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Culinarians Role in Seafood Preparation Post COVID-19

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Abstract

Prior to the COVID-19 outbreak, restaurants and food service establishments accounted for nearly two thirds of seafood expenditures in the U.S. With such establishments closed for dine-in service and many consumers quarantined, their patrons are exploring new culinary endeavors and cooking more seafood at home. With the drastic changes to the supply chain, producers are pivoting to connect directly with consumers and retail markets. Fears of new COVID-19 outbreaks will limit consumer spending at food service establishments for some time.

Increasing familiarity with seafood preparation will alter consumer expectations and demands. This will require a culinary workforce that is knowledgeable and comfortable working with a variety of seafood products and ready to answer consumer questions about the safety, nutrition, and sustainability of seafood. Although there are hundreds of seafood species fished and farmed in many ways, most culinary schools do not offer seafood specific training. A greater emphasis on seafood can help students develop marketable skills and stay current on consumer trends and culinary needs. Luring seafood diners back to food service, will require that chefs focus on a wider range of species, more exciting preparations, and enhanced plating techniques.

In a potentially slow to recover culinary marketplace, educators can help future chefs explore alternative opportunities in the seafood industry. As Americans return to work, they will be looking for easy to prepare meal kits, take-away dishes, and other time savers. A basic seafood curriculum is presented as well as free resources to help build a comprehensive seafood program. New skills that can prepare students for post-COVID-19 careers in food service are highlighted and a set of activities is presented to help students better prepare for the challenges of a post-COVID-19 culinary landscape.

Key Words: seafood, aquaculture, fisheries, safety, sustainability, nutrition, curriculum

Background

In March of 2020, the coronavirus was officially declared a pandemic (Chappell, 2020; WHO, 2020). Shortly after, states across the country began closing food service establishments (including restaurants and corporate dining facilities), canceling large events, and halting tourism (White et al., 2020). Prior to the pandemic, food service establishments accounted for nearly two thirds of seafood expenditures in the U.S. (Love et al., 2020). These economic disruptions have forced seafood producers to restructure their standard business models and connect more directly with consumers and retail markets (FAO, 2020b).

The loss in international trade because of border closings coupled with changes in tariff policies caused drastic changes in the seafood supply chain. Prior to the pandemic, it was estimated that between 85 and 90% of the seafood consumed in the U.S. was imported, with the major U.S. suppliers shown in Image 1. Approximately 50% of those imports, especially shrimp, salmon and tilapia, were aquacultured or farm-raised (Lowther et al., 2020; NOAA Fishwatch, 2019). Included in those numbers are products that were farmed or fished in the U.S., sent overseas for processing, and then reimported back to the U.S. (NOAA Fishwatch, 2019). These global shifts have not only limited the availability of imported products but have also limited the ability of U.S. companies to provide a processed product. This situation has been exacerbated by labor shortages and processing plant closures (FAO, 2020b; Smith et al., 2020)

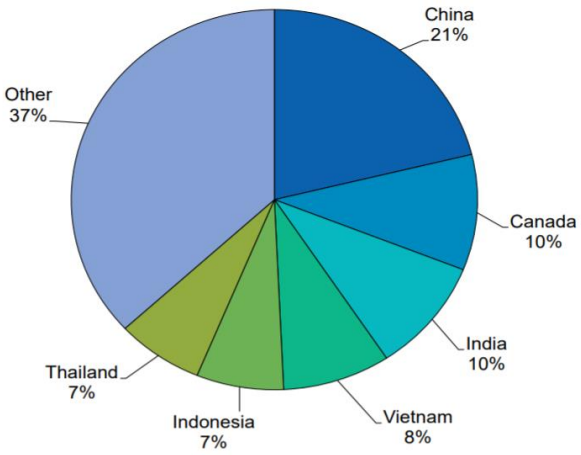


Image 1: Major US suppliers of imported edible fishery products by volume in 2018. Source: Fisheries of the United Sates 2018 (Lowther et al., 2020).

The Food and Agriculture Organization predicts that the supply chain will not reopen anytime soon and that commercial demand and prices for seafood will remain depressed. Capture fisheries are expected to decline and shortfalls must be filled with domestic products including farm-raised products (FAO, 2020b). Consumption will be determined by availability, and reliance on traditional species, the majority of which are imported, will decrease.

In the past, consumers expressed concerns about their ability to purchase good quality seafood and prepare it well. They often viewed seafood as a treat when dining out. With restaurants closed for dine-in service, many consumers are taking the opportunity to explore new culinary endeavors. Trends in retail sales are suggesting that consumers are preparing more seafood at home, being more adventurous with their seafood selections, trying ambitious and interesting preparations, and sharing their newly discovered culinary skills with others on social media (Blank, 2020; Fisher, 2020; Mohney, 2020; Wells, 2020).

With the pandemic disrupting both foreign trade and supply chains (FAO, 2020b; Kearns, 2020; Smith, 2020), locally harvested and farmed seafood products are gaining market-share (Holmyard, 2020). These shifts could alter consumer demand away from the more traditional commercial species. Familiarity with less commercialized species is continuing to grow as harvesters and fish farmers reach out to the consumer directly (Modlin, 2020). This may alter consumer expectations of restaurant meals as their palates become more diverse and sophisticated. The pandemic has also raised health concerns and many consumers are expressing a growing preference for a healthy diet.

With limited supplies and the rising price of other center of the plate proteins (Mukewar, 2020; Taylor, 2020; Wiener-Bronner, 2020), seafood is becoming more price competitive as a menu item. These changes will alter the trends in seafood consumption that will likely extend beyond the pandemic and warrant a culinary workforce that is knowledgeable and comfortable working with a variety of different seafood products, species, and preparations.

Seafood is a confusing commodity with hundreds of species harvested and farmed in a myriad of ways. Although seafood plays a major role on many restaurant menus, over 85% of the seafood consumed in the U.S. is confined to the top ten species and preparations are simple (Table 1; NFI, 2020).

While incorporation of lesser known species is gaining traction on restaurant menus (Postelsia, 2019), the disruptions in supply and access to protein foods may fast track such practices. Most Americans consume only about 16 pounds of seafood each year (Lowther et al., 2020). That translates to far below the USDA recommendation of a minimum of 2 seafood meals per week to maintain good health. Exploring new species and searching for healthy sustainable alternatives are growing trends. In addition, expanding the American palate to highlight more diverse seafood consumption is key to ensuring sustainability of our seafood resources (CBS News, 2019). Keeping on top of these trends will be critical to ensuring resilience in the food service industry as consumption patterns continue to change.

To entice customers back, food service operations will need to be more creative, offering interesting new to market species, more adventurous and attractive preparations, and developing plating techniques that can lead to more social media sharing. Social media sharing is a great way to advertise restaurants and showcase chef's skills at no cost. Consumer photos have even been shown to shape consumption patterns by enhancing the consumer experience and making the food more enjoyable (Coary & Poor, 2016).

Table 1: U.S. Per Capita Seafood Consumption Top Ten Species 2018

Species	Pounds
Shrimp	4.6
Salmon	2.55
Canned Tuna	2.10
Tilapia	1.11
Alaska Pollock	0.77
Pangasius	0.63
Cod	0.62
Catfish	0.56
Crab	0.52
Clams	0.32
Total Top Ten	13.78
Total Consumption	16.10

New species and preparations are generally introduced at the restaurant level. A good way to do this is by offering them as appetizers and daily specials or bringing a free sample for the table to share. Many consumers are wary to try something new as their main course out of fear of disliking it, but ordering an appetizer allows for more experimentation with less risk, especially if it can be shared with a group. This was the case with calamari. Years ago, calamari was reserved for Italian cuisine and usually included in a pasta sauce. Now fried calamari is a staple on restaurant menus across the U.S. Seaweed production is growing in coastal areas, especially in the Northeastern U.S. (Hathaway, 2019a) and seaweed salads don't have to be reserved for sushi restaurants (Hathaway, 2019b). Seaweed or sea vegetables can be a good addition to a variety of dishes including stir fries, stews, and sauces (Zuckerbrot, 2015). To accommodate changing needs and demand, suppliers are expanding their inventories to include a wider variety of species (Personal Communication, 2020).

U.S. aquaculture, or the production of marine and freshwater organisms under controlled conditions, is adding to the list of species available to food service. Steelhead, hybrid striped bass, branzino, barramundi, redfish, catfish, and oysters are growing in popularity. Not only are these products produced domestically under strict federal, state, and local regulatory guidance (AFS, 2020; Carter & Goldstein, 2019; Porter & Kihslinger, 2015), farm-raised products, are consistent in supply, quality and price. This simplifies menu planning and cost projections.

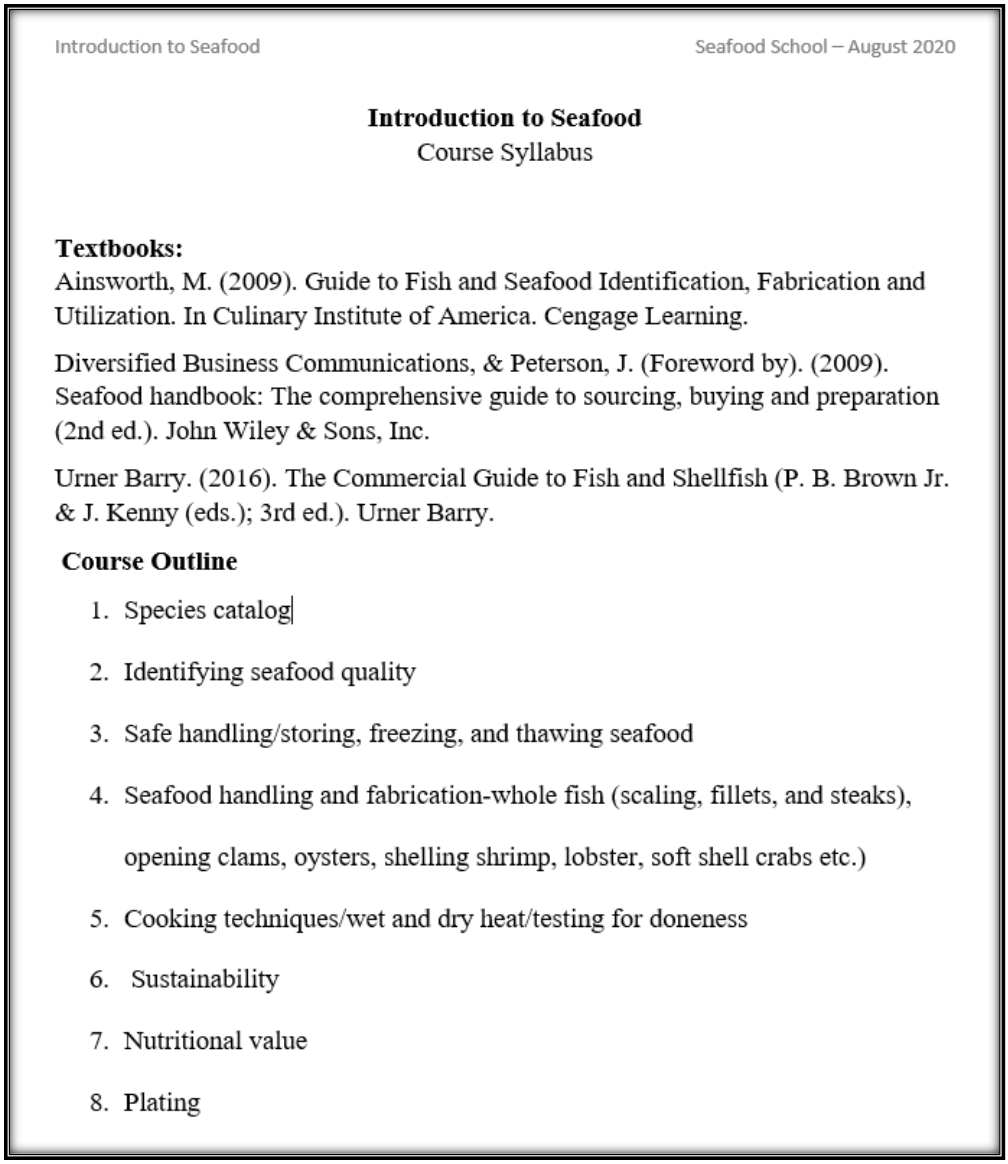
Even before COVID-19, food delivery options were on the upswing, especially among Millennials, and now that trend has taken off (Fantom, 2020; Littman, 2019). But how much of that delivery market is fast food? Is there still a market for upscale preparations? Ghost kitchens, also known as cloud kitchens, delivery kitchens, dark kitchens, or virtual kitchens have sprung up everywhere. These operate on several different models (Barkham et al., 2019). It may be a restaurant that still operates its traditional kitchen with no front of the house staff. It may consist of satellites that serve product from a central location much like a commissary. This allows a restaurant to expand its delivery range. As the earning power of the millennial generation increases, chefs and restaurateurs need to be prepared for a return to in-house dining, while continuing to offer expanded take-out and delivery options.

Studies have shown that lack of knowledge and comfort with seafood products was a serious limitation to in home use (White, 2019). Thus, with shifting patterns it may be time for chefs to hone their ability to create easy to use/follow recipes and meal prep kits that can be marketed to wary consumers for home preparation. Not only will this be crucial for expanding the market for high value nutritious protein like seafood but will afford chefs the opportunity to engage consumers and market themselves. This could be crucial to jumpstarting a career in culinary outreach and education or laying the groundwork for a strong consumer base should a new chef be presented an opportunity to open or operate their own kitchen.

Unfortunately, most culinary training programs do not offer a specialized seafood course. Not only are such courses important in learning how to select and prepare seafood, but they can assist in providing answers to consumer questions about sustainability, food safety, and nutrition. A basic outline one might consider for an introductory seafood course is depicted in Image 2 along with potential textbooks that can help expand on the suggested topics and more (Ainsworth, 2009; Diversified Business Communications & Peterson, 2009; Urner Barry, 2016). Culinary educators can help prepare their students for a rapidly changing culinary world by creating curricula that challenge students to think about shelf-life, different preparations, and how they might hold up to take-away and delivery. Educators can also prepare students to address changing trends through curricula on meal kits, prepared take-away foods offered, recipe development, and delivery of cooking classes.

Heavier reliance on take-away has highlighted some of the pitfalls to delivering seafood meals. Chefs find themselves having to consider - does the product travel well? What is the delivery range? Can the food be prepared ahead? Does the cost appeal to at-home diners? Some chefs are addressing these pitfalls by adjusting recipes to reduce overall cost, focusing on cold preparations like seafood salads, adding soups and dips to the to-go menu, and subbing fried sides like French fries with house made potato chips (Glazer, 2020). Chefs are also experimenting with new innovative packaging and creation of engaging and interactive online tools to enhance the at-home dining experience, which can add value to the take-away meals (Glazer, 2020). Organizations like the Alaska Seafood Marketing Institute, are working to provide resources to address these topics as well (Heimbigner, 2020), but there is more work to be done. Culinary educators could play a pivotal role in exploring these options and fostering a well-trained workforce for the post-COVID-19 food service landscape through innovative

culinary curricula. The first step in creating these curricula will be creating an understanding of the health benefits, safety, and sustainability of U.S. seafood.



Introduction to Seafood Seafood School – August 2020

Introduction to Seafood
Course Syllabus

Textbooks:
Ainsworth, M. (2009). Guide to Fish and Seafood Identification, Fabrication and Utilization. In Culinary Institute of America. Cengage Learning.

Diversified Business Communications, & Peterson, J. (Foreword by). (2009). Seafood handbook: The comprehensive guide to sourcing, buying and preparation (2nd ed.). John Wiley & Sons, Inc.

Urner Barry. (2016). The Commercial Guide to Fish and Shellfish (P. B. Brown Jr. & J. Kenny (eds.); 3rd ed.). Urner Barry.

Course Outline

1. Species catalog
2. Identifying seafood quality
3. Safe handling/storing, freezing, and thawing seafood
4. Seafood handling and fabrication-whole fish (scaling, fillets, and steaks), opening clams, oysters, shelling shrimp, lobster, soft shell crabs etc.)
5. Cooking techniques/wet and dry heat/testing for doneness
6. Sustainability
7. Nutritional value
8. Plating

Image 2: A draft outline with potential textbook resources for a basic seafood curriculum.

Seafood and Health

Institutional food service programs especially those in hospitals, nursing homes, and corporate dining facilities are increasingly concerned about the health of their diners. The United States Department of Agriculture (USDA) updates their Dietary Guidelines for Americans publication every 5 years to reflect current science and understanding of health and nutrition (U.S. Department of Health and Human Services & U.S. Department of Agriculture, 2015). The 2015-2020 edition of this publication recommends a minimum of two seafood meals per week to maintain good health. Similar recommendations have been made by the American Heart Association, the American Cancer Society, and the American Diabetes Association.

Fish and shellfish provide high quality, easily digestible protein and are a good source of important vitamins and minerals. Most seafoods are more nutrient dense than beef, pork and chicken (Hallström et al., 2019). Fish is a natural source of B-complex vitamins, selenium, vitamin D [which is often lacking in Americans (Parva et al., 2018)], and vitamin A. Seafood is the best source of unique polyunsaturated fats called Omega-3 fatty acids (DHA and EPA) (Hosomi et al., 2012). All fish and shellfish contain Omega-3 fatty acids, but generally fattier fish contain more Omega-3s than leaner fish. Consumption of seafood has been shown to decrease risk of cardiovascular disease and type 2 diabetes (Hosomi et al., 2012) and significantly improve child development and overall health in pregnant women and children (Bernstein et al., 2019; Hibbeln et al., 2007). In summary, a healthy diet complete with diverse seafood dishes can promote a healthy heart, brain, eyes, and muscles.

The way seafood is prepared can have significant impacts on the overall nutritive value of the meal. Deep fried and drenched in saturated fats like butter are often the most common preparations, which negate the low calorie count inherent in seafood products. Chefs looking to provide healthy flavorful options for their seafood diners must be familiar with the many other ways you can add flavor while limiting the use of salt, carbohydrates, and saturated fats. Add flavor with herbs and spices rather than butter and cream sauces. Seafood blends well with a variety of fruits and vegetables and that can add to a well-balanced, healthy meal. This is especially important for restaurants required to include calorie content on their menus (FDA, 2019).

Seafood Safety

In the United States, the Food and Drug Administration (FDA) mandates that all seafood processors implement Seafood HACCP (Hazard Analysis Critical Control Point) programs, which are preventative food safety plans that target common hazards associated with the specific seafoods they produce and the processes they use (FDA, 2020c). Since its implementation in 1997, new rules by the FDA authorized by the Food Safety Modernization Act have added additional regulations for the processing, handling, and transportation of human food that affect how seafood is handled (FDA, 2020a).

Sustainability

In the U.S. environmental sustainability is monitored and maintained through strict regulatory oversight and management. The National Oceanic and Atmospheric Administration (NOAA) Fisheries Service in conjunction with the Regional Fishery Management Councils carefully regulate wild harvest to ensure that U.S. fishery resources are sustainable and available for future generations (NOAA Fisheries, 2018). Because the demand for seafood continues to grow, aquaculture, which is also regulated to ensure operations are managed sustainably (FAO, 2020a), has grown to bridge the widening gap between wild supply and consumer demand. In addition, the Department of Labor's Occupational Safety and Health Administration (OSHA) sets and enforces regulations for worker welfare and compensation to ensure socially sustainable U.S. operations (OSHA, 2020). Focusing efforts to source domestically farmed and fished products, especially local to you, allows chefs to develop relationships and a stronger understanding of sustainable production. Sourcing locally will also increase the sustainability of the seafood by reducing the distance the product travels (food miles), since seafood is often imported from distant sources, the carbon footprint can be substantial and is often overlooked when assessing the sustainability of a product (Madin & Macreadie, 2015).

Seafood Education: Meeting the Challenges of the Future

There is a lot to learn about seafood. To help train chefs for the future, culinary schools should consider adding a specific seafood course to the curriculum and professional chef associations should include continuing education offerings. Table 2 highlights additional resources that can help in developing a seafood education program. Listed below are some new skillsets that could help culinary professionals build a career post-COVID-19.

- **High quality take-away and delivery** preparations, of a variety of seafood species, will be crucial to securing a market for high value seafood products for wary consumers concerned with eating out. Table 3 provides a sample curriculum that incorporates activities to prepare students for developing high quality seafood take-away.

- **Recipe writing and creation** will be a crucial avenue for engaging consumers over the next year or more. Ensuring students have the skills to write easy to follow recipes that inspire home cooks can help students build connections with consumers. In addition, considering the current health concerns arising due to the pandemic, chefs can increase trust in consumers by demonstrating their dedication and understanding of food safety by incorporating food safety tips throughout their recipes. The Partnership for Food Safety Education has developed resources to assist in safe recipe development (PFSE, 2019).

- **Effective pandemic safety protocols** to protect patrons and employees will increase the likelihood that patrons will return to food service establishments sooner. Agencies and culinary organizations across the country have published resources outlining the best practices for opening and operating safely during a pandemic (FDA, 2020b; NRA, 2020) that students should be familiar with.

- **Meal prep kits** are growing in popularity, but creation of easy to use quality kits requires experience. It will be important to understand the shelf-life and stability of products and the various organoleptic properties of food that could be affected by transport, packaging and the limitations of cooking at home. This warrants a more scientific understanding of foods. Culinary students with interest in building meal prep kits would benefit greatly from more training in food science. If relationships don't already exist, connecting with local university food science programs could provide insights into how to effectively incorporate this into culinary curricula (IFT, 2020). Table 3 provides additional ideas for a curriculum that could help students hone their skills around the creation of meal kits and afford them the experience necessary to build accessible and high-quality kits.

- **Storytelling and Marketing** is a great way of building relationships. Making connections with producers and sharing their story along with yours can be a great way to help consumers understand seafood and make connections between you and the local food community. These connections and stories can build trust with consumers and develop a loyal following that could be beneficial for future culinary pursuits (GFS Contributor, 2020).

In developing new curricula and exploring more engaging ways to educate students, culinary educators might consider reaching out to local seafood producers (fishermen and farmers) (Ciaramella, 2020). Inviting producers to visit the classroom or planning field trips to their docks/facilities can help to build connections and enhance students understanding of seafood sources and how it is harvested/farmed. Educators can work with the producers to get their products in the classroom. When engaging producers, it will be important to highlight the potential benefits to them, which could even encourage donations or product discounts for preparation and testing. The main benefits to highlight might be the development of dishes that complement their product(s), which can be shared. Producers can use the recipes and photos of the dishes created to help market their products. In addition, these interactions could lead a student to a career with a food service purveyor or seafood wholesaler who could be crucial to assisting and educating other food service professionals in accessing high-quality sustainable seafood products.

Table 2: List of free resources on U.S. Aquaculture and Seafood

Topic	Resource
Aquaculture	The National Aquaculture Association
	Culinarians Guide to Aquaculture
	Today's Farmed Fish
Education	CAFÉ Lesson Plan on U.S. Farm Raised Seafood
	Alaska Seafood Marketing Institute: Training and Education
	Seafood Products Teacher Resource Guide
	Seafood Products: Food Service Program Guide
	Sea Grant Extension Professionals
Fisheries	NOAA Fish Watch: U.S. Seafood Facts
Stories	NOAA Fisheries Video Gallery
	NOAA Voices: Oral History Archives
Nutrition	The Seafood Nutrition Partnership
	Seafoodhealthfacts.org
	USDA Health and Human Services Dietary Guidelines for Americans
Safety	USDA Food Safety for Delivery of Groceries and Prepared Meals
	U.S. Food and Drug Administration (FDA): Seafood
	Safe Recipe Style Guide
	U.S. FDA: Best Practices for Retail Food Stores, Restaurants, and Food Pick-up/Delivery Services During the COVID-19 Pandemic
	U.S. FDA: Guide to Acceptable Market Names for Seafood
	U.S. FDA: Fresh and Frozen Seafood, Selecting and Serving it Safely
Impacts of COVID-19	Open Table: State of the Restaurant Industry
	USDA: Food Expenditure Series

Table 3: Example Post COVID-19 seafood curriculum/activities highlighting take-away/delivery and meal kit creation.

	Title	Description
1	Learning Objectives	1. Gain a better understanding of different seafood preparations. 2. Learn more about non-traditional seafood species 3. Acquire information necessary to answer diner questions about seafood sustainability, safety, and health benefits. 4. Identify best preparations for seafood take-away and best practices for meal-kit creation. 5. Understand how to test and evaluate different take-away/delivery preparations and user-friendly meal prep kits.
2	Introduction to seafood	Review seafood nutrition, safety, and sustainability including regulatory aspects. A basic introduction is provided in this article along with references to expand on topics as needed.
3	Handling and Preparing	Cover basic handling and processing techniques for major seafood categories: round fish, flatfish, large species, crustacean shellfish, molluscan shellfish etc.
4	Seafood take-away activity	1. Separate students into groups and have them think about the different types of seafood and what preparations might stand up well to take-away/delivery. 2. Challenge students to test their ideas and prepare seafood meals packed for take-away/delivery. 3. Mimic take-away/delivery conditions then taste the products and evaluate each on appearance, flavor, and texture. Consider measuring product temperature and explore the effect on all these categories with different packaging types. To get an accurate picture be sure to repeat this multiple times and with different take-away/delivery conditions.
5	Seafood meal-kit activity	1. Separate students into groups and challenge them to develop an easy to follow recipe with safety tips that consumers could prepare in their own home. 2. Have students' portion and build meal-kits to complement the recipe developed. 3. Groups should trade meal kits and work through the provided recipe to create the meal as described using the ingredients provided. Throughout this process students should constructively evaluate all aspects of the meal kit including, clarity and accuracy of recipe, ease of use, packaging, and flavor of the final dish.
6	Presentation and Review	Students can then present their findings and experience with both activities. Sharing different methods and what worked and didn't will be an important component of broadening students understanding of different methods for take-away, delivery and meal kit development and those preparations and features that are most effective and least effective.

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