



Seafood Nutrition:

UNDERSTANDING THE SCIENCE,
COMMUNICATING TO CLIENTS, RESOURCES
AND RECIPES TO SHARE

RDN Seafood Toolkit



Seafood Nutrition Partnership is here to inspire Americans to enjoy seafood at least twice a week by showing how buying and preparing seafood is simple, delicious, good for them and good for the planet, too!

Research shows eating seafood two to three times per week reduces the risk of death from any health-related cause.¹ Seafood provides unique health benefits as a lean protein and is the best source for many nutrients and omega-3 fatty acids.

As an expert, you know consumers are often overwhelmed by the options, or confused about how best to prepare a tasty seafood dish. The Seafood Nutrition Partnership can help! This guide will help you to teach your clients how to buy, cook and enjoy seafood they can feel good about.

Consumer interest in sustainability is growing and throughout this guide we have included information on how consumers can ensure they are buying the best seafood for their health and our planet’s health.

This toolkit was made possible by the following partners:



Cover photo: Roasted Barramundi with Refrigerator Vegetables, courtesy Australis Aquaculture, photography by Nicole Gaffney.

¹Mozaffarian D, Rimm EB. Fish intake, contaminants, and human health: evaluating the risks and the benefits. JAMA. 2006; 296:1885- 99.

Fun ways to use this toolkit

All resources within this toolkit are available as one-page printable downloads at seafoodnutrition.org/rd.

- **TAKE IT TO THE SUPERMARKET** — learn to buy sustainable seafood with confidence.
- **IN THE KITCHEN** — try recipes together, teach cooking techniques to clients to show them how easy it can be.
- **BE CREATIVE** — take tried and true recipes from your client’s kitchen and make them special with seafood.
- **TALK ABOUT SEAFOOD** — tell your followers and share the seafood news in articles and blogs.

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Reel in the Benefits: Seafood for Health

Make seafood - fish and shellfish the main protein food on your plate at least twice a week. Seafood is not only an excellent source of lean protein, it contains a range of nutrients including vitamins A, B, and D, as well as healthy omega-3 fats. Fish is also rich in calcium and phosphorus and a great source of minerals such as iron, zinc and magnesium. Seafood is the whole package your body needs for optimal wellness.

According to the Dietary Guidelines for Americans, eating two servings (8 ounces) per week of a variety of seafood can help prevent heart disease. Not only that, new research studies recommend eating seafood regularly to contribute to improving your mental health and preventing and managing diabetes, while keeping your brain and eyes in good condition throughout your lifespan.

EATING SEAFOOD 2× PER WEEK:

- Leads to improved **brain & eye development** in infants, children, and adults.
- Helps to **reduce** risks of **heart disease**.
- Benefits **pregnant women** and their **babies**.
- Influences your mental health in a positive way, including **reducing risk for depression & anxiety**.
- Helps the **environment** with a lower carbon footprint.

10 Tips to Get Seafood on Your Plate

1 EAT A VARIETY OF SEAFOOD

With more than 500 species commonly available, it's easy to find one that suits your tastes. Fish higher in heart-healthy omega-3s include tuna, salmon, trout, and sardines. Shellfish counts, too! Oysters, mussels, crab, and calamari (squid) all supply healthy omega-3s. To keep it lean and flavorful, try cooking methods like grilling, broiling, or roasting, and using spices and herbs to boost flavor.

2 KEEP SEAFOOD ON HAND

Canned seafood, such as canned salmon, tuna, or sardines, makes for a delicious, easy and healthy meal with minimal food prep. Also, keep frozen fish in the freezer as a cost-effective option - you can cook from frozen or thaw fillets in about 15-20 minutes. From frozen-at-sea fillets to baked fish sticks, grilled salmon to shrimp scampi, frozen seafood offers varieties everyone in your family will love.

3 SHOP SUSTAINABLE

To have a sustainable supply of seafood in the future, seafood needs to be caught or farmed with socially and environmentally responsible methods. The U.S. is a global leader in sustainability standards, so feel confident in buying fish caught or raised here. Look for certifier logos like Aquaculture Stewardship Council, Best Aquaculture Practices, and Marine Stewardship Council, find a reputable retailer, and ask questions at the fresh counter.

4 BUDGET FRIENDLY

Delicious seafood comes at all price points. Eating more seafood doesn't have to be expensive. Some quick tips to find a great deal: Check seasonality - for example, fresh Alaskan salmon is cheaper in early summer when the fish are running. (Farmed seafood is available year round.) Many sustainable species with large, healthy fisheries can be found at great deals - look for flounder, perch, tuna and Pacific or Alaskan cod, pollock and rockfish, for example. Buy in bulk and freeze. Check the weekly sales and clip coupons to save.

5 COOK IT SAFELY

When seafood is properly handled and cooked to temperature it is safe and delicious. Keep seafood refrigerated until ready to use and then cook fish to an internal temp of 145°F, until it easily flakes with a fork. Cook shrimp, lobster, and scallops until they are opaque (milky white).

6 GET CREATIVE WITH SEAFOOD

Think beyond the fish fillet. Try salmon patties, shrimp stirfry, fish tacos, or clams with whole-wheat pasta. Eat the foods you already enjoy and jazz it up with fish or shellfish!

7 PUT IT ON A SALAD, GRAIN BOWL OR IN A SANDWICH

Top a salad or grain bowl with canned tuna or salmon or use it for sandwiches in place of deli meats. You can also cook extra of your favorite fish and use the leftovers for another meal or two - a great way to get your seafood twice a week!

8 GROW UP HEALTHY WITH SEAFOOD

Omega-3 fats from seafood can help improve nervous system development in children, impacting brain function and eye sight. Serve seafood to children twice a week in portions appropriate for their age and appetite. And make sure to get an early jump start - a variety of seafood should also be part of a healthy diet for women who are pregnant or breastfeeding. You can include omega-3 fish oil supplements as needed.

9 KNOW YOUR SEAFOOD PORTIONS

To get 8 ounces of seafood a week, use these as guides: A drained can of tuna is about 3 to 4 ounces and a typical salmon fillet ranges from 4 to 7 ounces.

10 GO BEYOND FISH & SHELLFISH!

If you're a vegan or vegetarian, you can also enjoy the health benefits of seafood - try sea vegetables like seaweed and algae. You can mix it in soups, stews and salads for a salty, umami flavor, stir it into salad dressings, or eat seaweed dried as a snack.



Adapted from USDA's MyPlate resource:
www.choosemyplate.gov/ten-tips-eat-seafood



The Ultimate Guide to Buying Seafood

Buying seafood doesn't need to be complicated. Utilize this guide to find the perfect seafood to satisfy your taste, schedule, budget and diet.

I'M IN THE MOOD FOR:

- **For a light, delicate fish.** Choose a lean fish, such as barramundi, sea bass, cod, flounder, grouper, haddock, halibut, mahi mahi, perch, pollock, red snapper, rockfish, sole or yellowfin tuna. For shellfish, shrimp is light and lean.
- **For a richer taste.** Choose a fattier fish usually with darker flesh, such as herring, mackerel, salmon, sardines, swordfish, trout or albacore tuna. Several shellfish varieties fit in this rich category and offer delicious briny flavor, such as clams, mussels and oysters.

TO COOK MY SEAFOOD, I'D LIKE TO:

- **Use my outdoor grill:** Many fish stand up to the heat, and it can bring out a delicious smoky flavor. Pick a variety that is firmer in texture, such as catfish, mahi mahi, salmon, scallops, shrimp, snapper, swordfish or tuna.
- **Steam or poach it:** Try lean fish – mild-flavored with tender, white or pale flesh – such as sea bass, cod, flounder, grouper, haddock, halibut or pollock.
- **Broil or bake:** Try a medium-fat fish, such as bluefish, catfish, salmon or swordfish.
- **Eat it without having to cook it:** Choose a precooked fish that's frozen (so you just have to warm it up), or opt for canned tuna, salmon, sardines or crab.

TIP

Let availability and freshness be your guides. It's easy to substitute one fish for another in a recipe, so if the mahi mahi looks and smells fresher than the pompano, buy it instead. Also, keep in mind the frozen and canned sections offer the same health benefits and often a wider variety to choose from.

AT THE STORE, WHAT TO DO:

Find a grocery store, box store, or butcher shop you trust. Most major chains have their seafood sourcing policies on their website, and the smaller stores can often provide their sourcing guidelines if you ask. Making healthy, sustainable choices is easier than it has ever been as a good grocer will do the research for you.

If you want to know more about what you're buying, ask the staff in the seafood department. They're there to help you!

What to ask at the seafood counter

- How long has it been on display? Or, when did you get this in?
- Is there a 3rd-party certification?
- Where is the seafood from?

If you're looking for more information about sustainability, digital guides such as NOAA Fisheries' FishWatch offers information about many U.S.-produced species.

ACROSS THE STORE

FRESH: A great option if you're planning to eat fish today or tomorrow. Seafood should be consumed within one to two days when it's fresh or thawed. If you're eating it right away, prepared seafood is a quick and easy option, as well. Swing by the sushi station or prepared foods section for a meal on the run.



- **For the wallet:** Seasonal or local fresh options tend to be more budget-friendly at your fish counter. Both farm-raised and wild fish are good nutritional choices, so talk to your seafood counter expert about best deals, what's freshest and recipe ideas.
- **Look for:** Firm and moist flesh with shiny skin, if skin is on. The flesh should bounce back when poked. It should smell like the ocean, not "fishy."
- **Note:** If you find a deal or bulk package of fresh fish, you can freeze fillets for up to six months. If a fish was previously frozen and thawed, sometimes sold as "refreshed," you should not refreeze it.

FROZEN: If you plan to save your seafood for a later date, this is the way to go. It's also great for fast family-friendly meals such as pre-seasoned fish that can be cooked quickly in the oven or even microwave. Frozen seafood is just as good for you, with most fish flash-frozen within hours of harvest, preserving peak flavor and texture until you are ready to cook.



- **For the wallet:** Frozen seafood is often a budget-friendly option, especially if you can buy larger packages and store them. Check for sales and coupons for even better values.
- **Look for:** Individually vacuum-packed pieces when possible, and avoid ice formed on the fish.

CANNED, TINNED OR POUCHED: There are many canned seafood options for a quick and easy meal or snack, and they serve as a great source of protein.

- **For the wallet:** Canned seafood is often the most budget-friendly option. Keep an eye out for sales and stock up on this shelf-stable pantry protein.



Sustainable Fish: Better for You & the Planet

By choosing sustainable, responsibly farmed and wild-caught fish, you can help restore the health of our oceans and ensure more food for everyone.

- Sustainable means seafood has been caught or farmed in ways that conserve fish stocks and the ecosystems that support them.
- **The majority of U.S. retailers have sustainability sourcing policies in place.** Always buy seafood from a reputable market where the employees are able to answer your questions.
- You can also visit FishWatch.gov or download the Seafood Watch app from the Monterey Bay Aquarium, both of which list sustainable seafood choices based on where the fish is from, how it was caught and additional factors.

Remember, it's not wild versus farmed, it's responsible versus not. Sustainable seafood means that wild-caught seafood comes from a well-managed fishery and farmed seafood comes from a farm following responsible practices.

- Both farmed and wild seafood are safe to eat.
- Farming fish, shellfish, and seaweed is vital for supporting seafood production, year-round jobs, and rebuilding threatened and endangered species and habitats.
- In the U.S., the most common farmed species include oysters, clams, mussels, and shrimp, and fish such as catfish, trout, salmon and sea bass.
- When it comes to the environment, both farmed and wild fish and shellfish can be harvested responsibly, or not, so it is best to find out the sustainability policy of your grocer or look for a trusted certification on the package.



The Ultimate Guide to Cooking Seafood

Take the stress out of planning and preparing family meals! Here are some quick tips to make sure your seafood meals turn out delicious every time. For more tips, visit seafoodnutrition.org/cooking.

THE BEST WAYS TO COOK YOUR SHELLFISH

Often, shellfish are boiled, poached, steamed or even microwaved. They can also be baked, broiled or grilled, as with scallops or shrimp. See the chart below for species-specific recommendations:

IS IT DONE?

- **Raw shrimp:** will turn pink and become firm.
- **Live oysters, clams and mussels:** shells will open when they are done.
- **Shucked oysters, clams and mussels:** will become plump and opaque. The edges of the oysters will start to curl.
- **Scallops:** will turn white or opaque and become firm to the touch.
- **Crab and lobster:** shells will turn bright red and the meat will become white or opaque.

	CLAMS	CRAB	LOBSTER	MUSSELS	OYSTERS	SCALLOPS	SHRIMP
COOKING METHOD	Steam	Steam, boil or buy precooked frozen or canned	Boil, or use precooked frozen	Steam or poach	Steam, roast or poach	Pan-sear, broil or grill	Boil, sauté, grill or use precooked frozen
WAYS TO ENJOY	In risotto or on their own with a squeeze of lemon	In gumbos, as crab cakes, or as a topping on fish, shrimp, or lobster	Over a fresh salad or served with melted butter	Cooked in broth or soup, or on their own with a squeeze of lemon	Grilled or baked, topped with sautéed spinach and garlic	Tossed with pasta	Grilled, in tacos or over pasta

Need a quick recipe? **Many fish dishes can be made in 15 minutes or less.** Plus, if you didn’t plan ahead, seafood can be cooked from frozen!

THE BEST WAYS TO COOK YOUR FISH

Fish is versatile and can be paired with a variety of cuisines and flavors. Try a few of our favorite ways to enjoy it!

Fish can be divided into categories based on the amount of fat it contains. Within each category, you can swap types of fish in recipes and cooking techniques.

- **Lean, mild-flavored fish – or “white fish”:** Steaming, poaching or baking is best for these tender pale-flesh species, which include barramundi, cod, flounder, grouper, pollock, red snapper, rockfish, sole or tilapia.
- **Rich-flavored, fatty fish:** Grilling, baking, slow-roasting or broiling all work well with a firmer texture fish that can withstand the heat. Try black cod (sablefish), bluefish, catfish, mackerel, salmon, sardines, swordfish, trout or tuna steaks.

IS IT DONE?

- Many types of fish are delicate and tender, so you want to avoid overcooking them. **The best way to tell if a fish is done is by testing it with a fork. Insert the fork at an angle, at the thickest point, and twist gently. The fish will flake easily when it’s done, and it will lose its translucent or raw appearance.**
- If you are new to preparing seafood, try using a food thermometer and cook the fish to an internal temperature of 140° to 145°F.



MASTER THE ART OF FISH COOKING

6 Simple Techniques for the At-Home Cook

BROILING

Get that grilled taste without the grill; cook fish in an oven set to broil, skin side up.
Good for: skin-on fillets or small whole fish

EN PAPILLOTE

Enclose seasoned fillets in parchment, gently roast in oven.
Good for: medium to firm fish

GRILLING

Cook over high heat; brush with oil and cover with herbs and citrus.
Good for: whole fish, skin-on fillets

PAN SEARING

Score fish skin with a few shallow cuts. Cook skin-side down in pan until crispy, then flip.
Good for: skin-on or skinless fillets

POACHING

Gently cook fillets in simmering stock or sauce such as tomato or curry. Submersion is key.
Good for: lean, flaky fish

ROASTING

Cook thawed or frozen fillets in a 400°F oven (375°F for whole fish)
Good for: medium to fatty fish

HOW TO DEFROST FROZEN FISH

Let the fish thaw slowly in the refrigerator overnight on paper towels. In a rush? Submerge it in its vacuum packaging or a water-tight bag in cold water for 15-20 minutes.



GOOD RULE OF THUMB

Try the 10-minute rule, which says you should measure the fish at its thickest point, and cook it on medium for 10 minutes per inch, turning halfway through the cooking time.

That means a **thin fish like sole or perch cooks in about 4-5 minutes** while a **thicker salmon or tuna steak might be closer to 15-20 minutes.**

For the Planet, too

A DIVE INTO SEAFOOD SUSTAINABILITY

ENJOY THE SEAFOOD YOU LOVE TODAY, TOMORROW AND ALWAYS!

If the saying “You are what you eat” is true, then eating sustainable seafood means you care about your health, the health of the planet, and enjoying truly good food.

To have a sustainable supply of seafood for future generations means that seafood needs to be caught or farmed in environmentally and socially responsible methods.

The seafood industry, along with NOAA Fisheries, environmental groups and certification programs, have worked hard to ensure a sustainable supply of seafood.



How to Buy Sustainable Seafood

1 LOOK FOR CERTIFIED

There are several sustainable seafood certifications and oversight programs that work with fisheries, farms and companies to ensure a safe, healthy and accountable seafood supply. For logos on seafood products, look for Aquaculture Stewardship Council (ASC) and Best Aquaculture Practices (BAP) for farmed fish, Marine Stewardship Council (MSC) and Alaska Seafood for wild-caught fish, or Fair Trade USA.



2 ASK QUESTIONS

Asking questions about how your seafood was harvested and where it came from can help you determine if it's good for the planet. In the absence of a certification, you can use this information to reference digital guides like NOAA Fisheries' FishWatch for a listing of best choices.

What to ask at the seafood counter

- What is the country of origin?
- Is there a 3rd-party certification?

3 FIND A REPUTABLE VENDOR

Making sustainable choices is easier than it has ever been. About 90% of U.S. retailers have seafood sustainability purchasing programs in place.

4 BUY U.S. SEAFOOD

The United States is a global leader in responsibly managed fisheries and sustainable seafood.

HERB-BROILED MACKEREL

Recipe adapted from NOAA Chef Laura Rogers

Servings: 4
Prep Time: 5 minutes
Cook Time: 10 minutes
Total Time: 15 minutes

INGREDIENTS:

- 4 mackerel fillets
- ¼ cup margarine or butter, softened
- 1 Tbsp. fresh parsley, chopped
- 1 Tbsp. green onion, thinly sliced
- ½ tsp. fresh tarragon, chopped (or ¼ tsp. dried)
- ½ tsp. fresh thyme (or ¼ tsp. dried)
- 1 tsp. salt
- ⅛ tsp. freshly ground black pepper
- ⅛ tsp. paprika



INSTRUCTIONS:

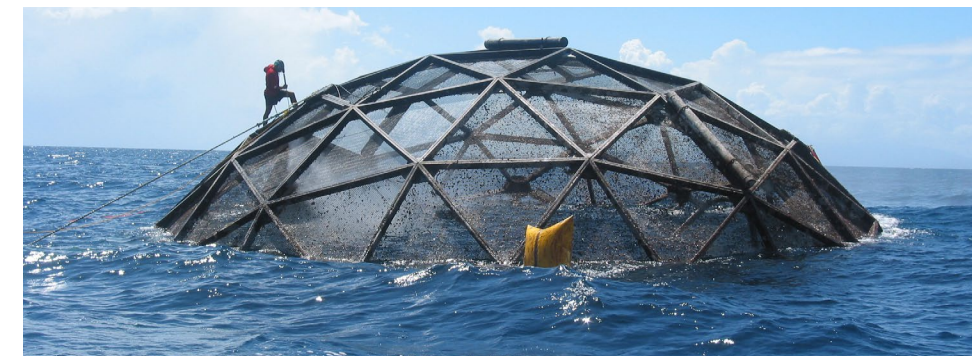
1. Place fillets in greased broiler-safe pan, without rack, skin-side down.
2. In small bowl blend together all other ingredients. Spread over fillets.
3. Broil about 4 inches from heat until fish flakes with a fork, about 8 to 10 minutes
4. Baste once or twice during cooking with pan juices.

FARMED OR WILD, WHICH SHOULD I CHOOSE?

It's not wild versus farmed, it's responsible versus not.

Sustainable seafood means that wild caught seafood comes from a well-managed fishery and farmed seafood comes from a farm following responsible practices.

The global human population is rising, but the global abundance of wild fish is not. Seafood is a high-protein, low-fat, healthy, and nutritionally rich food. Aquaculture, or seafood farming, has the capacity to help meet the growing global demand for healthy seafood. Aquaculture is the fastest growing food production system in the world, and more than half of the fish consumed globally comes from aquaculture. By choosing sustainable wild-caught and responsibly farmed seafood, you can feel confident that either is a healthy choice for you and for the ocean.



FishWatch is the nation's database on U.S. managed sustainable seafood, helping you make smart seafood choices. Search for up-to-date information on the status on U.S.-harvested and farmed seafood. The seafood profiles on FishWatch have information ranging from how the species are harvested, managed or farmed and even how they taste!

The U.S. is a global leader in sustainable seafood thanks to a rigorous science-based fisheries management process that supports the goals of sustaining fish populations, protecting habitat and other species, and keeping fishermen on the job.

Seafood Smarts

A DIVE INTO BENEFITS FOR KIDS

The benefits of seafood for kids are big! Fish and shellfish supply the nutrients, vitamins and omega-3s essential for strong bones, brain development, and healthy heart and immune system.

Protein, vitamins B-6, B-12 and D, and omega-3 fatty acids (especially DHA and EPA) are key nutrients found in seafood that promote healthy growth and development throughout childhood, and can help minimize chronic disease risk later in life.

Despite everything we know about the importance of seafood for growing minds, overall, kids are only getting about 40% of the omega-3s EPA+DHA recommended by the National Academy of Medicine.²



- **BIG BRAINS:** Fish makes your brain bigger, literally!³ Your brain is nearly 60% fat,⁴ and omega-3 fatty acids found in seafood are among the most crucial molecules that determine your brain's ability to perform.

- **BETTER GRADES:** Kids who eat fish at least once per week may do better in school.⁵ Seafood's omega-3s help your kids' brains develop, leading to higher IQs and improved reading and spelling skills.⁶

Research shows that kids who eat fish at least once a week sleep better and have an IQ about 4.8 points higher than those who seldom or never eat fish.⁷

- **HEALTHY EYES:** Along with supporting healthy eye development, seafood's omega-3s support our ability to detect light. Nearly half of our eye's light-detecting cell structure are made up of omega-3s.⁸

- **STRONG BONES:** Fish – especially salmon – is naturally packed with Vitamin D, a bone-strengthening nutrient that is naturally present in very few foods. Fish has more vitamin B12 and vitamin D than any other type of food.⁹ D is necessary for building bones and teeth and assisting in the absorption of calcium.

Seafood is an excellent source of lean protein, essential for a child's body development especially during times of rapid growth. Protein is found in every cell in your body and is necessary for the continuous repair and growth of tissues including bone, skin and muscles.

- **LESS STRESS:** Children who consume more seafood have less anxiety and better focus. Omega-3s have been shown to help reduce behavior problems and aggression in children – and their parents.¹⁰

- **BREATHE WELL:** Want fewer sick days? Research shows that omega-3 DHA improved children's immune responses and kids have a lower risk of some allergic diseases and upper respiratory infections.¹

Fish twice a week may help reduce asthma symptoms in children,¹¹ a disease affecting 1 in 12 kids in the U.S., according to the CDC.

HAPPY FISH®

Recipe by Blue Circle Foods

A healthy alternative to traditional fish sticks, Happy Fish® contain just three ingredients – our sustainably sourced fish, sea salt and pepper. These versatile fish-shaped bites, available in salmon or cod, cook directly from frozen in just 8 minutes and contain no additives, fillers or preservatives.

Happy Fish® is:

- Free of antibiotics, added hormones and GMOs
- No gluten or sugar
- Certified sustainable by Monterey Bay Aquarium's Seafood Watch Program, the Aquaculture Stewardship Council and the Marine Stewardship Council.

HOW TO COOK

- **Sauté:** Lightly brush pan with oil over medium heat. Sear Happy Fish® for 4 minutes per side.
- **Grill:** Cook Happy Fish® for 4 minutes per side on a hot grill.
- **Poach:** Add to boiling water and cook for 7 minutes.

PAIRING IDEAS

1. Add to boiling **pasta** 7 minutes before the pasta is done. Drain, top with desired sauce and serve.

2. Gently coat Happy Fish® on both sides with Everything Bagel seasoning or sesame seeds before sautéing for 4 minutes per side. Pair **crusted** Happy Fish® with your favorite dipping sauce.

3. Build Happy Fish® **sliders**. Sauté Happy Fish® for 4 minutes a side. Serve on a potato roll or slider bun and top with avocado, arugula and chipotle mayo.



TIPS TO GETTING KIDS TO EAT MORE SEAFOOD

1. HAVE FIN FUN! WHEN SEAFOOD LOOKS FUN, IT'S "YUM!" For younger kids, this can simply be visually appealing, like a sandwich shaped like a fish. The heart of this concept is for there to be an exciting component. Maybe it's interactive and they can "play" with their food.

2. DIPPING MEANS YUMMING! Kids love to dip foods into their favorite condiments, such as ketchup, ranch dressing and barbecue sauce.

3. DO THE SEAFOOD SWAP! Replace taco filling with shrimp, chicken fingers for breaded fish or any numbers of easy swaps into their family-favorite dishes.

4. TOP IT. KIDS LOVE IT! Kids love fruit? Pile it on! Try making an avocado and fruit salsa with mango, pineapple or even strawberries to top a fillet.

5. ADD IT TO A FAVE, WATCH 'EM RAVE! Crab in mac & cheese, please! Tuna on pasta makes it go fasta!

For more tips, visit seafoodnutrition.org/kids.

¹ Nettleton J, Salem Jr. N. International Society for the Study of Fatty Acids and Lipids 2018 Symposium: Arachidonic and Docosahexaenoic Acids in Infant Development. *Ann Nutr Metab* 2019;74:83-91.

² Thompson M, et al. Omega-3 Fatty Acid Intake by Age, Gender, and Pregnancy Status in the United States: National Health and Nutrition Examination Survey 2003-2014. *Nutrients*. 2019;11(1):177.

³ Raji CA, et al. Regular fish consumption and age-related brain gray matter loss. *Am J Prev Med*. 2014;47(4):444-451.

⁴ Chang CY, Ke DS, Chen JY. Essential fatty acids and human brain. *Acta Neurol Taiwan*. 2009 Dec;18(4):231-41.

⁵ Kim J, et al. Fish consumption and school grades in Swedish adolescents: a study of the large general population. *Acta Paediatrica*. 2010;99: 72-77.

⁶ Kuratko CN, et al. The relationship of docosahexaenoic acid (DHA) with learning and behavior in healthy children: a review. *Nutrients*. 2013;5(7):2777-2810.

⁷ Liu J, et al. The mediating role of sleep in the fish consumption – cognitive functioning relationship: a cohort study. *Scientific Reports*. 2017;7(17961).

⁸ Innis S. Perinatal biochemistry and physiology of long-chain polyunsaturated fatty acids. *J Peds*. 2003;143(4):1-8.

⁹ FDA and EPA. Advice about Eating Fish. <https://www.fda.gov/food/consumers/advice-about-eating-fish>. Current as of: 07/02/2019.

¹⁰ Raine A, et al. Reduction in behavior problems with omega-3 supplementation in children aged 8-16 years: a randomized, double-blind, placebo-controlled, stratified, parallel-group trial. *J Child Psychology & Psychiatry*. 2015;56(5):509-520.

¹¹ Papamichael M, et al. Efficacy of a Mediterranean diet supplemented with fatty fish in ameliorating inflammation in paediatric asthma: a randomised controlled trial. *J Human Nutr & Dietetics*. 2019;32(2):185-197.

Fish in Pregnancy

A DIVE INTO WOMEN'S HEALTH & INFANT OUTCOMES

Eating seafood – whether canned, cooked from frozen or fresh during pregnancy – is a good way to get the nutrients you and your baby need. **Seafood is the only food rich in a healthy oil called omega-3 DHA, which is needed for your baby's brain and eye development.** In fact, children whose mothers eat seafood during pregnancy may gain an average 7.7 IQ points compared to those whose mothers do not eat seafood.¹

The American Academy of Pediatrics recommends children and pregnant and breastfeeding women eat 1-2 servings of fish per week, with sustainably caught or raised fish and shellfish offering the best choices.²

This guide will show you tasty ways to meet your seafood needs so you and your baby can maximize the many benefits of fish.



According to the FDA³, fish are part of a healthy eating pattern and provide:

- Protein
- Healthy omega-3 fats (called DHA and EPA)
- More vitamin B12 and vitamin D than any other type of food
- Iron which is important for infants, young children, and women who are pregnant or who could become pregnant
- Other minerals like selenium, zinc, and iodine

Premature birth is the leading cause of death for children under 5 years old worldwide, accounting for close to one million deaths annually. Premature babies are at higher risk of a range of long-term conditions including visual impairment, developmental delay and learning difficulties. A 2018 review shows omega-3 fatty acids found in seafood dramatically reduce the risk of dangerous preterm birth.⁴

When pregnant, increasing the daily intake of omega-3s EPA and DHA:

- lowers the risk of having a premature baby (less than 37 weeks) by 11%
- lowers the risk of having an early premature baby (less than 34 weeks) by 42%
- reduces the risk of having a small baby (less than 2500g) by 10%

HITTING MILESTONES WITH SEAFOOD

Research shows that moms-to-be who eat fish 2-3 times each week during pregnancy have babies who reach these month milestones more quickly⁵:

At 6 months:

Copy sounds
Hold up head
Recognize family

At 18 months:

Climb stairs
Drink from a cup
Draw

CAN YOU EAT SUSHI WHILE PREGNANT? AND OTHER COMMON QUESTIONS

Sushi can be safe to eat during pregnancy—but stick with sushi that includes cooked seafood. Pregnant women should avoid shark, swordfish, king mackerel, tilefish, bigeye tuna, marlin and orange roughy.³ To reduce your risk of getting sick from food during pregnancy, do not eat any raw meats or raw seafood.

TROPICAL GRILLED BARRAMUNDI WITH CRUNCHY SLAW

Recipe by Chef Kelly Armetta for Australis Aquaculture

Servings: 3
Prep Time: 10 minutes
Cook Time: 10 minutes
Total Time: 20 minutes

INGREDIENTS:

- 12 oz. Australis Barramundi, thawed
- 1 firm mango, peeled and sliced into ¼ inch pieces
- ½ package broccoli slaw
- 1 Tbsp. smoked paprika
- 2 limes, juiced
- 2 Tbsp. canola oil, separated
- 2 stalks green onions, chopped and washed
- Salt and pepper

Australis is on a mission to raise the best fish imaginable in the most responsible way possible. That's why Australis Barramundi is:

- High in omega-3s
- Excellent source of lean protein
- No traceable levels of mercury
- Chemical and antibiotic-free
- Versatile and easy to cook



Omega-3s EPA + DHA
per serving: **600 mg**

INSTRUCTIONS:

1. Heat up your grill to medium heat or when the temperature reaches 400 degrees. Clean the grill grates and coat with oil to prevent sticking.
2. Brush the barramundi with 1 Tbsp of oil and season it with salt and pepper.
3. Sprinkle paprika on the mango slices until it's well coated.
4. Place both the fish and mango slices on the grill. (Note: If the fish sticks to the grill, you can place it on top of a sheet of aluminum foil.)
5. Allow mangos to lightly char, turn over and cook for 3 minutes, then remove.
6. Cook barramundi for 4 minutes on each side or until it flakes.
7. Meanwhile, toss the broccoli slaw with green onion, lime juice, remaining oil. Add salt and pepper to taste.
8. Place the cooked barramundi onto plate, mango slices on the fish and finish with broccoli slaw on the side.

Eating fish can reduce stress and distress for new parents. Studies of pregnant women reported that eating 8-12 oz., or 2-3 servings, of fish a week reduced psychological distress and post-partum depression. Interestingly, fathers felt less distress during the pregnancy when they regularly ate fish, too.⁶

¹ Hibbeln JR, et al. Relationships between seafood consumption during pregnancy and childhood and neurocognitive development: Two systematic reviews. PLEFA, V151, 14 - 36.

² Bernstein AS, Oken E, de Ferranti S; Council on Environmental Health; Committee on Nutrition. Fish, Shellfish, and Children's Health: An Assessment of Benefits, Risks, and Sustainability. Pediatrics. 2019;143(6):e20190999 - 1 Oct 2019.

³ FDA and EPA. Advice about Eating Fish. <https://www.fda.gov/food/consumers/advice-about-eating-fish>. Updated: 07/02/2019.

⁴ Middleton P, et al. Omega-3 fatty acid addition during pregnancy. Cochrane Database of Systematic Reviews 2018, Issue 11. Art. No.: CD003402.

⁵ Oken E, et al. Maternal fish intake during Pregnancy, Blood Mercury Levels, and Child Cognition at Age 3 Years in a US Cohort. American Journal of Epidemiology, 2008; 167(10), 1171-1181.

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Fish is Brain Food

A DIVE INTO MENTAL HEALTH & DEPRESSION

Depression and anxiety are the most common mental health conditions in the world. Anxiety and depression affect at least 6% of adults in the United States – or 1 in 17 - with twice as many women as men affected, and it occurs across all ages.^{1,2}

When we are depressed or anxious, we naturally resist self-care, including preparing and eating nutritious food. But good nutrition is more important than ever for those suffering from depression. **Research shows that our daily food choices influence our mental health, and evidence is strong that seafood is brain food.**

Feelings of anxiety and stress can be eased by regular consumption of fish.^{3,4}

WELLNESS CHECK

Improving nutrition takes time. When we change our diet, it can take weeks to feel any significant improvement. Other self-care is important, too, such as physical activity, getting fresh air, connecting with friends and family, rest and sleep.



- **People who regularly eat fish are 20% less likely than their peers to have depression.**⁵⁻¹⁰ Over the past 20 years, dozens of studies evaluating more than 20,000 cases of depression have shown that eating 8-12oz. of fish per week (about 2-3 servings) and/or consuming omega-3 fish oil supplements significantly reduces risk for major depression.^{5,6} In fact, the American Psychiatric Association endorsed the fats in fish as an effective part of depression treatment.¹¹
- **Fish is like a multivitamin for your brain.** Fish is more than just an excellent source of lean protein and essential omega-3s, it provides other vitamins and minerals important for mental health. The nutrients that tend to be low in people who are depressed – vitamin D, magnesium, and zinc – are found in fish.¹²⁻¹⁷
- **If you are taking anti-depressant medication, research reports the nutrients in fish may make them work better.** Mental health medications work better in people with better nutrition. Getting complete protein from fish, along with omega-3s EPA + DHA and zinc, for example, have been shown to improve response to anti-depressants.^{5,9,18,19} The American Psychiatric Association recommends that all Americans eat fish two or more times a week, preferably fatty fish such as salmon or trout.¹¹
- **Eating fish shows promise for reducing migraine headaches.** Increasing omega-3s EPA + DHA while lowering omega-6 intake (often found in junk food containing soybean and vegetable oils) has been shown to significantly reduce frequency, duration, and severity of migraine headaches.²⁰

SIMPLE TIPS TO SWAP SOME SEAFOOD

1. **Make a delicious seafood pasta.** Swap ground meat for your favorite fish or shellfish – just poach the fish in the sauce, or sprinkle in canned tuna. Don't forget to add veggies for extra nutrients and flavor.
2. **Switch it up.** Try salmon or mahi mahi burgers at your family table for a tasty brain-boost of omega-3s!
3. **A different kind of steak.** Fresh swordfish, salmon or tuna steaks are wonderful sources of lean protein with the added benefits of having omega-3 fatty acids and being very low on saturated fat. These options are tasty and satisfying.

MUSSELS IN GARLIC BROTH

Recipe by Chef Kelly Armetta

Servings: 4
Prep Time: 5 minutes
Cook Time: 10 minutes
Total Time: 15 minutes

INGREDIENTS:

1 tsp. olive oil
4 garlic, cloves sliced
2 Tbsp. onions, chopped
2 lbs. mussels, cleaned
½ lemon, juiced
½ tsp. basil, dried
½ tsp. thyme, dried
¼ cup clam juice (optional)
2-14.5 oz. canned tomatoes, chopped
2 Tbsp. butter, unsalted
Salt and pepper, to taste

Omega-3s EPA + DHA
per serving: **665 mg**



INSTRUCTIONS:

1. Heat large pot with olive oil and sliced garlic and onions.
2. When aroma is released, add mussels.
3. Add lemon juice, herbs and clam juice (optional), and gently toss.
4. Add tomatoes. Cover and simmer over medium heat until mussels are steamed open, generally 3 to 6 minutes.
5. Remove pot from heat. Discard unopened mussels.
6. To finish mussels, add butter and swirl to make broth thicker.
7. Optional: Serve with crusty bread for dipping in broth.

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⁴ Su KP, et al. Association of Use of Omega-3 Polyunsaturated Fatty Acids With Changes in Severity of Anxiety Symptoms: A Systematic Review and Meta-analysis. JAMA Netw Open. 2018; 1(5):e182327

⁵ Grosso G, et al. Dietary n-3 PUFA, fish consumption and depression: A systematic review and meta-analysis of observational studies. J Affect Disord. 2016;205:269-281.

⁶ Li F, Liu X, Zhang D. Fish consumption and risk of depression: A meta-analysis. J Epidemiol Comm Health. 2016;70(3):299-304.

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⁸ McNamara RK. Role of omega-3 fatty acids in the etiology, treatment, and prevention of depression: Current status and future directions. J Nutr Intermed Metab. 2016;5:96-106.

⁹ Hibbeln JR. Fish consumption and major depression. Lancet. 1998;351:1213.

¹⁰ Sánchez-Villegas A, et al. Seafood Consumption, Omega-3 Fatty Acids Intake, and Life-Time Prevalence of Depression in the PREDIMED-Plus Trial. Nutrients 2018, 10(12), 2000.

¹¹ Freeman MP, et al. Omega-3 fatty acids: Evidence basis for treatment and future research in psychiatry. J Clin Psychiatry. 2006;67:1954-1967.

¹² Thesing CS, et al. Omega-3 and omega-6 fatty acid levels in depressive and anxiety disorders. Psychoneuroendocrin. 2018;87:53-62.

¹³ Swardfager W, et al. Zinc in depression: A meta-analysis. Biol Psychiatry. 2013;74(12):872-878.

¹⁴ Wang J, Um P, Dickerman, BA. Zinc, magnesium, selenium and depression: A review of the evidence, potential mechanisms and implications. Nutrients. 2018;10(5):584.

¹⁵ Jacka FN, et al. Association between magnesium intake and depression and anxiety in community-dwelling adults: The Hordaland Health Study. Aust N Z J Psychiatry. 2009;43(1):45-52.

¹⁶ Wilkins, CH, et al. Vitamin D deficiency is associated with low mood and worse cognitive performance in older adults. Am J Geriatr Psychiatry. 2006;14(12):1032-1040.

¹⁷ Polak MA, et al. Serum 25-hydroxyvitamin D concentrations and depressive symptoms among young adult men and women. Nutrients. 2014;6(11):4720-4730.

¹⁸ Gertsik, L, et al. Omega-3 fatty acid augmentation of citalopram treatment for patients with major depressive disorder. J Clin Psychopharmacol. 2012;32(1):61-64.

¹⁹ Ranjbar E, et al. Effects of zinc supplementation on efficacy of antidepressant therapy, inflammatory cytokines, and brain-derived neurotrophic factor in patients with major depression. Nutr Neurosci. 2014;17(2):65-71.

²⁰ Ramsden, CE, et al. Targeted alteration of dietary n-3 and n-6 fatty acids for the treatment of chronic headaches: A randomized trial. Pain. 2013;154(11):2441-2451.

Love Your Heart

A DIVE INTO SEAFOOD & CARDIOVASCULAR HEALTH

Heart disease is the leading cause of death in America. Fortunately, many risk factors are things we have control over – such as our food and lifestyle choices. Making nutritious food choices and working in physical activity throughout the day are two excellent ways to help keep your family's heart beating strong.

Did you know that eating seafood twice a week could help to improve your omega-3 levels and reduce your risk for cardiovascular disease? Just a simple shift in your eating pattern can put you on a positive path to improve your heart health.

Seafood is a very important part of a healthy diet. Fish and shellfish are the major sources of healthful omega-3 fats and are also rich in nutrients such as vitamin D and selenium, high in protein, and low in saturated fat. There is strong evidence that eating fish or taking fish oil is good for the heart and blood vessels.¹



In 2018, the American Heart Association assembled top researchers to review the latest evidence on seafood and heart health, and the conclusion: keep saying yes to fish twice a week for heart health.²

“We conclude that **1 to 2 seafood meals per week be included to reduce the risk of congestive heart failure, coronary heart disease, ischemic stroke, and sudden cardiac death**, especially when seafood replaces the intake of less healthy foods.”

Increased seafood consumption is associated with lower risk of sudden cardiac death and a beneficial role on triglycerides, blood pressure, endothelial function and inflammation.^{2,3}

HOW DOES FISH FIGHT HEART DISEASE?

The omega-3 fats in fish protect the heart against the development of erratic and potentially deadly cardiac rhythm disturbances. They also lower blood pressure and heart rate, improve blood vessel function, and, at higher doses, lower triglycerides and may ease inflammation.

The strong and consistent evidence for benefits is such that the American Heart Association, Dietary Guidelines for Americans, and World Health Organization recommend seafood at least twice a week, aiming to take in an average of 250-500 mg daily of omega-3s EPA and DHA. Higher intakes of 1 gram and above are supported for a range of cardiovascular benefits.

4 TIPS TO COOKING HEART HEALTHY

- 1. Select fish as your lean protein option.** Fill up the rest of your plate with healthy fruits, vegetables and whole grains.
- 2. Consider cooking with healthy fats.** Opt for unsaturated fats such as olive oil in moderation during meal preparation, and swap avocado for mayonnaise where you can.
- 3. Try healthier cooking methods** like grilling, poaching, roasting, broiling, and pan-searing.
- 4. Use fresh herbs, spices, and citrus** in place of added salt to enhance food with bold flavors.

For more tips from USDA MyPlate on cooking heart healthy, visit seafoodnutrition.org/10-heart-health-tips

TROUT ALMONDINE

Recipe by Chef Kelly Armetta

Servings: 4
Prep Time: 3 minutes
Cook Time: 15 minutes
Total Time: 18 minutes

INGREDIENTS:

2 Tbsp. olive oil
1 lb. trout fillets
Salt & pepper to taste
2 Tbsp. flour
1 cup green beans, canned or frozen
2 oz. almond slices
2 Tbsp. butter, unsalted
1 Tbsp. Worcestershire sauce
1 lemon, juiced
½ tsp. parsley, dried

INSTRUCTIONS:

1. Heat oil in pan on medium-to-high heat.
2. Salt and pepper trout and dredge with flour. Shake off extra flour.
3. Place trout into heated pan with oil and cook for 4 to 5 minutes on each side.
4. Meanwhile heat green beans in microwave for 2 minutes on High or until cooked.
5. Place beans on plate and place cooked trout on top.
6. Using the same pan, add almond slices to pan and lightly toast.
7. Add butter and Worcestershire sauce, heat sauce until foam starts.
8. Add lemon juice and parsley.
9. Pour over fish and spoon almonds on top.



HEART FACT

Heart disease is 80-90% preventable with proper diet, exercise and lifestyle modifications.^{4,5}

Eating approximately one to two servings of fatty fish a week reduces the risk of dying from heart disease by 36%.⁶



HEART HEALTHY SEAFOOD PAIRINGS

Look for recipes that incorporate these perfect pairings, which make it easy to create a heart healthy dish for your family.

- Beans, peas and lentils
- Fruits and vegetables
- Whole-grain breads, hot cereals and pasta, brown rice, barley
- Nuts such as almonds, walnuts, pecans and hazelnuts



¹ Fish: Friend or Foe? Harvard T.H. Chan School of Public Health, The Nutrition Source. <https://www.hsph.harvard.edu/nutritionsource/fish>. Accessed 2020.

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³ Albert CM, et al. Blood Levels of Long-Chain n-3 Fatty Acids and the Risk of Sudden Death. *N Engl J Med* 2002; 346:1113-1118.

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⁵ World Health Organization Global Strategy on Diet, Physical Activity and Health. https://www.who.int/dietphysicalactivity/media/en/gsf_general.pdf.

⁶ Mozaffarian D, Rimm EB. Fish intake, contaminants, and human health: evaluating the risks and the benefits. *JAMA*. 2006; 296:1885-99.

Seafood & Type 2

A DIVE INTO DIABETES

For people with type 2 diabetes or those at high risk, the statistics are familiar. In the United States, approximately 30 million people have diabetes¹ – that’s nearly 10% of the country – and rates are on the rise. Healthy lifestyle changes can help reduce diabetes risk and help keep diabetes in control. But change can be hard, especially when unhealthy options surround you.

Small improvements to your eating habits can make a huge impact on your health. Remember, your health matters to you and to those who love you! The American Diabetes Association offers recommendations, tips and recipes for balanced meals, including the suggestion to eat fatty fish 2-3 times per week.²

Based on the overwhelming research, just one more seafood meal a week improves your health, and ideally for those with diabetes and/or prediabetes, 1,000 – 2,000 mg of omega-3s EPA+DHA a day can show significant impacts to your health.



- The type of fat in seafood, heart-healthy omega-3s, helps prevent clogging of the arteries, according to the American Diabetes Association, and it has so many other benefits – including reducing inflammation, increasing insulin function, and even improving your mood (with the release of blissful serotonin).^{3,4} Simply, **omega-3s may improve effectiveness of insulin and reduce your risk for related complications.**
- Studies have shown that **eating (non-fried) fish and shellfish can reduce your risk of getting type 2 diabetes⁵** – and the data show the more fish, the better.
- Diabetes has many side effects and complications. People with type 2 diabetes are twice as likely to die from heart attack or stroke.⁶ A study that followed young adults for 25 years showed that **eating (non-fried) fish reduced risk of high blood pressure, a large waistline, prediabetes, and abnormal cholesterol measurements** later in life.⁷ In women living with diabetes, **higher consumption of fish is linked to less sudden cardiac death,⁸ may reduce the risk of heart disease,⁹ lower triglycerides and blood pressure,¹⁰ and improve HDL-cholesterol.^{11,12}**

QUICK TIPS TO UP YOUR SEAFOOD INTAKE

The American Diabetes Association recommends fatty fish 2-3 times per week. Seafood with the highest amounts of these healthy fats include salmon, herring, mackerel, sardines, swordfish, trout, albacore tuna, pollock, barramundi, oysters, mussels, and crab. Get your dose of omega-3s EPA and DHA from eating seafood – **just one 4 oz. serving of salmon has more than 1,200 mg!**

- **Try canned seafood.** Keeping canned options, like salmon, tuna or sardines on hand can make for an easy and healthy weeknight dinner.
- **Throw it on a sheet pan!** Sheet pan meals are an easy way to save time in food preparation and cleanup and allow you to cook everything at once. Pair your choice of fish with some delicate veggies like asparagus for an easy, delicious and-nutritious meal.
- **Get creative with seafood.** Try adding it as a salad topper, layering it in a sandwich or making homemade fish tacos for an easy way to add protein, nutrients and flavor.

SMOTHERED SHRIMP OVER POLENTA

Recipe by Maya Feller, RDN

Servings: 3
Prep Time: 5 minutes
Cook Time: 10 minutes
Total Time: 15 minutes

INGREDIENTS:

3 cups low sodium vegetable broth
¾ cups yellow cornmeal
1 lb. of shrimp (shelled and deveined; small or medium; thawed if frozen)
3 Tbsp. olive oil, divided
1 small onion, diced
2 cloves of garlic, minced
1 red bell pepper, diced
1 green bell pepper, diced
3 ribs of celery, diced
¼ tsp. smoked paprika
Salt and pepper to taste
1 ½ cups tomato sauce
¼ cup Parmesan cheese, freshly grated



INSTRUCTIONS:

1. **Making Polenta:** Bring vegetable broth to a boil in a large pan. Pour the cornmeal into the boiling water and whisk until all the “polenta” is stirred and you do not see any clumps. Lower heat to low and whisk until the polenta begins to thicken, approximately 5 minutes. Cover and cook for 30 minutes, whisking every 5-6 minutes.
2. **Sauté shrimp:** Meanwhile, rinse and dry shrimp. Heat 1 tablespoon of oil in a pan with medium heat until sizzling. Add onion, garlic, bell peppers and celery. Cook for 3-5 minutes until vegetables soften. Add shrimp and season with smoked paprika, salt and black pepper to taste. Sauté for 2 minutes on each side. Once they turn opaque pink or white, turn heat off. Add tomato sauce to shrimp and stir.
3. **Seasoning Polenta:** After 30 minutes, turn heat off and add in 2 tablespoons of olive oil and Parmesan cheese. Stir until the cheese has melted. Cover and let sit for 5 minutes to thicken.
4. **Serve.** Plate shrimp over the polenta.

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² American Diabetes Association. Protect Your Heart: Choose Healthy Fats. 2009. https://professional.diabetes.org/sites/professional.diabetes.org/files/media/Choose_Healthy_Fats.pdf

³ Gao H, et al. Fish oil supplementation and insulin sensitivity: a systematic review and meta-analysis. *Lipids Health Dis.* 2017 Jul 3;16(1):131.

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⁵ Patel PS, et al. Association between type of dietary fish and seafood intake and the risk of incident type 2 diabetes: the European prospective investigation of cancer (EPIC)-Norfolk cohort study. *Diabetes Care.* 2009 Oct;32(10):1857-63.

⁶ Danaei G, et al. The preventable causes of death in the United States: comparative risk assessment of dietary, lifestyle, and metabolic risk factors. *PLoS Med.* 2009 Apr 28;6(4):e1000058.

⁷ Kim YS, et al. Intake of fish and long-chain omega-3 polyunsaturated fatty acids and incidence of metabolic syndrome among American young adults: a 25-year follow-up study. *Eur J Nutr.* 2016 Jun;55(4):1707-16.

⁸ Hu FB, et al. Fish and long-chain omega-3 fatty acid intake and risk of coronary heart disease and total mortality in diabetic women. *Circulation.* 2003 Apr 15;107(14):1852-7.

⁹ Harris WS, Del Gobbo L, Tintle NL. The Omega-3 Index and relative risk for coronary heart disease mortality: Estimation from 10 cohort studies. *Atherosclerosis.* 2017 Jul;262:51-54.

¹⁰ Kim H, et al. Association between fish and shellfish, and omega-3 PUFAs intake and CVD risk factors in middle-aged female patients with type 2 diabetes. *Nutr Res Pract.* 2015 Oct;9(5):496-502.

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Seafood for Life

A DIVE INTO HEALTHY AGING

Regular fish consumption is associated with significantly greater longevity and improved quality of life as we age, according to an NIH-AARP study.³

Seafood consumption is associated with lower risk for:

Women

- 38% lower Alzheimer's disease mortality
- 10% lower heart disease mortality
- 8% lower total mortality

Men

- 37% lower chronic liver disease mortality
- 20% lower respiratory disease mortality
- 10% lower heart disease mortality
- 6% lower cancer mortality
- 9% lower total mortality

This study, which followed 421,309 American seniors for 16 years, found even modest consumption of fish, around 1-2 servings per week, was associated with significant reductions in risk for death by cardiovascular, respiratory, liver and cancer diseases. While eating all fish is healthful, the greatest impact on long-term health was found with eating non-fried fish.



As we age, it's important to keep our bodies and our brains nourished and strong. Seafood can play a central role in aging with good health. Lean protein, healthy fats, and the vitamins and minerals naturally occurring in fish all provide valuable nutrients our bodies need. **Research shows people who regularly consume fish live an average of 2.2 years longer than those who don't eat fish.¹**

- **Eating fish is associated with better brain health and better cognitive function as we age.** A 2019 analysis showed 60-80 year olds who consumed, on average, at least 250 mg of omega-3s per week from seafood (about 2-3 servings) scored significantly better on three indicators of cognitive health.²
- A recent meta-analysis, which assessed 27,000 people, found that eating fish regularly was associated with a 20% lower risk for Alzheimer's type dementia. Specifically, adding a 3.5 ounce serving of fish per week was associated with an additional 12% reduction in risk for Alzheimer's type dementia.^{3,4} **People who eat fish are also less likely to experience depression.^{5,6}**
- **Eating fish may help you stay biologically younger.** A genetic marker of biological age (telomeres), which combines both genetic factors and environmental stressors, indicates that mature adults who consume more omega-3 fats are younger and have healthier hearts than those who do not consume much omega-3 in their diets.^{7,8}
- Once we reach middle-age, muscle mass declines and is associated with a higher risk of falling, disability, longer hospital stays and the inability to carry out routine activities in older age. **Healthy intake of lean protein, omega-3s, calcium and vitamin D as found in fish can help maintain muscle strength, prevent muscle loss and reduce our risk of falling as we age.^{9,10,11}** One study of seniors using approximately 3 grams of EPA and DHA omega-3s from fish oil per day showed significant increase in muscle mass and muscle strength.¹²
- The documented life-long health benefits from regularly eating fish are expanding. For example, eating seafood is associated with less risk for Metabolic Syndrome, dry eyes and non-alcoholic fatty liver.^{13,14,15}

MEDITERRANEAN TUNA SANDWICH

Recipe by Chicken of the Sea®

For over 100 years, Chicken of the Sea® has brought you the freshest, best-tasting seafood the oceans have to offer.

Servings: 1
Total Time: 7 minutes

INGREDIENTS:

- 1 (2.5 ounce) pouch Chicken of the Sea® Albacore or Light Tuna
- 2 dried apricots, diced
- 5 Kalamata olives, diced
- 3 Tbsp. cucumber, finely diced
- 3 Tbsp. parsley, finely chopped
- 3 Tbsp. red onion, chopped
- 2 Tbsp. plain Greek yogurt
- Juice of 1 lemon
- ⅛ tsp. salt
- ¼ tsp. fresh ground pepper
- 2 slices whole grain bread, toasted

INSTRUCTIONS:

1. In a large bowl, mix together tuna, apricots, olives, cucumber, parsley, onion, yogurt, lemon juice, salt and pepper.
2. Stir to mix well. Serve between two slices of toasted bread.

TIP Make a big batch of this recipe and have on hand for family meals, or to make quick lunches throughout the week.



BUDGET-FRIENDLY SEAFOOD

Delicious seafood comes at all price points. Eating more seafood doesn't have to be expensive. Some quick tips to find a great deal:

- **Check seasonality** – for example, fresh Alaskan salmon is cheaper in early summer when the fish are running. (Farmed seafood is available yearround.)
- Many **sustainable species** can be found at great deals – look for flounder, perch, tuna and Pacific or Alaskan cod, pollock and rockfish, for example.
- **Buy in bulk and freeze.** Fresh and frozen seafood often come in “family pack” size – just freeze fresh fish within a couple days.
- **Check the weekly sales and clip coupons** – or seek out digital coupons on apps such as Ibotta – to save.

¹ Mozaffarian D, et al. Plasma phospholipid long-chain omega-3 fatty acids and total and cause-specific mortality in older adults: A cohort study. *Ann Intern Med* 2013;158(7):515-525.

² Nielsen S.J. Omega 3 Fatty Acid Consumption from Seafood and Cognitive Functioning, 2011-2014. *Curr Dev Nutr* 2019;3(S1).

³ Zeng L-F, et al. An exploration of the role of a fish-oriented diet in cognitive decline: a systematic review of the literature. *Oncotarget* 2017;8(24):39877-39895

⁴ Muldoon MF, et al. Serum phospholipid docosahexaenoic acid is associated with cognitive functioning during middle adulthood. *J of Nutrition* 2010; 140: 848-853

⁵ Sanchez-Villegas A, et al. Seafood Consumption, Omega-3 Fatty Acids Intake, and Life-Time Prevalence of Depression in the PREDIMED-Plus Trial. *Nutrients* 2018;10(12). pii: E2000.

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⁷ Farzaneh-Far R, et al. Association of marine omega-3 fatty acid levels with telomeric aging in patients with coronary heart disease. *JAMA*, 2010;303(3):250-257.

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¹⁴ Miljanovic B, et al. *Am J Clin Nutr*. 2005;82(4):887-893.

¹⁵ George ES, et al. Practical dietary recommendations for the prevention and management of nonalcoholic fatty liver disease in adults. *Advances in Nutr*, 2018;9(1):30-40.

Fuel Your Fitness

A DIVE INTO SEAFOOD FOR SPORTS NUTRITION

Just like a car, the fuel you put into your body impacts the performance you get out of it. This statement is true for everyone, but especially for athletes who put added stress on their bodies and demand more fuel. All the evidence shows diet impacts training, performance, and recovery.

The International Society of Sports Nutrition lists fish as one of the best sources of high-quality protein for athletes.¹ Fish provides a host of nutrients, including lean protein, essential fats, vitamins and minerals, such as calcium, magnesium, zinc, iron, and vitamins A and D – each of which have been shown to be low in competitive athletes.^{2,3,4}

Including fish and seafood in your training regimen is a nutrient-dense, tasty, and calorie-efficient choice to fuel performance, endurance, and recovery.



Magnesium, zinc, and omega-3s EPA and DHA play important roles in healthy nerve and muscle function, immune function, normal heart rhythm and blood pressure.^{4,5,6,7} The omega-3s found in fish perform highly unique functions in cells and cell membranes where they reside – helping to manage heart rate, circulation, metabolism, muscle contraction, nerve function, inflammation, body temperature, and more.^{8,9} Potassium is an important electrolyte that's necessary for proper muscle contraction and maintaining fluid balance in the body.

- **EPA and DHA omega-3s are beneficial for good circulation and heart rate.**¹⁰ Placebo-controlled trials have shown more efficient heart rate and utilization of oxygen among trained cyclists who consumed fish oil¹¹ and stronger cardiovascular function in professional football players.¹²
- **Improved lung function both during and after exercise** was reported in a study of young, healthy wrestlers who took 1 gram of EPA and DHA.¹³ And significant reductions in exercise-induced bronchoconstriction (EIB) have been shown in elite athletes and in those with asthma when they consumed high amounts of EPA and DHA fish oil.^{14,15}
- Studies report that 2 grams or more daily of EPA and DHA **reduce exercise-induced post-exercise muscle soreness and speed recovery.**^{7,16,17}
- **Better reaction time and decision making** was reported in female soccer players who consumed more DHA.¹⁸
- An estimated 1.6 to 3.8 million sports-related concussions occur per year in the United States.¹⁹ Evidence shows the protective benefits of DHA, which makes up about 10% to 15% of the total fat in the brain.²⁰ A study in American football players found 2 grams of **DHA protected brain health.**^{21,22}

TIPS TO UP YOUR SEAFOOD GAME

Eating protein throughout the day – not just at dinner – is the best way to help your muscles repair, recover and rebuild.

- For **breakfast**, add canned tuna, salmon or sardines to an omelet or frittata, or top eggs or toast with smoked salmon.
- Seafood has great **snacking** potential – pair fish jerky with fresh fruit, or open a single-serve container of flavored tuna.

BLACKENED WHITE FISH

Recipe by Chef Barton Seaver

Servings: 4
Prep Time: 20 minutes
Cook Time: 5 minutes
Total Time: 25 minutes

INGREDIENTS:

- 4-5 oz. Alaska pollock or other white fish fillets
- Kosher salt
- 1 Tbsp. sweet or smoked sweet paprika
- 1 Tbsp. freshly cracked black pepper
- 1 tsp. onion powder
- 1 tsp. garlic powder or garlic salt
- 1 tsp. dried, crushed thyme or rosemary
- Pinch of cayenne pepper
- 4 Tbsp. unsalted butter, melted
- 4 Tbsp. olive oil
- 1 cup loosely packed fresh herb leaves (such as parsley, mint, chervil)
- Lemon wedges for serving



INSTRUCTIONS:

1. Lightly season fish with salt and let sit 20 minutes.
2. Meanwhile, mix all spices and dried herbs in a wide, flat bowl.
3. Heat a large cast iron skillet or heavy-bottomed sauté pan over high heat until it is screaming hot.
4. Combine butter and oil in a small bowl and dip each fillet so it barely glistens on all sides.
5. Dredge each fillet in the spice mix, coating them evenly.
6. Place coated fillets in the pan and drizzle about 1 teaspoon of the butter/oil mixture over each fillet. Cook fillets undisturbed for 2 minutes before turning them to cook for another 2-3 minutes. The spices will have formed a colorful crust ranging from sunset red to midnight black. The fish is done when it flakes apart under gentle pressure of your finger.
7. Transfer fillets to serving plates, scatter with fresh herbs and garnish with lemon wedges.

TIP Any white-flesh fish with relatively thin fillets like Acadia redbfish, barramundi, catfish, perch, snapper, or tilapia would be perfect partners to the bold flavors of this blackened spice blend.

¹ Kerkick CM, et al. ISSN exercise & sports nutrition review update: research & recommendations. J Int Soc Sports Nutr 2018;15(1):38.

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⁵ Volpe SL. Magnesium and the Athlete. Curr Sports Med Rep 2015;14(4):279-283.

⁶ Ochi E, Tsuchiya Y. Eicosapentaenoic Acid (EPA) and Docosahexaenoic Acid (DHA) in Muscle Damage and Function. Nutrients 2018;10(5).pii:E552.

⁷ Sikora-Klak J, et al. The Effect of Abnormal Vitamin D Levels in Athletes. Perm J 2018;22:17-216.

⁸ Gammone MA, et al. Omega-3 Polyunsaturated Fatty Acids: Benefits and Endpoints in Sport. Nutrients 2018;11: doi: 10.3390/nu11010046.

⁹ Simopoulos AP. Omega-3 fatty acids and athletes. Current Sports Medicine Reports 2007;6:230-236.

¹⁰ Mozaffarian D, et al. Effect of fish oil on heart rate in humans. Circulation 2005;112:1945-1952.

¹¹ Peoples GE, et al. Fish oil reduces heart rate and oxygen consumption during exercise. J Cardiovasc Pharmacol 2008;52(6):540-547.

¹² Buckley JD, et al. Effects of omega-3 polyunsaturated fatty acids on cardiovascular risk, exercise performance and recovery in Australian Football League players. Asia Pac J Clin Nutr 2005;14:S57.

¹³ Tartibian B, Maleki BH, Abbasi A. The effects of omega-3 supplementation on pulmonary function of young wrestlers during intensive training. J Science and Medicine in Sport 2010;13:281-286.

¹⁴ Mickleborough TD, et al. Protective effect of fish oil supplementation on exercise-induced bronchoconstriction in asthma. Chest 2006;129(1):39-49.

¹⁵ Mickleborough TD, et al. Fish oil supplementation reduces severity of exercise-induced bronchoconstriction in elite athletes. Am J Resp Clin Care Med 2003;168:1181-1189.

¹⁶ Black KE, et al. Adding omega-3 fatty acids to a protein-based supplement during pre-season training results in reduced muscle soreness and the better maintenance of explosive power in professional Rugby Union players. Eur J Sport Sci 2018;9:1-11.

¹⁷ Corder KE, et al. Effects of Short-Term Docosahexaenoic Acid Supplementation on Markers of Inflammation after Eccentric Strength Exercise in Women. J Sports Sci Med 2016;15(1):176-183.

¹⁸ Guzman JF, Esteve H, et al. DHA-Rich Fish Oil Improves Complex Reaction Time in Female Elite Soccer Players. J Sports Sci Med 2011;10(2):301-305.

¹⁹ Hobbs JG, Young JS, Bailes JE. Sports-related concussions: diagnosis, complications, and current management strategies. Neurosurg Focus 2016;40(4):E5.

²⁰ Carver JD, Benford VJ, Han B, Cantor AB. The relationship between age and the fatty acid composition of cerebral cortex and erythrocytes in human subjects. Brain Res Bull 2001;56(2):79-85.

²¹ Oliver JM, et al. Effect of Docosahexaenoic Acid on a Biomarker of Head Trauma in American Football. Med Sci Sports Exerc 2016;48(6):974-982.

²² Oliver JM, et al. Serum Neurofilament Light in American Football Athletes over the Course of a Season. J Neurotrauma 2016;33(19):1784-1789.

Seafood Brings Families Together

Helping families be healthier and happier with quick, easy seafood meals



OCTOBER IS NATIONAL SEAFOOD MONTH

FOR NATIONAL SEAFOOD MONTH IN OCTOBER – AND THROUGHOUT THE YEAR – WE ARE BRINGING THE FOCUS BACK TO FAMILY.

Magic happens during family mealtime when children and parents gather around the table and engage each other in conversation. Family meals eaten at home have been proven to benefit the health of children, to fight obesity and substance abuse, and to make families stronger — creating a positive impact on our communities and our nation.

Join us as we work collaboratively with health partners, seafood companies, retailers and dietitians from across the country to bring families back to the table.

Seafood Nutrition Partnership is partnering with the Food Marketing Institute Foundation to emphasize the importance of family meals, expanding National Family Meals Month throughout the year and into a true movement — the Family Meals Movement.

For more information and ways to participate in October National Seafood Month, please see our Partner Toolkit at seafoodnutrition.org/family and Retail Toolkit at seafoodnutrition.org/retail.

THE IMPORTANCE OF FAMILY MEALS

Researchers and health experts endorse and promote the lifelong benefits of family meals. When adding seafood to your family meals, everyone can benefit from the nutrition it provides. Not only that, it's super easy to make and with its many species, you can find something the entire family will enjoy. Numerous studies show that home-cooked meals nourish the spirit, brain and health of all family members. Bringing seafood to your table brings unity to the entire family.



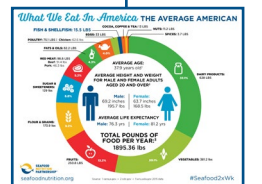
Additional Resources

Seafood Nutrition Partnership is an independent nonprofit grounded in science and guided by respected researchers, healthcare professionals, and academics, with a mission to create a healthier America through consumption of seafood. SNP addresses the biggest barriers to eating seafood — a lack of confidence in knowing how to select, prepare and eat seafood — to encourage more Americans to consume fish, shellfish and omega-3s as part of a balanced diet.

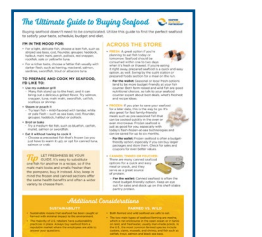
SNP offers free materials that emphasize fish and shellfish at all price points, ease of cooking, and culturally relevant recipes — many of which feed a family of four for less than \$10 and can be made in less than 15 minutes.

RESOURCES & INFOGRAPHICS

- Which Fish is Richest in Omega-3 Chart
- What We Eat in America
- The Ultimate Guide to Making Smart Seafood Choices
- How to Buy Sustainable Seafood
- All the Reasons You Need to Eat Seafood
- The Ultimate Guide to Buying Seafood
- The Ultimate Guide to Cooking Seafood
- Tour Talking Tips & Three Steps to the Best Demo
- Guide to Answering Customers Questions
- Benefits of Different Species



Feel free to share our resources with your stakeholders.



FOLLOW US, TAG US! @Seafood4Health



WHICH FISH IS THE RICHEST IN OMEGA-3s? (PER 4 OUNCE COOKED PORTION)

Studies show omega-3s can reduce risk of heart disease, depression, dementia and arthritis, and improve overall happiness. Prominent health organizations suggest eating a variety of seafood at least twice a week, aiming to consume an average of 250 to 500 milligrams of omega-3s EPA and DHA per day.

> 1,000 milligrams



Anchovies
Herring
Mackerel
(Atlantic & Pacific)
Oysters (Pacific)
Sablefish (Black Cod)
Salmon
(Atlantic, Chinook,
Coho)
Sardines
(Atlantic & Pacific)
Swordfish
Trout

500 - 1,000 milligrams



Alaskan Pollock
Barramundi
Crab
Mussels
Salmon (Chum,
Pink & Sockeye)
Sea Bass
Squid
Tilefish
Tuna (Albacore)
Walleye

250 - 500 milligrams



Catfish
Clams
Flounder/Sole
Grouper
Halibut
Mackerel (King)
Oysters (Eastern)
Perch
Rockfish
Snapper
Tuna
(Skipjack, canned)

< 250 milligrams



Cod
Crayfish
Haddock
Lobsters
Mahi Mahi
Shrimp
Scallops
Tilapia
Tuna (Yellowfin)

Source: U.S. Department of Agriculture, FoodData Central at fdc.nal.usda.gov

If you are not able to meet the omega-3 recommendation from seafood
then consider supplementing with omega-3 EPA + DHA capsules.



**SEAFOOD
NUTRITION
PARTNERSHIP®**

seafoodnutrition.org