE/SOURCING
The key to squid quality is texture and tender is better. For that reason, species from the Loligo family generally sell for the highest prices. Buyers should also look for white skin. Squid that wasn’t frozen in good condition will have a reddish tinge to it. Poor quality squid will also have a noticeable iodine or ammonia odor.

MARKETS
Squid are most widely consumed in ethnic markets in large cities. However, squid consumption by most Americans is steadily increasing.

PRODUCT SUBSTITUTION
Squid is well suited to a variety of recipes and it can be used as a substitute for more expensive shellfish such as shrimp and clams.
Striped bass (*Morone saxatilis*)

Striped bass are anadromous fish that migrate up and down the Atlantic coast from Florida to the Bay of Fundy. A large fish that can reach 50 pounds, striped bass migrate inshore to spawn in fresh and brackish water in the spring and summer. Young striped bass will spend two to four years in coastal estuaries before migrating to the open ocean. In recent years, due to strict conservation measures, stocks of striped bass have largely recovered. Although the commercial catch of about 3,000 metric tons is significant, recreational fishermen take about two thirds of the total striped bass catch. More than two-thirds of the striped bass harvest is landed by fishermen from Maryland and Virginia.

Hybrid striped bass, a cross between *M. saxatilis* and white bass, *M. chrysops*, are farmed in tanks and ponds in Massachusetts, California and the southeastern U.S. Farmed stripers are normally harvested at a size of about 2 pounds. Annual harvests are estimated at about 5,000 metric tons. Hybrid stripers can easily be distinguished from wild stripers by the hybrid’s broken stripes.

**FISHERIES**

Striped bass are caught by a variety of methods including gillnets, pound nets, haul nets, traps and hook-and-line. Stripers are also landed as a bycatch of ocean fisheries. Although some striped bass are landed year-round, the peak months are November through March and June and July. Hybrid striped bass are available year-round.

**PRODUCT FORMS**

Both wild and hybrid striped bass are almost always sold fresh. Wild stripers are sold whole, or as pinbone-in, skin-on fillets. Hybrid stripers are sold both whole and live.

**WHOLESALE PRICE/SUPPLY HISTORY**

The New York wholesale price of whole striped bass normally ranges from a low of $1.50/lb. to a high of $3/lb., depending on the volume of landings. Fillet prices will range from about $4 to $8/lb. The price of whole, tank-raised hybrid stripers to wholesalers averages about $2.85 to $3.25/lb., while live fish typically sell for between $4 and $5 a pound. Pond-raised stripers from farms in the South average about $2.25 to $2.75/lb.

Good supplies of hybrid bass are available throughout the year, but supplies will peak periodically as pond farmers harvest their ponds. Wild stripers are available throughout most of the year, but the volume of landings will fluctuate from month to month.

**BUYING GUIDE/SOURCING**

The quality of wild striped bass can vary considerably depending on when and how it was caught. The highest quality stripers are caught in the late fall and winter. After stripers spawn in the spring and summer, their flesh loses fat—and flavor. As a rule, pound net and trap-caught fish will be the best quality. Smaller stripers under 10 pounds also have more tender flesh, say some buyers. The quality
of tank-raised hybrid bass is very consistent. Some pond-raised fish, though, may have an off flavor caused by algae in the ponds.

MARKETS
Striped bass (or rockfish as they are called in the Chesapeake Bay region) is a well-known fish in the Northeast, where it is sold in both foodservice and retail outlets. Hybrid striped bass are a popular fish along both coasts in Asian markets in large cities, which place a premium on small whole fish.

PRODUCT SUBSTITUTION
Striped bass is a mild, medium textured fish, which can be substituted both for white-fleshed species like red snapper, cod or grouper, as well as for fuller flavored fish like Chilean sea bass.
Swordfish are large migratory predators and distinct stocks of swordfish roam throughout the world's oceans. In the Atlantic, which produces about one-third of the world catch, swordfish are found from Canada to Argentina and from Norway to South Africa. In the Pacific, swordfish are harvested commercially from Japan to Australia and from California to Chile. Swordfish are also landed in significant quantities in the Indian Ocean. The U.S. is a major producer of swordfish with an annual catch of between 6,000 and 8,000 metric tons, about 8 percent of the world total.

FISHERIES
Swordfish migrate from colder waters in the summer to warmer waters in the winter, making the fishery highly seasonal depending upon location. Off the East Coast, which produces about 25 percent of the U.S. catch, swordfish are caught primarily by longline. About 75 percent of the U.S. swordfish harvest are landed in two states, California and Hawaii. The California fishery is coastal and is conducted primarily by gillnet in the fall, while the Hawaii fishery is a high seas, year-round longline fishery. Although U.S. fishermen throughout the year catch swordfish, the peak landings occur from August to October.

PRODUCT FORMS
About two-thirds of all the swordfish consumed in the U.S. is sold fresh. Processors and distributors buy headed and gutted (H&G) swordfish and sell “chunks,” which are skin-on sections of loins. Frozen swordfish loins are imported and sold as loins or as frozen steaks, which are produced in the U.S. by secondary processors.

WHOLESALE PRICE/SUPPLY HISTORY
Fresh swordfish prices fluctuate significantly, with the lowest prices in the early fall, when supplies peak. The price of fresh loins, for example, will range from a high of about $7/lb. in the winter to a low of about $4/lb. in the fall. The price of frozen swordfish loins is more stable, with prices normally fluctuating in a range between $3 and $3.50/lb.

Supplies of North Atlantic swordfish have declined in recent years, as the International Commission for the Conservation of Atlantic Tunas (ICCAT), which regulates the amount of swordfish fishermen can catch in the Atlantic, has reduced quotas to rebuild stocks. Quotas have recently been increased in response to indications that stocks are rebuilding. There are no set quotas on catches of swordfish from the Pacific and fresh and frozen product is readily available most of the year. In addition to its catch of about 6,000 metric tons of Pacific swordfish, the U.S. imports about 12,000 metric tons of Pacific swordfish a year. Most of this fish is landed as a bycatch of the high-seas tuna fishery.

BUYING GUIDE/SOURCING
Swordfish boats will stay at sea anywhere from less than a week to almost a month, so the quality of fresh product will vary significantly. Some of the best quality swordfish is landed by California gillnet boats in the fall. As a rule, the meat color of swordfish
should be a bright white or pink and the bloodline should be a bright red. Gray meat color and a brown bloodline generally indicate the fish is of inferior quality.

MARKETS
Fresh and frozen swordfish is widely available in most large cities in the U.S. Although most swordfish is sold in restaurants, large quantities are sold by supermarkets, especially in the fall when prices are low.

PRODUCT SUBSTITUTION
Yellowfin and bigeye tuna make an excellent substitution for swordfish, as all these fish have a firm, meaty texture and can be prepared in similar ways.
Native to Africa, tilapia are a hardy freshwater fish that is farmed in many countries throughout the world. The growth in tilapia farming has occurred because tilapia can be raised relatively inexpensively on a grain-based diet under a variety of conditions in both fresh and brackish water. Although they can reach a size of 8 pounds, most tilapia are harvested when they are between 1 to 2 pounds. In their effort to farm tilapia more efficiently, fish farmers have crossed a variety of strains to breed fish that will grow faster. In recent years, tilapia producers in Latin America and Asia have increased their production of high-quality, skinless, boneless fillets, which has made tilapia one of the most popular new species sold in the U.S.

**FISHERIES**

Tilapia are farmed in earthen ponds and floating cages in both fresh and brackish water. In the U.S., tilapia are also farmed in indoor recirculating tanks. Because it is more expensive to grow tilapia in tanks, this fish is mostly sold live to Asian restaurants and markets, which pay a premium price. Tilapia are a fast-growing fish and will reach a harvestable size in just 8 to ten months. If necessary, fish farmers will sometimes put their tilapia in fast flowing water for several days before harvesting to remove any possible algae taste.

**PRODUCT FORMS**

Tilapia are readily available in a variety of product forms. Large quantities of fresh skinless, boneless tilapia fillets are imported from farms in Latin America. Frozen skinless, boneless fillets and whole frozen tilapia are imported from a number of Asian countries, including Indonesia, China and Taiwan. Most tilapia fillets are sold in the 3–5 and 4–6 ounce range, although larger, 5–7 and 7–9 ounce, fillets are also available. Live and fresh whole tilapia are produced by U.S. growers. These fish normally average about 1 to 1.5 pounds.

**WHOLESALE PRICE/SUPPLY HISTORY**

In spite of the increase in supply, the wholesale price of fresh skinless, boneless tilapia fillets has remained relatively consistent at between $3 and $3.25/lb., depending on the fillet size. Frozen skinless, boneless fillets normally wholesale between $1.90–$2.50/lb., depending on size and quality. Live tilapia will fluctuate between $2 and $2.50/lb., while wholesale prices for fresh whole tilapia average between $.80 and $1/lb.

The supply of fresh tilapia fillets has grown considerably in recent years, due primarily to the development of a large tilapia-farming industry in Ecuador. Increasing supplies of fresh fillets are also available from Costa Rica and Honduras. Imports of frozen tilapia fillets have also increased sharply due to increased exports from China and Indonesia. U.S. production of tilapia is growing more slowly due to the relatively small size of the live and fresh whole markets.

**BUYING GUIDE/SOURCING**

The quality of fresh tilapia fillets is for the most part very consistent, as production is concentrated in the hands of a small number of large producers that sell a uni-
formly high-quality product. The quality of frozen tilapia fillets, on the other hand, can vary, as there are large numbers of small producers, especially in China. When buying fresh or frozen tilapia, find a good brand and stick with it. Be aware that most frozen tilapia fillets from Taiwan and China are briefly exposed to carbon monoxide, a process that gives the bloodline an attractive red color.

MARKETS
Tilapia is most popular in the eastern U.S., although it is rapidly gaining market acceptance throughout the U.S. as a good substitute for many species of white-fleshed fish that are in short supply. On the West Coast, for example, tilapia sales are growing as supplies of Pacific snapper (rockfish) have declined.

PRODUCT SUBSTITUTION
Tilapia is a bland, white fish that has wide applications, as it is suited for most culinary applications from sautéing to deep-frying. It is an excellent substitute for other white fish such as flounder, rockfish, grouper or snapper.
A member of the salmonid family, rainbow trout are native to western North America and range from Alaska to Mexico. Rainbow trout occur as both freshwater and sea-run races. Sea-going rainbows, which are known as steelhead trout, return to their natal rivers to spawn. Unlike Pacific salmon, however, steelheads do not die after spawning. Beginning in the late 1800s, rainbows have been introduced to rivers and lakes around the world. They have also been farmed commercially since the early 1900s.

FISHERIES
Although rainbows are farmed in almost every state, about 70 percent of the farmed rainbow trout consumed in the U.S. is grown in Idaho’s “Magic Valley,” where trout are raised in raceways that use water from the Snake River aquifer, which is a constant 58°F. Elsewhere in the U.S., rainbows are farmed in freshwater ponds. Most rainbows that are farmed in freshwater raceways and ponds are raised to a size of 10 to 14 ounces in a period of about 8 months. Rainbows are also grown in net pens in both fresh and salt water. These fish, which are grown to a market size of 4 to 8 pounds in about two years, are marketed as steelhead.

PRODUCT FORMS
Most of the rainbow trout raised in the U.S. is marketed fresh, although frozen product is also available. Common products include whole dressed trout, boned trout (head-on, butterfly cut, which has the backbone removed, but the pinbones left in) and skin-on fillet, bone-in or boneless. Steelhead is primarily sold as fresh whole fish and as boneless fillets, skin-on or skin-off.

WHOLESALE PRICE/SUPPLY HISTORY
Prices for fresh rainbow trout have been very consistent. Dressed trout wholesale for between $2.25–$2.50/lb., while boned trout averages about $3/lb. Boneless fresh trout fillets run about $4/lb. Steelhead prices, on the other hand, have declined as production has grown. Fresh boneless steelhead fillets have been averaging between $1.80–$2/lb., while whole fish have been selling for about $1.25/lb.

The supply of fresh rainbow trout has been very stable, as Idaho production can not increase due to water constraints. Fresh product is readily available throughout the year. Production of steelhead, which is also readily available year-round, has increased; however, the low prices are expected to lead to a decline in production.

BUYING GUIDE/SOURCING
Rainbow trout is very straightforward to buy, as the quality of raceway-raised fish is very consistent. Some pond-raised rainbows, however, may have an off flavor caused by algae. Some trout farmers market “pink” rainbows at a premium.
price. To get the color, these farmers add a synthetic carotenoid pigment to the fish feed.

MARKETS
Rainbow trout are a well-known fish and are marketed throughout the U.S.

PRODUCT SUBSTITUTION
Rainbow trout are a very high-quality fish that can be substituted for similar fish like salmon or for white-fleshed fish such as cod, snapper or haddock.
Yellowfin and bigeye tuna (*Thunnus albacares* and *Thunnus obesus*)

Both yellowfin and bigeye tuna are collectively marketed under their Hawaiian name “ahi” throughout the U.S. Both these tunas are fished in warm and temperate waters throughout the world, although the most productive grounds are in the western Pacific and Indian oceans. Of the two species, yellowfin is much more common, with annual catches of more than 1 million metric tons. The highest quality yellowfin and bigeye are sold in Japan, where they are primarily consumed raw. Both yellowfin and bigeye can grow to a size of almost 400 pounds, although most fish are in the 80 to 150-pound range. As tuna are highly migratory, catches will vary throughout the year. U.S. fishermen typically catch between 6,000 and 10,000 metric tons of yellowfin and between 3,000 and 4,000 metric tons of bigeye tuna a year. Hawaiian fishermen catch about half of the yellowfin and bigeye landed in the U.S. Large quantities are also landed in California and Louisiana.

**FISHERIES**

Yellowfin and bigeye are caught using a variety of methods. Purse seiners, who land the highest volumes of fish, catch the smaller fish near the surface of the water for the canneries. Larger fish, which are caught in deeper water by longlines and hand lines, have a much higher fat content and are much more valuable.

**PRODUCT FORMS**

Yellowfin and bigeye are available fresh, frozen and canned in a variety of product forms. Fresh ahi is normally sold to distributors and retail operators as skin-on loins. Frozen ahi is sold as both loins and steaks. Growing quantities of frozen, skinless ahi steaks and loins are treated with carbon monoxide, or tasteless smoke, to prevent the tuna’s bright red meat color from turning brown.

**WHOLESALE PRICE/SUPPLY HISTORY**

Fresh yellowfin and bigeye prices fluctuate widely, depending on quality and time of year. The most expensive No. 1 quality H&G fish normally sells for more than $10/lb. on the Tokyo wholesale market. Most of the No. 2 H&G fish sold in the U.S., however, sell between $3.50 and $5.50/lb., with the lowest prices in the late summer and the highest prices in January. Fresh loins are normally available for prices ranging between $6 and $10/lb. The price of frozen treated (CO or tasteless smoke) tuna is more stable, fluctuating between $4.50 and $5/lb. for loins or steaks. Untreated brown “chocolate” tuna loins and steaks sell for about $2–$3/lb.

**BUYING GUIDE/SOURCING**

Buying tuna is tricky because of the many quality grades, which are based upon highly subjective criteria. For most purposes, No. 2 quality yellowfin or bigeye is adequate for the U.S. market. True No. 1 fish is almost always exported to Japan, where knowledgeable consumers will pay a premium price for high oil-content fish. It is helpful to have a good relationship with your vendor when buying tuna to get the highest quality product at a reasonable price. The best time to promote yellowfin and bigeye is in the late summer, when U.S. landings peak and prices fall.
To take some of the variability out of tuna prices, increasing numbers of buyers are buying treated frozen steaks and loins.

Although periodic shortages can occur, fresh and frozen yellowfin and bigeye are normally available most of the year. In addition to its own catch, the U.S. is a major importer of fresh and frozen ahi, with annual imports of more than 30,000 metric tons.

MARKETS
Fresh and frozen yellowfin and bigeye are sold throughout the U.S. by both retail and foodservice operators.

PRODUCT SUBSTITUTION
Yellowfin and bigeye tuna are excellent substitutes for meaty, firm-textured fish such as swordfish, shark and monkfish. They are excellent for grilling and are often served seared or raw.
Glossary

**Anadromous**  Fish that migrate from the sea (salt water) to rivers or streams (fresh water) to spawn. This includes salmon. When fish go the other direction to spawn (from rivers to the sea), they are called catadromous.

**Bushel**  Equal to 32 quarts or 8 gallons. Often used when measuring units of clams, oysters and mussels.

**Bycatch**  The portion of a fishing catch that is discarded as unwanted or commercially unuseable.

**Bloodline**  Darker, stronger tasting meat in fish that runs parallel to the backbone from head to tail.

**Bycatch reduction device (BRD)**  Any of a number of implements that have been certified to reduce the likelihood of capturing non-target species.

**Deep skinned**  Skinning to a level that removes the subcutaneous fat layer between the skin and muscle tissue. The fat layer is the source of much of a fish’s oil and pronounced flavor.

**Dredging**  This is a method used to capture shellfish, mainly scallops, clams, oysters and mussels. Essentially, a dredge is a metal rake that is dragged across the ocean bottom, scraping up shellfish that are held in a chain-mesh bag. Dredges vary from hand-operated to much larger, hydraulically operated ones, such as those used to harvest sea scallops and surf clams.

**Dressed**  Refers to a fish that has been gutted and had its organs removed.

**Driftnet**  A term used to describe unanchored gillnets. Driftnets are used in coastal fisheries for salmon and herring and on the high seas for species like swordfish, squid and tuna.

**Eviscerate**  Remove the entrails of, disembowel.

**Ex-vessel price**  Also called the dock price. Refers to the price a fisherman receives for his catch.

**Factory vessel**  A large fishing boat that processes and freezes its catch on board. Some simply head and gut the fish, while others go as far as filleting.

**FAS**  Acronym for Frozen At Sea.

**Fillet**  A strip of flesh from the side of the fish, cut away from the backbone. They can be either skinless or skin-on, pinbone-in or pinbone-out.

**Fishmeal**  A nutritive mealy substance produced from fish or fish parts and used as animal feed and fertilizer.

**Fletch**  A large, skinless boneless fillet. Normally a term used with halibut.
**FOB**  Stands for Free On Board. Usually, a location will follow FOB (i.e., FOB Santiago), which indicates the point from which the buyer must pay any additional shipping charges.

**Fry legs**  Crab upper leg meat.

**Georges Bank, Grand Bank**  Offshore fishing banks of the Northwest Atlantic coast. Georges Bank is in both U.S. and Canadian territory, while the Grand Bank is in Canadian and international waters.

**Gilnetting**  A method that entangles fish by the gills after they penetrate the net (which is invisible to the fish) and get caught in the mesh. The size of the mesh determines the size of the fish captured. There are many different types of gillnetting, including floating gillnets and sunken gillnets which are anchored on the bottom. Commonly gillnetted species are salmon, cod and monkfish.

**Glaze**  A coating of ice on seafood to protect it from harm during cold storage. Without it, it may become dehydrated or oxidized as moisture migrates out of the fish.

**Green**  A way to describe shellfish that is not cooked before it is frozen.

**Handline**  A fishing method involving hand-operated lines with baited hooks or lures.

**H & G**  Fish that has been headed and gutted.

**Hook-and-line**  A general term for several fishing methods that use hooks including bottom longlining, jigging and handheld lines.

**IQF**  Individually Quick Frozen. Describes a product that is frozen in individual pieces. Glazing IQF products is important, since it protects against dehydration.

**IFQ/ITQ**  Individual Fishing Quota/Individual Transferable Quota. Refers to fishery management systems that give individual fishermen a permit to harvest a specified amount of fish based on a percentage share of the total annual catch of a fishery. This quota can be bought, leased or sold by fishermen.

**Jigging**  A line is lowered over the side with bait or lure attached and then “jigged” up and down. This might be done by hand, but more often with jigging machines that fish up to a dozen lures at one time and pull in the fish automatically. Jigging is most effective when fishing near reefs and rock piles, although squid are jigged on the high seas by boats that use bright lights to attract them to the surface. Jigged fish can be of superior quality because of the individual handling.

**Loin**  The part of a fish fillet just above the belly cavity. This is the thickest part of the fillet.

**Longline fishing**  A method by which baited hooks are attached to a single longline, which is then set along the bottom or at a depth nearer to the surface (depending on the target species). The ends of the set are marked by buoys and, in the case of bottom longlining, anchored to the bottom. Halibut, black cod (sablefish)
and cod are taken by bottom longlining. Large quantities of tuna and swordfish are taken by longlines that are set in the open ocean at depths typically ranging from 50 to 150 meters.

**Merus**  Refers to meat from the leg section (closest to the shoulder) of a crab.

**Molting**  When a crustacean sheds its shell in the growing process.

**Net pens**  Permeable mesh structures used by the aquaculture industry to raise salmon and other fish species in marine and fresh waters.

**Otter trawls**  A type of bottom trawling, a mesh net used to collect organisms on or near the bottom of the ocean. “Otter boards” or trawl doors hold the mouth of the net open and the net is dragged along the bottom.

**Pinbones**  Tiny, fine bones found along the middle of fillets.

**Pot fishing**  Pots or traps are fished on the bottom from single lines and buoys, one pot per line; or from longlines, several or more pots to a string, with buoys marking either end of the “set.” Lobster and most crab species are captured by the former method (single pots). Pots can be big or small, depending on the fishery. A lobster pot made of galvanized wire may weigh less than 10 pounds, while a king crab trap made of steel pipe can weigh 500 pounds. Pot-fishing has two strong benefits: it is highly selective (not killing other species) and the product is landed live for maximum quality.

**Purse seining**  This method involves encircling a school of fish with a net, usually with the assistance of a power skiff, which takes the lead end of the net around the fish and back to the boat. The net is then “pursed” (closed) at the bottom, trapping the fish, then hydraulically hauled back aboard the vessel through a power block. Once the seine is at the side of the vessel, the fish are actually “brailed” into the boat with a scoop net or pumped aboard with a suction hose. Schooling pelagic species such as herring, mackerel, salmon, squid and sardines are usually taken by seine.

**Refreshed**  Terminology that refers to the practice of thawing out whole fish, filleting it and selling the fillets in a thawed state without re-freezing them.

**Roe**  Fish eggs. The eggs of many species are a delicacy, and harvested for caviar.

**Sashimi**  Raw, thinly sliced pieces of fish. Eaten frequently in sushi restaurants.

**Section**  Refers to a portion of cooked crab that includes half of a cleaned crab—legs, claw and shoulder.

**Scombroid fish**  Fish such as mahi mahi, tuna, and mackerel that contain high amounts of histadine. Histidine is a precursor of histamine, a compound released by immune system cells during an allergic reaction.

**Scombroid fish poisoning**  An illness that results from eating spoiled (decayed) fish. Scombroid can result from inappropriate handling of fish during storage or
processing, or fish that were inadequately refrigerated or preserved. As a result, bacteria convert the histadine into histamine which leads to poisoning.

**Sodium tripolyphosphate** An additive (sodium-based) used to reduce drip loss. Also can be used to add water to a seafood product.

**Steak** A cross-section slice of a fish. In smaller species like salmon or cod, it contains part of the backbone. Steaks from larger fish such as tuna and swordfish are boneless.

**Surimi** Japanese term for the raw material used in shellfish analog products. It is raw, extruded fish flesh.

**Tail** The end of a fillet that is narrow and tapering.

**Ton** A unit of measurement. In this guide a ton is a metric ton, which weighs 2,205 pounds.

**Trawling** A large, cone-shaped net is held open at the mouth by huge plates (called “doors”) and dragged through the water, scooping up everything in its path. There are basically two kinds of trawling: bottom trawling (in which the net is actually dragged across the bottom) and midwater trawling.

**Trolling** Trolling means dragging baits or lures behind a vessel that is under power and moving through the water. In the case of salmon trolling, as many as six wire lines are lowered from the vessel, with lead balls holding each wire more or less perpendicular to the vessel. The advantage of troll-caught fish is quality. One fish is hooked at a time, cleaned and bled, then stored in ice or frozen at sea.

**Turtle Exclusion Device (TED)** A device used primarily on shrimp trawlers to reduce the likelihood of capturing turtles.

**Twice frozen** Seafood that is thawed out, processed (usually filleted) and refrozen in a secondary processing plant from raw material that is frozen on board a boat or in a plant.

**Viscera** Intestines.

**Vibrio vulnificus** A naturally occurring marine organism that thrives in shallow, coastal waters in temperate climates throughout most of the world. Not associated with pollution, this bacterium can concentrate in shellfish, such as clams and oysters. When consumed raw, shellfish with vibrio vulnificus can cause severe illness and death in individuals with pre-existing health conditions. These conditions include hepatitis or other liver disease, chronic kidney disease, people under immunosuppression treatment, people who are HIV-positive, diabetic or who have achlorohydria, a condition where the normal acidity of the stomach is low.
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