COMPLIMENTARY LIVE WEBINAR

# Diving into Into the Power of Blue Foods As as Medicine

FOOD + PLANET

**PRESENTED BY**

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EARN 1 CEU FREE

## September 28, 2023
## 2-3pm ET

*Diving Into the Power of Blue Foods as Medicine awards 1.0 CPEU in accordance with the Commission on Dietetic Regitration's CPEU Prior Approval Program.*

# Disclosures

The faculty for this event have no relevant financial relationship(s) to disclose.

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# Accreditation Statement

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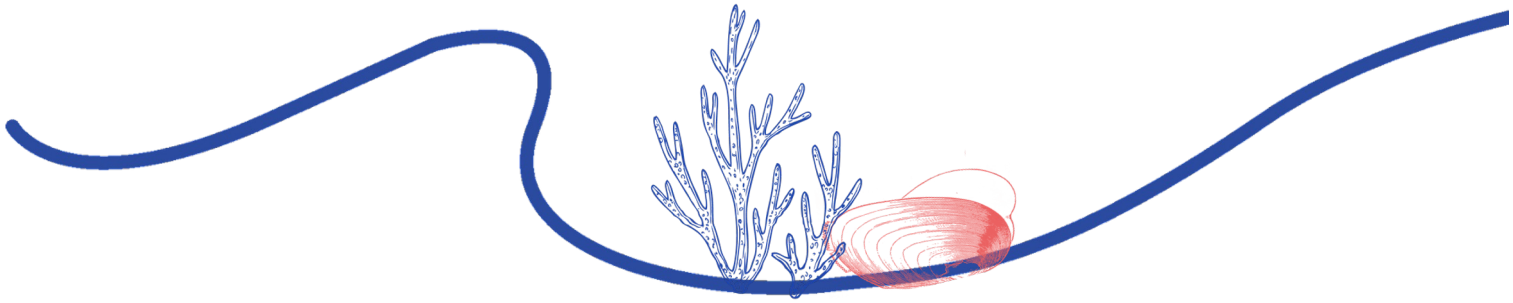
# Learning Objectives



## 1.

Define **blue foods** and why the concept is gaining significant global attention in public health and sustainable diets.

## 2.

Describe how blue foods fit into the **four dimensions of sustainable diets.**

## 3.

Explain **three ways** blue foods can be as incorporated into a **food as medicine approach,** including underutilized blue foods such as bivalves and sea vegetables.

## 4.

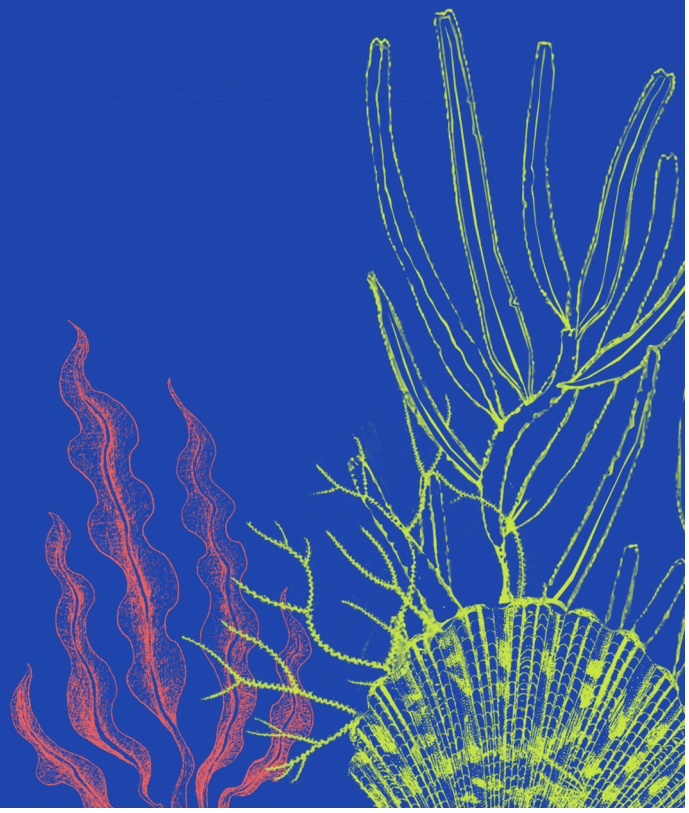
Explain how to choose **sustainably sourced** blue foods, the different forms and varieties available, and what to look for on labels.

## 5.

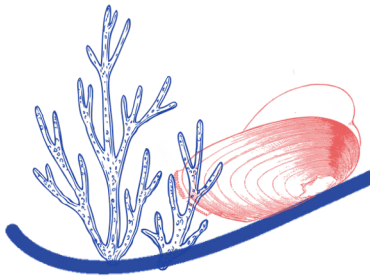
Strategize actionable ways practitioners can integrate **sustainable blue food concepts across populations.**

# Part 1
# What are Blue Foods?

Kate Geagan, MS, RDN

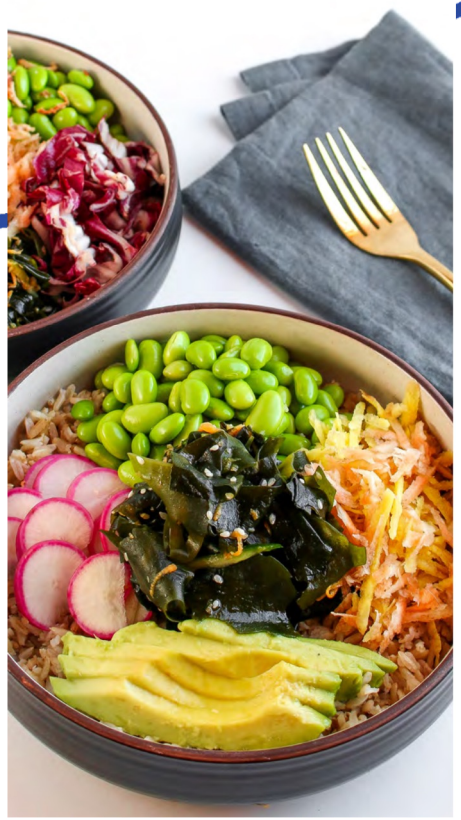


# What Are Blue Foods?



**Blue foods are foods produced from a diverse range of aquatic animals, plants, or algae that are caught or cultivated in freshwater or marine environments.**

Long enjoyed by many cultures as traditional foods and medicine, and a cornerstone of our global food system, **blue foods also sit at the moden nexus** of **culinary innovation** and **sustainability**.

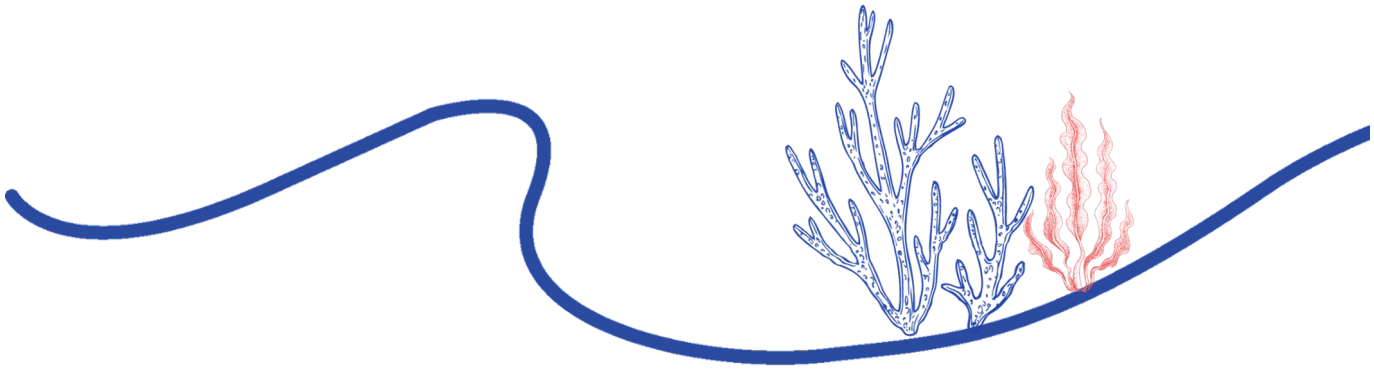


Sea Vegetable Grain Bowl

Photo Credit: Sherene Chou

Blue Food Assessment, 2021 https://bluefood.earth/

# Another Term for Blue Foods is Aquatic Foods



**Aquatic foods are defined as animals, plants and microorganisms, as well as cell- and plant-based foods of aquatic origin emerging from new technologies.**

**Aquatic foods can be farmed or wild-caught,** and are sourced from **inland** (for example, lakes, rivers and wetlands), **coastal** (estuaries, mangroves and near-shore) and marine waters, producing a diversity of foods across all seasons and geographic regions.

**Aquatic animal**
(mammals, insects and sea cucumbers)

**Crustaceans**
Crabs and shrimp

**Cephalopods**
Octopus and squids

**Finfish**
Herring, sardine, mackerel, bonito, mahi-mahi, tuna, swordfish, trout and salmon, pollock

**Aquatic plants**
Water spinach; Ipomoea aquatica

**Other molluscs**
Clams, cockles and sea snails

**Algae**
Seaweed

*Nature*, 2021. https://www.nature.com/articles/s41586-021-03

“Discussions of the food system tend to center on agriculture and land, crops and livestock. That framing shunts blue foods to the margins. **Game-changing opportunities are lost.** A first step is to **ensure that food issues are framed in terms that embrace the potential of blue foods** – in terms of food production instead of agriculture, of lands and waters instead of lands, of fish and seaweed as well as livestock and crops.”

UN Department of Social and Economic Affairs; May 5, 2021 “Sustainable Blue Foods are Vital to Global Food Security” sdgs.un.org/news/sustainable-blue-foods-are-vital-global-food-security-33148.

# Why Do Blue Foods Matter Now?

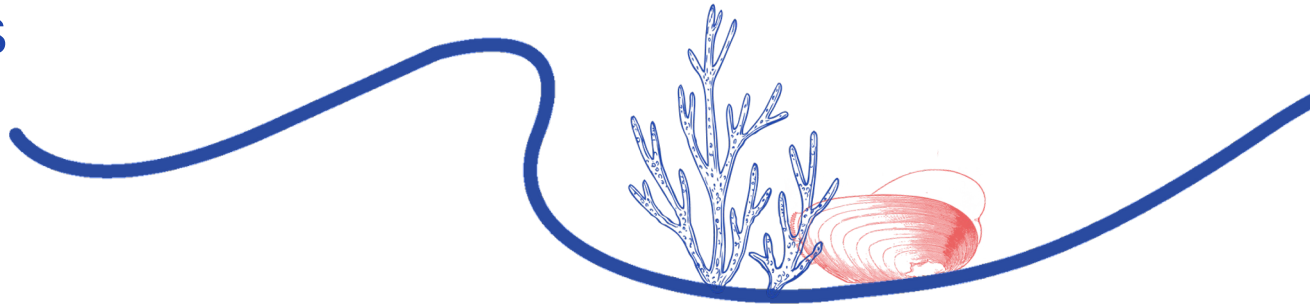
Recently Blue Foods have been highlighted in several landmark reports **as having an essential role to play in creating a more healthy, diversified, equitable, and sustainable food future.**

For decades, blue foods have been largely overlooked or undervalued in global food system assessments for several reasons:

1. Much of the sustainable food systems emphasis has focused on terrestrial agriculture and livestock.
2. Very little federal appropriations (such as the farm bill) addresses supports for sustainable fishing/aquaculture, further exacerbating “disparities” between terrestrial and aquatic sectors.
3. The topic of “seafood” has historically focused on relatively few species, and emphasized energy/protein content, masking the rich diversity of species, and micronutrients.


Image adapted from FAO. 2022. Blue Transformation - Roadmap 2022–2030: A vision for FAO’s work on aquatic food systems. Rome. https://doi.org/10.4060/cc0459en.

# Why Are Blue Foods Gaining Worldwide Attention?



## Nutrient-Density

A rich source of essential micronutrients such as **omega-3 fats (DHA+ EPA), vitamins A, D and B 12,** as well as healthy **high-quality protein**, blue foods hold untapped potential to meet nutritional needs and close nutrient gaps across the lifespan for vulnerable populations, **including pregnant and lactating women, children and the elderly**. Diet patterns including blue foods are associated with reduction in heart disease and other NCDs. Blue foods can be powerful tools for public health.

## Food Equity & Security

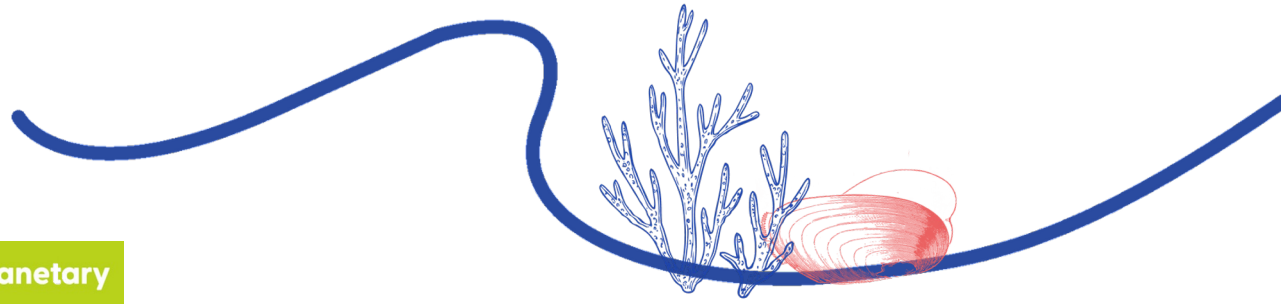
A **highly diversified food group** of **over 3,000 edible species**, blue foods supply critical nutrients and high quality calories that are **affordable** and **culturally relevant** for many diverse populations. Hundreds of millions of people worldwide derive their economic security from working in small scale fisheries, (including women and Indigenous communities) **diversifying incomes, preserving livelihoods and enhancing local resilience.**

## Sustainability

Blue foods play an **essential role in a healthy and resilient planet**. While blue foods vary in their environmental footprint, many species, such as sea vegetables, clams, mussels and oysters, are **nutrient-dense with low environmental impacts**, and can **improve and restore ecosystems** by enhancing water quality and improving habitat. As such, blue foods offer an important tool to boost nature-positive and sustainable food production.

FAO, 2022. doi.org/10.4060/cc0459e

# Blue Foods and Sustainable Diets



## Sociocultural

- A rich variety of blue foods are culturally relevant and play a role in traditional diets and medicine.
- Production can support Indigenous, small scale, local producers.
- Blue foods' versatility offers abundant opportunity to explore delicious diverse flavors and culinary applications.

## Economic

- Many Americans already enjoy diverse options prepared in culturally appropriate, affordable formats
- Sustainable practices can support long term economic viability for producers and boost community resilience.
- Affordable formats such as canned, dried or frozen support access, affordability + convenience.

## Planetary

- Blue foods, such as bivalves and sea vegetables, can improve water quality and provide habitat.
- Well managed production and harvest of blue foods can support human health and planetary health.
- Replacing more carbon-intensive animal food sources with blue foods can reduce climate impact of diets.

## Nutrition

- Blue foods are an essential protein source for over 3 billion people.
- Blue foods are rich in micronutrients and essential fatty acids, helping close nutrient gaps.
- Blue foods are prominently featured in a variety of dietary guidelines and food as medicine frameworks.

# What is Food as Medicine?

**Food as Medicine is a philosophy where food and nutrition aid individuals through intervention that supports health and wellness.**

Food as Medicine is **a reaffirmation** that food and nutrition play a role **in sustaining health, preventing disease,** and as **a therapy for those with conditions or in situations responsive to changes in their diet.**

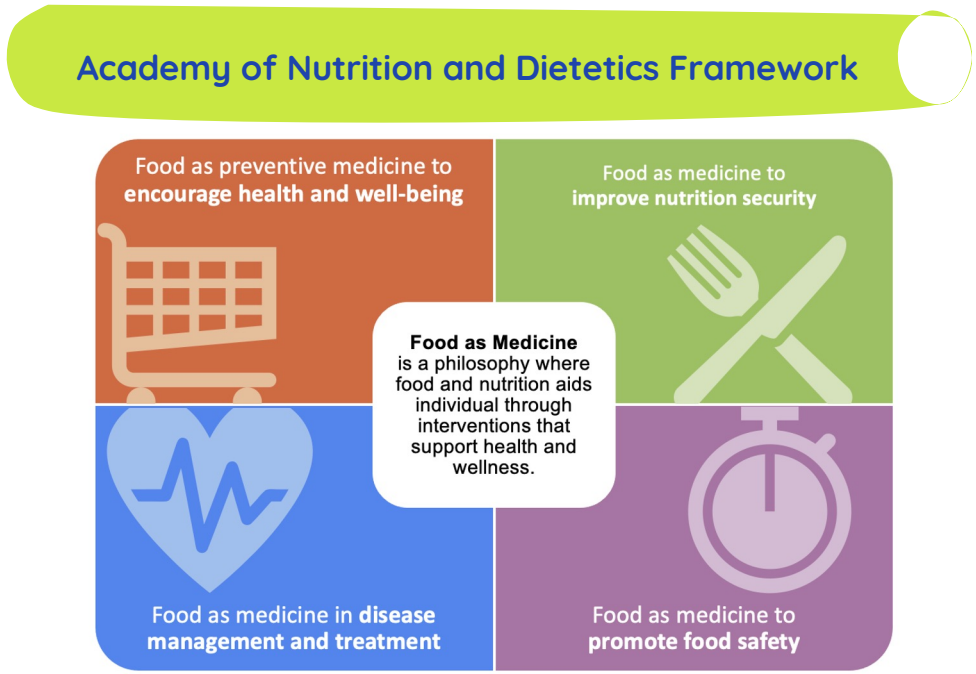
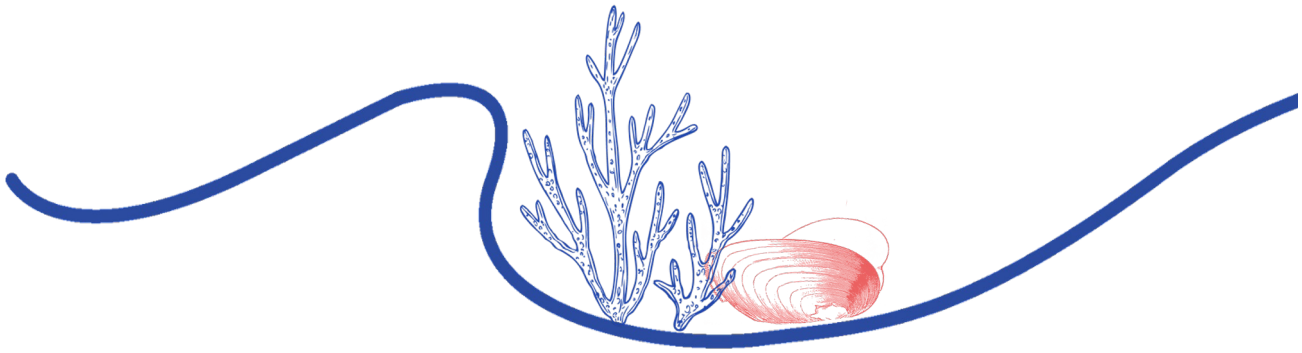
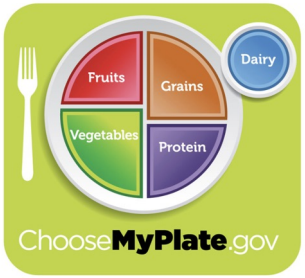



Image adapted from J Acad Nutr Diet. 2021, BMJ. 2020.

# Blue Foods in a Food as Medicine Framework

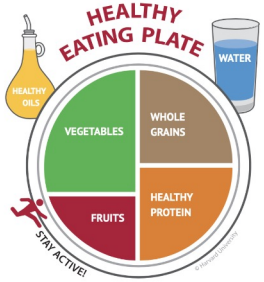





## "Protein"

- **Eat fish and seafood 8 oz/week**
- Pregnancy: 8-12 oz/week
- Dairy: Canned **sardines**, canned **salmon** w/bones listed as nutrient-dense, calcium + vitamin D
- Vegetables: **Seaweed**

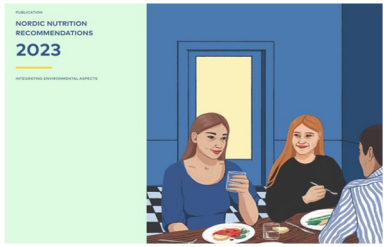
USDA DGA, 2020




## "Healthy Protein"

- Choose **fish**, poultry, beans and nuts; limit red meat and cheese; avoid bacon, cold cuts and other processed meats.



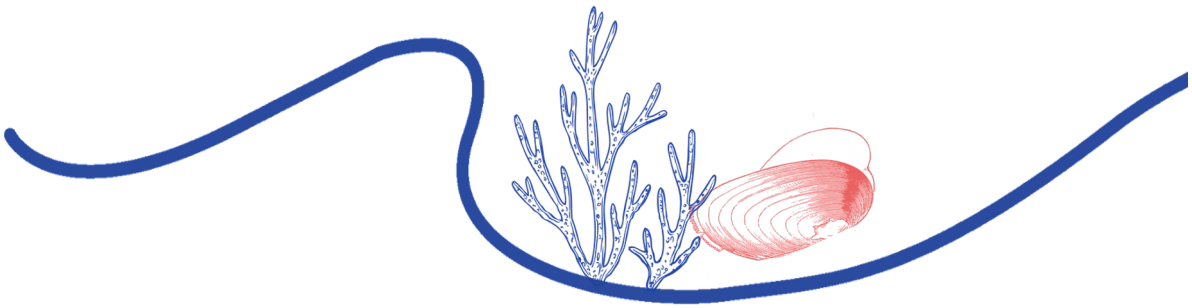



## "Healthy Sustainable Protein"

- It's recommended to have 300-450 g/week of **fish and seafood**, of which >200 g should be **fatty fish**.
- It is recommended to consume fish from sustainably managed stocks.

NNR, 2023

# Incorporating Blue Foods Into a Food as Medicine Framework



## AHA/ACC Primary Prevention Recommendations

"All adults should consume a healthy diet that **emphasizes the intake of** vegetables, fruits, nuts, whole grains, lean vegetable or animal protein, and **fish** and minimizes the intake of trans fats, red meat and processed red meat, refined carbohydrates and sweetened beverages."

## American Diabetes Association

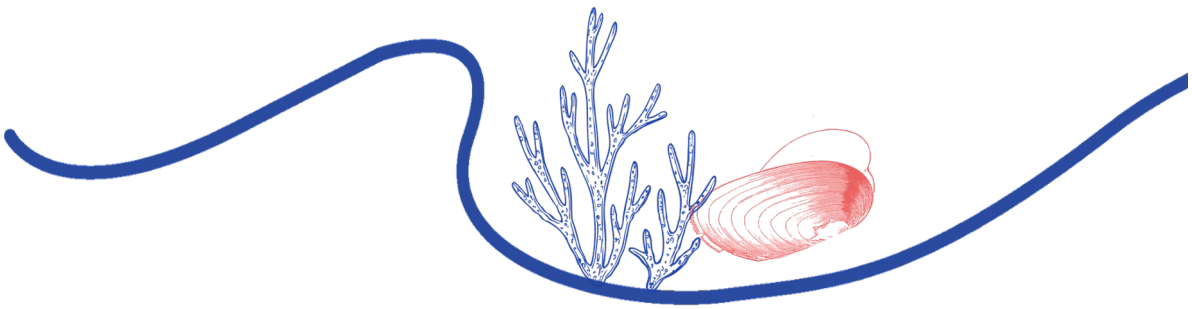
ADA 2023 Standards of Medical Care in Diabetes **recommends eating fish (especially fatty fish)** twice per week, and lists fatty fish as a **"superstar food good for diabetes."**

## American Psychiatric Association

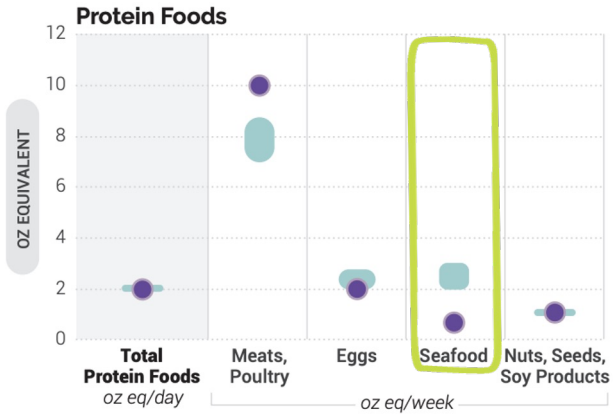
The APA has endorsed **fatty fish as an effective part of depression treatment,** and recommends Americans consume fish 2x/week, **especially fatty fish.**

Circulation, 2019. https://www.ahajournals.org/doi/10.1161/CIR.0000000000000678. Diabetes Care, 2023. https://diabetesjournals.org/care/issue/46/Supplement_1
J Clin Psychiatry, 2006. https://pubmed.ncbi.nlm.nih.gov/17194275/

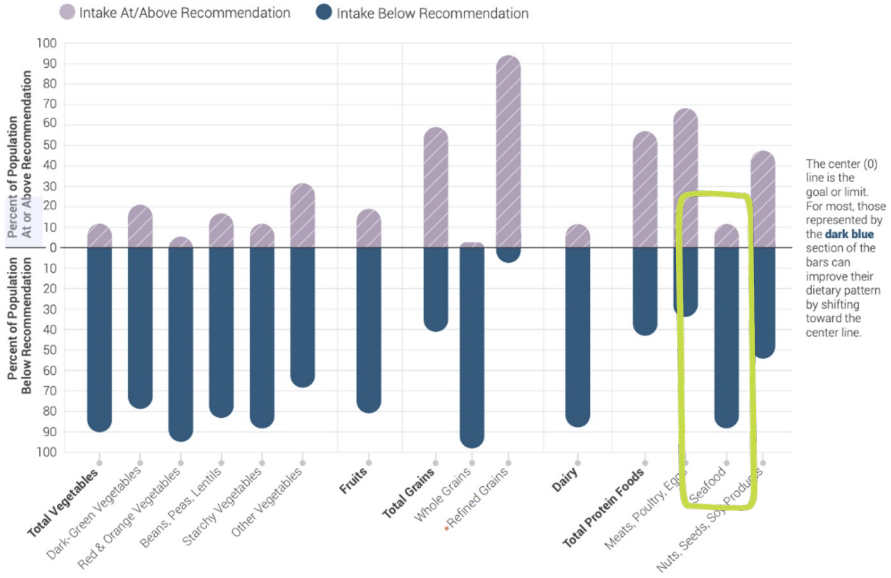
# Current US Intakes Fall Short in All Age Groups



**Average Intake Compared to Recommended Intake Ranges: Ages 12-23 Months**

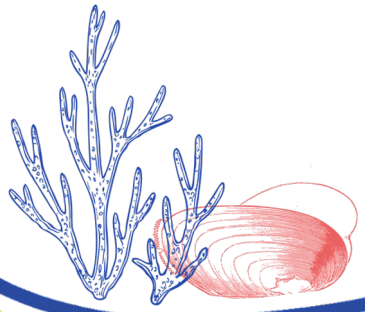



**Dietary Intakes Compared to Recommendations: Percent of the U.S. Population Ages 1 and Older Who are Below and At or Above Each Dietary Goal**

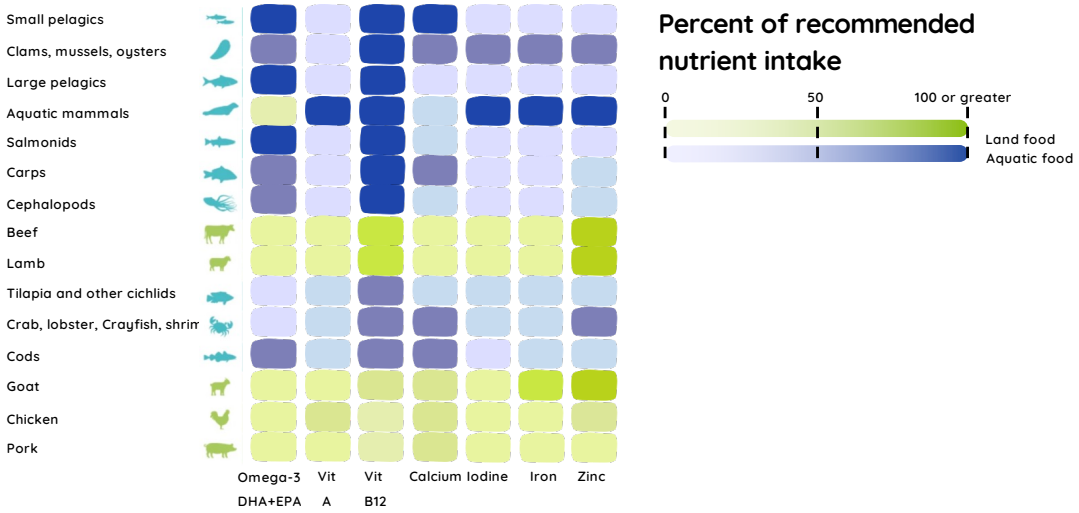



USDA DGA, 2020.

# Nutritional Significance of Blue Foods



**Nutrient diversity of aquatic animal-source foods in relation to terrestrial animal-sources foods (Blue Foods Assessment).**




## Blue foods' positive effect on health: 3 key pathways identified

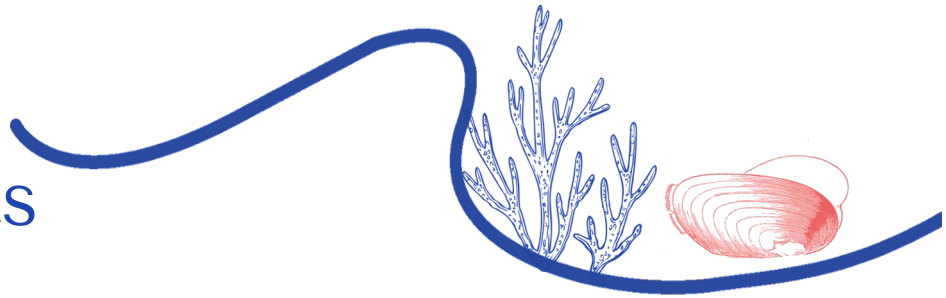
1. **Reduce** micronutrient deficiencies (i.e., iodine, iron, calcium)
2. **Provide** DHA+EPA (improve cardiovascular, brain, and eye health, protect against cancer)
3. **Displace** consumption of other animal proteins (i.e., processed meats, red meat), which may reduce incidence of NCDs.


Image adapted from Nature, 2021. https://doi.org/10.1038/s41586-021-03917-1

N. Engl. J. Med. 2019. https://www.nejm.org/doi/full/10.1056/NEJMoa1811403

Eur. J. Clin. Nutr. 2015. https://pubmed.ncbi.nlm.nih.gov/25969396/

# Blue Foods Deliver Key Nutrients and Micronutrients



## Long Chain Omega-3 Fats

Mainly found in fish and seafood, these fatty acids are essential for optimal brain development

Demonstrated benefits in pregnancy, nursing and lactation - **Verbal, motor, visual skill, and development** Average increase of 7.7 IQ points 2x/week consumption

Demonstrated benefits to mental health - **20% reduction in depression and anxiety in regular seafood eaters**

## Iodine

Seafood is in practice the only natural source of this crucial nutrient, Iodine serves several purposes like aiding thyroid function. It is also essential for neurodevelopment

Demonstrated benefits to thyroid function. Essential for T3, T4 production (metabolism & energy pathways)

Adequacy for healthy growth and development in pregnancy

## Calcium, Zinc, Other Minerals

Diet without dairy product often lack calcium and zinc deficiency slows a child's development

## Iron

During pregnancy, iron intake is crucial so that the mother can produce additional blood for herself and the baby

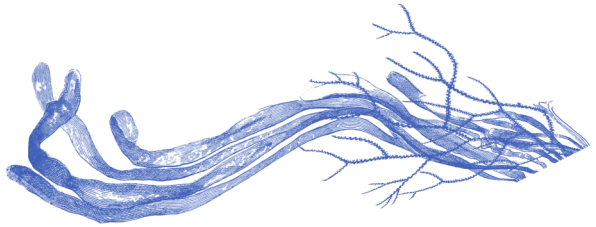
## Vitamin D

Another nutrient crucial for mental development, this vitamin also regulates the immune system function and is essential for bone health

USDA Dietary Guidelines: A Nutrient of Concern

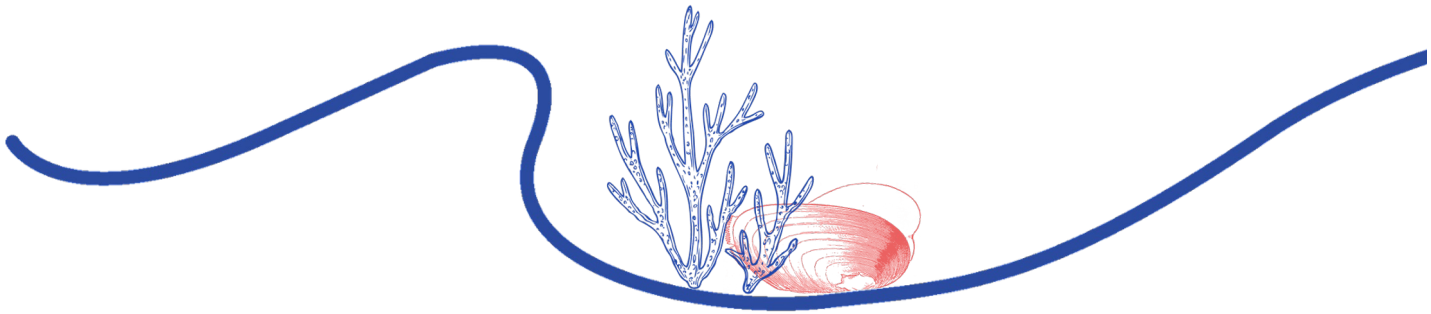
## Additional Nutrients

Vitamin B 12
Vitamin E
Selenium




FAO. 2022. Blue Transformation - Roadmap 2022–2030: A vision for FAO's work on aquatic food systems. Rome. https://doi.org/10.4060/cc0459en.
J Epidemiol Comm Health, 2016. https://pubmed.ncbi.nlm.nih.gov/26359502/
J Affect Disord, 2016. https://pubmed.ncbi.nlm.nih.gov/27544316/
PLEFA, 2019 https://pubmed.ncbi.nlm.nih.gov/31739098/
USDA DGA, 2020.
Biol Trace Elem Res, 2019. https://doi.org/10.1007/s12011-018-1606-5

# The Power of Blue Food Protein Swaps



## Nurses' Health Study and Health Professionals Follow-up Study

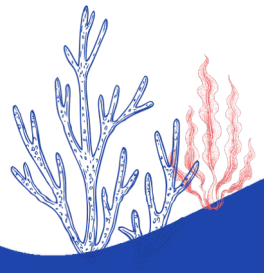
**Swapping fish for red meat shown to decrease risk of:**

1. All cause mortality (17%-25% risk reduction)
2. Cancer
3. Type 2 diabetes
4. Heart disease
5. Inflammation/oxidative stress

**Table 4** Statistical model-based hazard ratio (95% confidence intervals) for eight-year all-cause mortality associated with a decrease of one serving per day of red meat and a simultaneous increase of one serving per day of another major dietary protein source, whole grains, or vegetables over an eight year follow-up in Nurses' Health Study and Health Professionals Follow-up Study

| Mortality | Nuts | Poultry without skin | Fish | Dairy | Eggs | Legumes | Whole grains | Vegetables without legumes |
|---|---|---|---|---|---|---|---|---|
| Red meat | 0.81 (0.79 to 0.84) | 0.90 (0.86 to 0.95) | 0.83 (0.76 to 0.91) | 0.92 (0.86 to 0.99) | 0.92 (0.89 to 0.96) | 0.94 (0.90 to 0.99) | 0.88 (0.83 to 0.94) | 0.90 (0.87 to 0.93) |
| Processed meat | 0.74 (0.70 to 0.79 | 0.83 (0.78 to 0.90) | 0.75 (0.68 to 0.84) | 0.84 (0.76 to 0.92) | 0.83 (0.78 to 0.89) | 0.87 (0.81 to 0.94) | 0.80 (0.74 to 0.87) | 0.82 (0.77 to 0.88) |
| Unprocessed meat | 0.82 (0.79 to 0.86) | 0.90 (0.85 to 0.96) | 0.84 (0.77 to 0.93) | 0.94 (0.87 to 1.02) | 0.95 (0.90 to 0.99) | 0.95 (0.90 to 1.01) | 0.89 (0.83 to 0.96) | 0.92 (0.87 to 0.96) |

Image adapted from BMJ, 2019 https://www.bmj.com/content/365/bmj.l2110

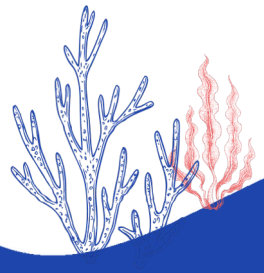


# Polling Question: Bivalves

**How often do you currently discuss bivalves**

**(i.e. clams, mussels, oysters and scallops) with your clients?**

a) Never or less than once a month
b) One to three times per month
c) Once per week
d) Two to four times per week
e) Not applicable



# Polling Question: Sea Vegetables

**How often do you currently discuss sea vegetables with your clients?**

a) Never or less than once a month
b) One to three times per month
c) Once per week
d) Two to four times per week
e) Not applicable

# Part 2
# Blue Foods as Medicine: Sea Vegetables

Sherene Chou, MS, RDN

# What Are Sea Vegetables?

- Also called **seaweeds, sea greens, sea plants, or "greens from the sea,"** sea vegetables are a vast, diverse group of edible marine algae and plants that grow in or near the ocean, as well as rivers and lakes.

- **Over 10,000 types of seaweeds exist** across our oceans, though just a handful of edible varieties reach our plates in the U.S. Traditionally hand-picked along rocky shores and calm waterways, 96% of sea vegetables are cultivated today. They come in red, brown and green varieties.

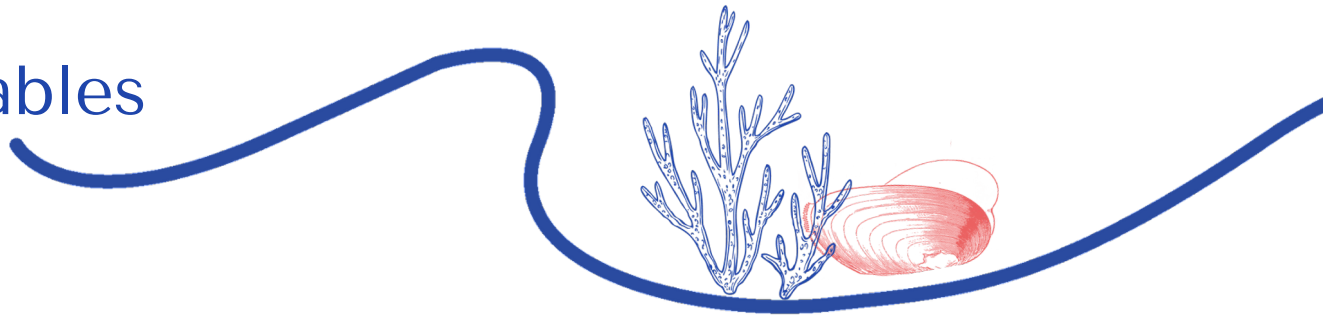
- **Producers across the U.S.**, including New England, Alaska, Washington, and California, grow many types of sea vegetables, such as dulse and kelp.

- Seaweed cultivation does not require arable land or freshwater and in most cases does not require fertilization, unlike land-based agriculture.

Photo Credit: Vanessa Stump
A rich variety of sea vegetables that are commonly consumed

Cherry P, O'Hara C, Magee PJ, McSorley EM, Allsopp PJ. Risks and benefits of consuming edible seaweeds. Nutr Rev. 2019 May 1;77(5):307-329. doi: 10.1093/nutrit/nuy066. PMID: 30840077; PMCID: PMC6551690.

# Why are Sea Vegetables Gaining Worldwide Attention?



## Nutrient-Density

Sea vegetables are among the **world's most nutrient-dense foods**, with archaeological evidence showing they have been used in both food and medicine for millennia in most coastal regions of the world.

Contains a variety of **23 essential nutrients**, including vitamin A, folate, omega-3 fatty acids (DHA/EPA), iron, iodine and magnesium.

Source: Food Climate League.

## Sustainability

Sea vegetables, rated as "Best Choice" by Monterey Bay Aquarium, are usually **grown without fossil fuel-based agricultural inputs**, like pesticides or fertilizers. They typically require **no land to produce high quality foods**, important as half of the planet's livable land is used for agriculture.

A responsible and restorative seaweed industry **plays a global role in food security, climate change mitigation, marine ecosystem restoration, job creation,** and regional resilience.

## Cultural Foods

Popular, **everyday foods** in several Asia countries, Japan, Korea, China, as well as Polynesia, and coastal communities in Scotland, Iceland, and France.

They are associated with health and longevity as a **staple ingredient** in the world-famous **"Blue Zone"** Okinawan and Mediterranean diet patterns.

# Common Varieties Available in the United States

## A Guide to the Wonderful World of Sea Vegetables

Learn more about the cultivation and qualities of commonly available sea vegetables.[3,4]

### What are Sea Vegetables?

Also called seaweeds, sea greens, sea plants, or "greens from the sea," sea vegetables are a vast, diverse group of edible marine algae and plants that grow in or near the ocean, as well as rivers and lakes.

### Dulse
**(Palmaria palmata)**

First harvested in Scotland and Iceland thousands of years ago; today grown in Northern Atlantic and Northern Pacific

Red (can be crimson, purple, or red-brown) seaweed with smooth fronds and palm-like shape of palmaria family. Provides a rich salty and savory flavor.

### Hijiki
**(Sargassum fusiforme)**

Harvested along rocky shorelines of China, Japan, and Korea

Leafy brown sea algae which is boiled and dried, giving an appearance of small black twigs. Delivers rich savory flavor with hints of earthy mushroom.

### Kelp
**(Alaria, Saccharina)**

Cultivated in waters of Pacific Northwest and shorelines of New England

Brown marine algae of which there are nearly 30 edible varieties including sugar, bull, winged, skinny, and ribbon kelp. Delivers rich umami flavor.

### Kombu
**(Laminaria)**

Traditionally, cultivated in Japan, also today in Northern Atlantic and along the coasts of Alaska and Washington

Mature brown algae that's a type of kelp. Typically available in dry, wide strips; rich in glutamic acids that give a deep umami flavor. Key flavor building ingredient in Japanese dashi (broth).

### Nori, Laver
**(Porphyra)**

Cultivated historically in East Asia, and recently in North Atlantic Ocean

Deep purplish-red algae, which turns dark green or brown after drying, toasting, and pressing into thin sheets; Sweet, mild nutty taste with savory notes.

### Ogonori, Sea Moss
**(Gracilaria)**

Many varieties across Canada, Maine, British Isles, East Asia, Caribbean, and Hawaii; cultivated in Hawaii, California, and Florida

Although not technically a "moss," this fluffy sea algae clings to rocks, growing just a few inches high. Fresh has a slightly salty flavor, while dried is the key ingredient in agar, used widely in Asian desserts and plant-based gelatin alternatives.

### Sea Lettuce
**(Ulva)**

Widely distributed across the world; commercially grown in California and Florida

Bright green, very fine marine algae which can grow with a ruffle-edge ("lettuce"), flat, or ribbon shape; has a soft, sorrel-like flavor.

### Wakame
**(Undaria)**

Native to many coastal areas, including China, Korea, and Japan; cultivated for centuries in Japan

Dark green fronds when rehydrated with a subtly sweet flavor and silky texture.

Source: Food + Planet Health Professionals Aquatic Foods Toolkit, 2023.

# Sociocultural Significance of Sea Vegetables

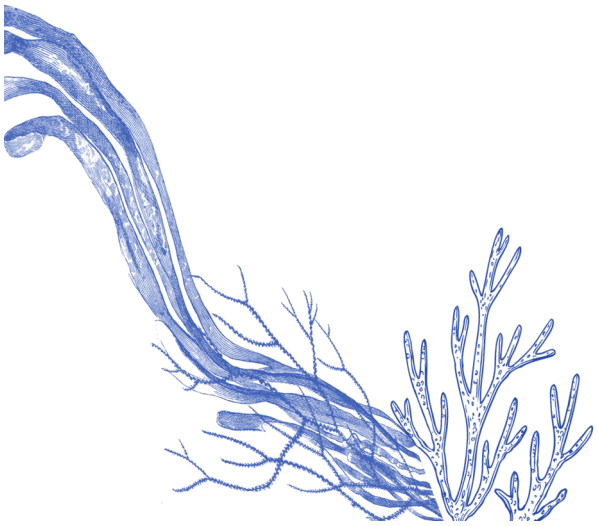
Braised Radish, Tofu and Kelp by Cindy Chou, RDN
Photo Credit: Vanessa Stump
Blue Foods as Medicine Cookbook by Food + Planet, 2023.

- **Culinary Traditions**: In Japan, China, and Korea, approximately 66% of algae species continue to be used in everyday dishes. In Austria and Germany, seaweeds are being used to produce a highly prized bread—algenbrot, a blend of cereals whose composition is up to 3% seaweed.
- **Honoring Traditional Knowledge**: 2022 Governor of Hawaii "Year of Limu", "...limu are an integral part of the traditional Hawaiian diet, are used for medicinal, religious, and cultural purposes, and expertise about limu has been transmitted largely among Native Hawaiian women for generations."
- **Food Security**: aid in Alaska Native Tribal sovereignty due to quick growth and nutrient content


Mar Drugs, 2020., doi: 10.3390/md18060301
USDA, https://www.climatehubs.usda.gov/hubs/northwest/topic/seaweed-farming-alaska
Hawai'i Dept. of Land and Natural Resources, 2022 News Release

# Nutrition

- Nutrient-dense
- Low-to-moderate sodium
- Iodine
- Bioactives
- Astaxanthin
- Gut-friendly prebiotics



## Nutrient Content of Common Sea Vegetables

Good source (10-19%DV)

Excellent source (≥ 20%DV)

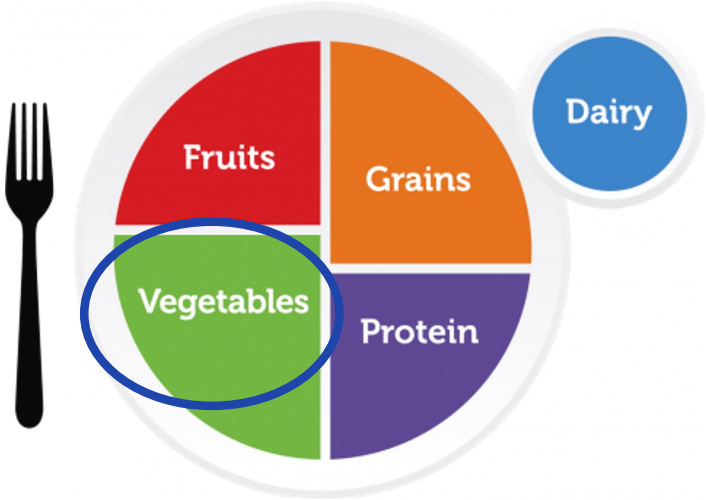
| Serving Size 7 g dried | Kcal | Grams | | | | Mg | % Daily Value (2000 kcal diet) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Energy | Protein | Total Fat | Carbohydrate | Fiber | Omega-3 (DHA+EPA) | Calcium | Iodine | Iron | Magnesium | Potassium | Sodium | Vitamin A RAE | Riboflavin | Folate | Vitamin C |
| Dulse | 18 | 1 | 0 | 4 | 2 | 1 | 1% | 663% | 15% | 7% | 17% | 13% | 4% | 6% | 5% | 10% |
| Kelp (Brown) | 6 | 0 | 0 | 1 | 0 | 6 | 1% | 840% | 1% | 3% | 0% | 1% | 0% | n.a. | 3% | 0% |
| Kombu | 15 | 1 | 0 | 4 | 2 | 10 | 5% | 9333% | 2% | 13% | 14% | 10% | 1% | 2% | 3% | 1% |
| Nori | 21 | 3 | 0 | 3 | 3 | 10 | 2% | 98% | 4% | 7% | 6% | 2% | 23% | 15% | 33% | 20% |
| Wakame | 11 | 1 | 0 | 3 | 2 | 1 | 5% | 75% | 1% | 24% | 14% | 23% | 7% | 5% | 8% | 3% |

Species and geographic diversity can impact the nutrient composition of sea vegetables. Source: USDA Food Central Database. 2019; MDPI. 2021; Maine Coast Sea Vegetables. N.D.

# Sea Vegetables in Diet Patterns

**USDA DGA 2020-2025:**

Part of the Vegetable Group in Customizing the Dietary Guidelines Framework P.28




## How Much?

Many cultures enjoy sea vegetables safely as everyday foods. Try these amounts as a vegetable side dish, condiment, or ingredient, to get started:

### Suggested serving sizes

**3-7 grams**
Dried sea vegetable

**9-21 grams**
Fresh or rehydrated sea vegetable

### Frequency

**1-2** times per week

## How Sea Vegetables Fit into Diet Patterns

Sea vegetables are compatible with numerous dietary patterns, including those listed below.

- American Diabetes Association
- American Heart Association
- Anti-inflammatory
- DASH
- Dietary Guidelines for Americans
- EAT-Lancet Planetary Health
- FODMAP
- Flexitarian/Plant-forward
- Gluten-free
- Low-carb
- Low-sodium
- Mediterranean
- Renal
- Vegan
- Vegetarian

Compatible · Sometimes compatible · Not Compatible

REFERENCES
5 - Biological Trace Element Research. 2019.
6 - ODS: Iodine. 2020.

# Micronutrients In Sea Vegetables

## Sodium

"Sea vegetables can **add saltiness and umami without** dramatically increasing **sodium** levels.

One teaspoon of kelp flakes contains **115 mg (5% DV) of sodium compared to 2,360 mg (103% DV) in 1 teaspoon of iodized salt." F+P toolkit**

USDA Food Central Database. 2022. Dried Seaweed. https://fdc.nal.usda.gov/fdc-app.html#/food-details/2345512/nutrients

USDA Food Central Database. 2017. Dried Dulse Flakes. https://fdc.nal.usda.gov/fdc-app.html#/food-details/1937270/nutrients

## Magnesium and Potassium

**7 grams dried, ⅓ cup**
**Good source - 10% or higher daily value**

- **Magnesium: kombu and wakame**

Wakame 

Kombu 

- **Potassium found in**

Dulse 

Kombu 

Wakame 

## Iodine

"**Seaweed** (such as kelp, nori, kombu, and wakame) is one of the **best food sources of iodine.**"

**Recommended Dietary Allowances** (RDAs) for Iodine

Adults 150 mcg per day
Pregnant women 250 mcg per day

NIH, https://ods.od.nih.gov/factsheets/Iodine-HealthProfessional/

Source: Food + Planet Health Professionals Aquatic Foods Toolkit, 2023.

# Iodine Impacts

**“Seaweed** (such as kelp, nori, kombu, and wakame) is one of the **best food sources of iodine.”**

**NIH Iodine Fact Sheet**

- People at greater risk for **iodine deficiency:**
  - People who do not use iodized salt
  - Pregnant women (higher RDA)
  - Eat vegan diet
  - Communities with Iodine-deficient soils
  - Eat foods high in goitrogens (i.e., soy, cassava, and cruciferous vegetables)
  - Have deficiencies of iron and/or vitamin A; may also be goitrogenic

“In most people, iodine intakes from foods and supplements are unlikely to exceed the UL.”
- Institute of Medicine (IOM)

NIH, https://ods.od.nih.gov/factsheets/Iodine-HealthProfessional/

Sea vegetables can be very rich in iodine. Learn more:

Research suggests iodine is a potential shortfall nutrient for many people in the U.S., and is a particular concern among women of childbearing age.[5]

Many cultures have long enjoyed sea vegetables as part of a healthy diet pattern, but high iodine levels may be an important consideration for those with thyroid disorders.[6]

Consider the RDA of iodine, which is 150 mcg/day for adults (higher during pregnancy and lactation).

If too much iodine is a concern, read labels, switch varieties (species vary in iodine content due to environmental and genetic factors), and aim for moderate consumption.

## A Closer Look: Nori

**One serving provides:**

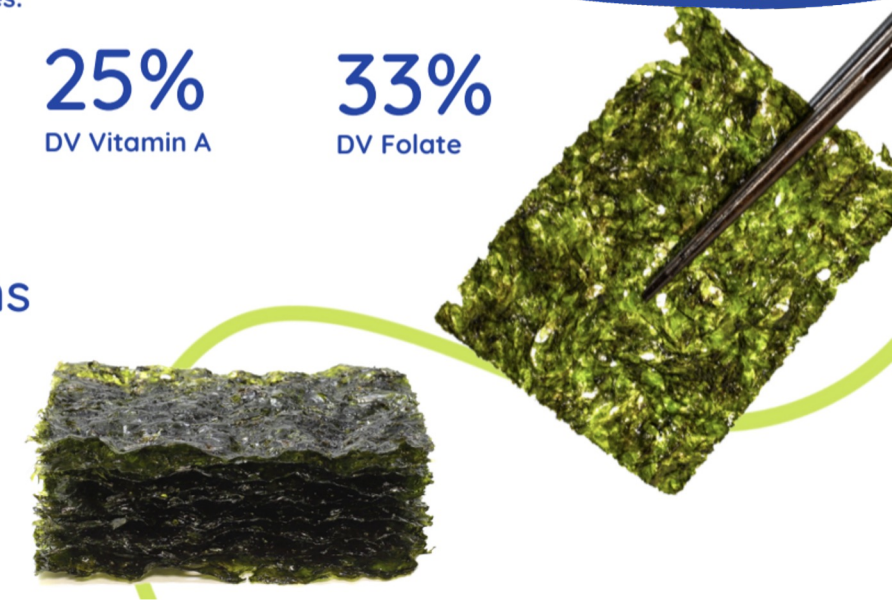
**98%** DV Iodine

**25%** DV Vitamin A

**33%** DV Folate

**2.5 grams** Fiber

**3 grams** Protein



Source: Food + Planet Health Professionals Aquatic Foods Toolkit, 2023.

# Culinary Nutrition: Cooking with Sea Vegetables

## Cooking and Processing Effects on Iodine

- “Seaweed is often cooked to flavor dishes or soup stocks before consumption
- Kombu boiled in water for 15 minutes - lose up to 99% of its iodine content, while iodine in sargassum, a similar brown seaweed, loses around 40%
- Processed kelp is often boiled in dye for half an hour ("ao-kombu" or "kizami-kombu") before hanging to dry, a process which can reduce seaweed iodine content before it is consumed.”

## Cultural Foods

- Asian cultures, seaweed is commonly cooked with foods containing goitrogens - broccoli, cabbage, Bok choy, and soy
- Phytochemicals can competitively inhibit iodine uptake by the thyroid gland (i.e., isothiocyanates from cruciferous vegetables) or inhibit incorporation of iodine into thyroid hormone (i.e., soy isoflavones)

## Sodium Reduction

- Add saltiness and umami without added sodium

Photo Credit: Vanessa Stump

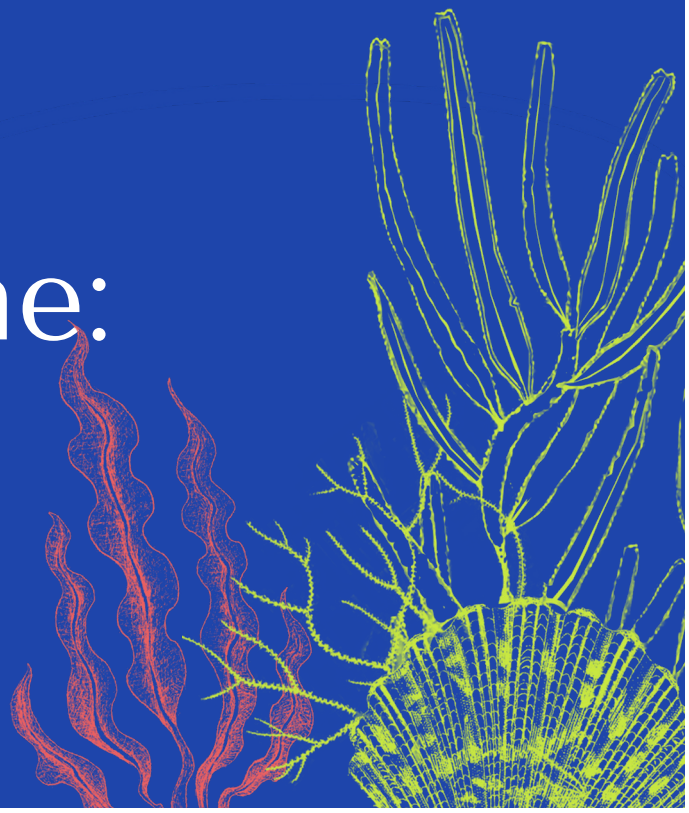
Thyroid Res, 2011. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3204293/

# Part 3

# Blue Foods as Medicine:

## (Bivalves) Clams, Mussels, Scallops, and Oysters

Chris Vogliano, PhD, RDN



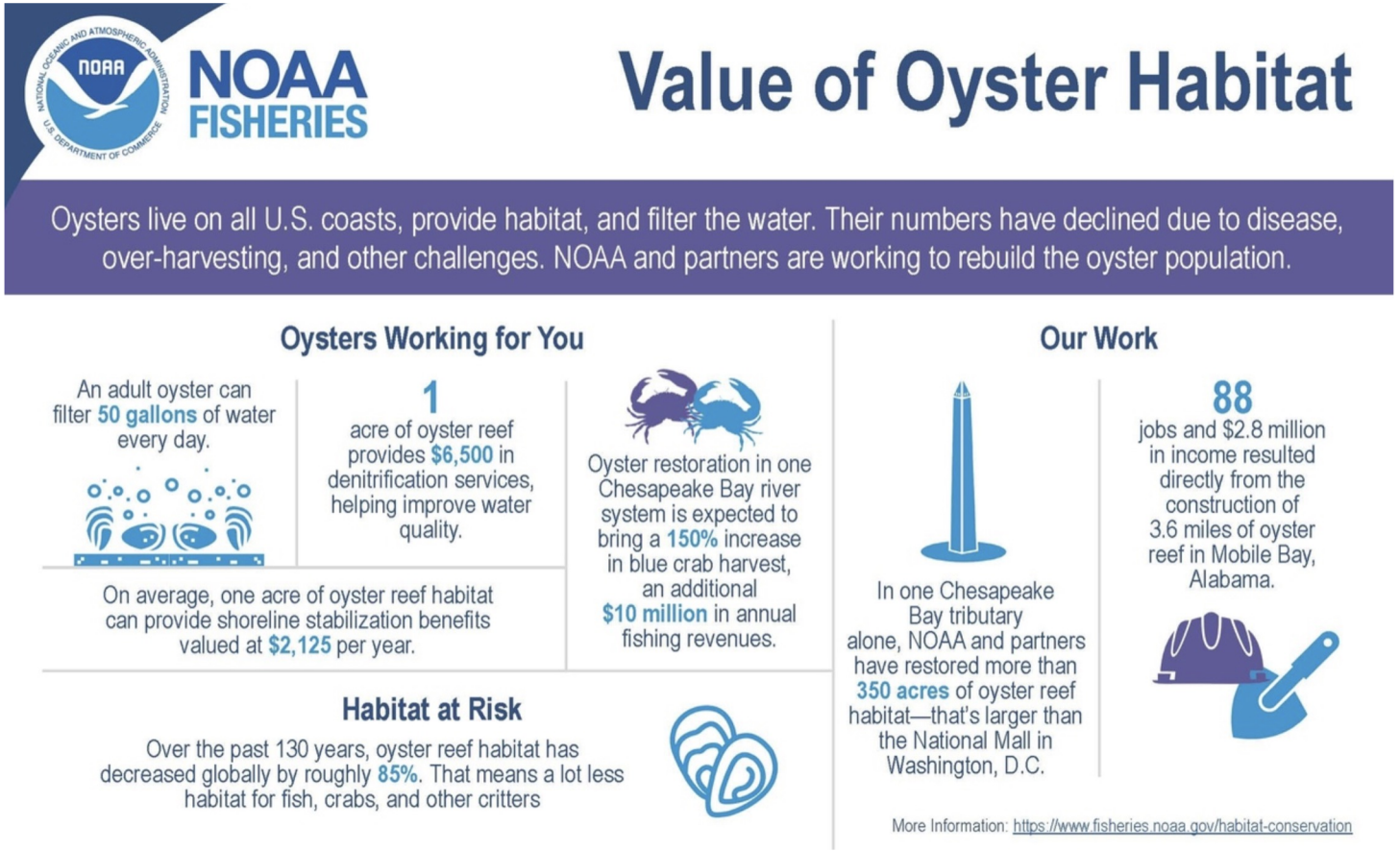
# What Are Bivalves?

- Bivalves (Class Bivalvia) are a category of aquatic mollusks (and type of shellfish) that have bodies enclosed within a hinged shell. This category includes clams, mussels, oysters, and scallops. Bivalves are a type of shellfish, but they are different from crustaceans. There are believed to be over 9,000 bivalves.
- An abundance of bivalve varieties in an array of colors, shapes, and sizes stretch across many cultures and food traditions; from global delicacies like Mejillónes de Galicia in Spain to green-lipped mussels found only in New Zealand, which are a staple in Indigenous Maori diets.

- Bivalves have been hand-harvested along marine and freshwater coastal waterways for millennia
- The farming (called aquaculture) of bivalves is considered a sustainable, resource-efficient method of increasing and diversifying U.S. seafood production, while bringing health benefits to populations and economic benefits to coastal communities.

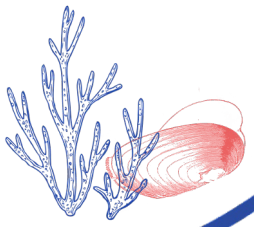
Source: Food + Planet Health Professionals Aquatic Foods Toolkit, 2023.

# Why Are Bivalves a Highly Sustainable Protein?




NOAA, 2022.

# Bivalves and the Environment



- **Water filtration,** as they are natural filter feeders, meaning they actively extract plankton, algae, and other particulate matter from the water column as they feed. By doing so, they help improve water quality by reducing excess nutrients and suspended solids, which can otherwise lead to water pollution and eutrophication.
- **Habitat creation and biodiversity support**, as they form dense shellfish beds and reefs, providing essential habitat and shelter for diverse marine species.
- **Coastal erosion prevention**, as they act as natural breakwaters, reducing the impact of wave energy and helping prevent coastal erosion.
- **Carbon sequestration**, as they build their shells, they incorporate carbon dioxide from the water, which is eventually deposited on the seafloor when they die.
- Bivalves, when produced regeneratively, can also **boost marine biodiversity,** aligning with global goals (UN SDG 14).


NOAA. 2022.
Image adapted from
United Nations. SDG 14: Life Below Water. 2020.

# Bivalves Easily Fit Into a Food as Medicine Approach

**1. Packed with healthy and sustainable protein**

- Cooked clams, mussels, and scallops contain 15-20 grams of protein per 3-ounce serving.
- Mussels and oysters contain more iron than red meat.

**2. Rich in Omega-3 Fatty Acids**

- Excellent source of omega-3 fats, with mussels containing more than 700 mg of DHA + EPA per serving.

**3. Abundant Minerals and Vitamins**

- Such as vitamin B12 and other essential minerals, including zinc, choline, and selenium.

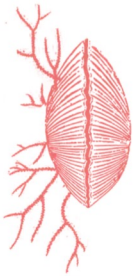
## How Much?

Try these recommended amounts to reap health and environmental benefits.

### Suggested serving sizes

3 oz or 85 g of cooked bivalves

### Frequency



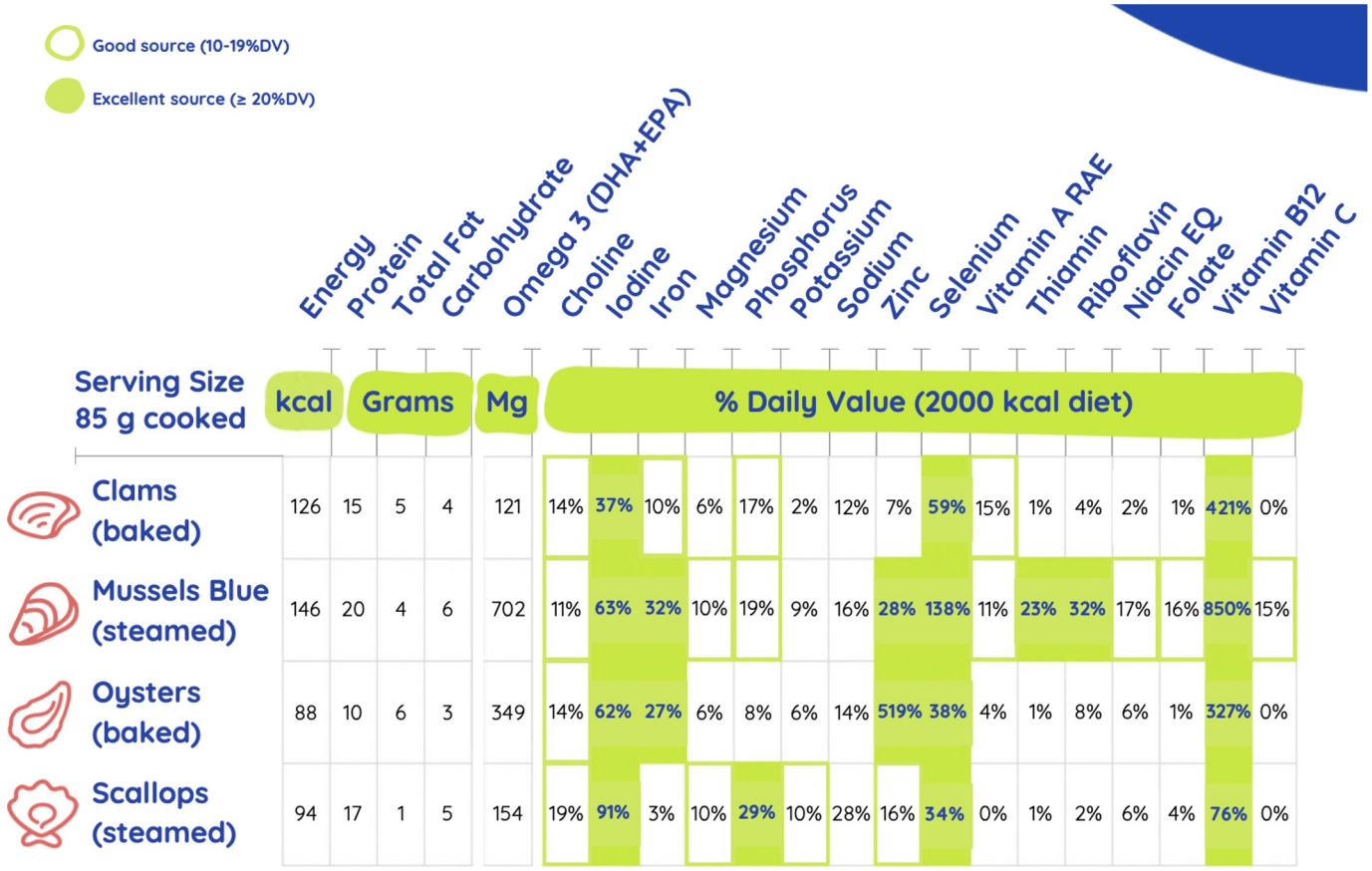
2 times per week as part of the Dietary Guidelines for Americans' recommendations for seafood [3]

## How Bivalves Fit into Diet Patterns

Healthy bivalves are compatible with a variety of healthy eating patterns, including those listed below.


Source: Food + Planet Health Professionals Aquatic Foods Toolkit, 2023.

# Nutrition Composition of Select Bivalves




| Serving Size 85 g cooked | kcal | Grams | | | Mg | % Daily Value (2000 kcal diet) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Energy | Protein | Total Fat | Carbohydrate | Omega 3 (DHA+EPA) | Choline | Iodine | Iron | Magnesium | Phosphorus | Potassium | Sodium | Zinc | Selenium | Vitamin A RAE | Thiamin | Riboflavin | Niacin EQ | Folate | Vitamin B12 | Vitamin C |
| Clams (baked) | 126 | 15 | 5 | 4 | 121 | 14% | **37%** | 10% | 6% | 17% | 2% | 12% | 7% | **59%** | 15% | 1% | 4% | 2% | 1% | **421%** | 0% |
| Mussels Blue (steamed) | 146 | 20 | 4 | 6 | 702 | 11% | **63%** | **32%** | 10% | 19% | 9% | 16% | **28%** | **138%** | 11% | **23%** | **32%** | 17% | 16% | **850%** | 15% |
| Oysters (baked) | 88 | 10 | 6 | 3 | 349 | 14% | **62%** | **27%** | 6% | 8% | 6% | 14% | **519%** | **38%** | 4% | 1% | 8% | 6% | 1% | **327%** | 0% |
| Scallops (steamed) | 94 | 17 | 1 | 5 | 154 | 19% | **91%** | 3% | 10% | **29%** | 10% | 28% | 16% | **34%** | 0% | 1% | 2% | 6% | 4% | **76%** | 0% |

Species and geographic diversity can impact the nutrient composition of bivalves.[2] Source: USDA Food Central Database. 2019.

# Exploring the Diverse and Delicious World of Commonly-Consumed Bivalve Species in the US

## Clam (hard-shell, Quahog, littleneck)
**(Mercenaria)**

Grows in eastern shores of North and Central America, from Prince Edward Island to Yucatan Peninsula

Triangle shape with a thick shell, light gray in color with violet edge, and mild, sweet, and briny taste.

## Clam (soft-shell, steamer, longneck
**(Mya arenaria)**

Abundant across the coastline of New England

Thinner shells, ranging in color from blue to gray to white, with a sweet flavor and hint of the sea.

## Clam (razor)
**(Ensis directus)**

Numerous species dot both coasts, from Alaska to California and Atlantic Seaboard

Long narrow shell yellowish brown in color with a fresh, mild, meaty flavor.

## Mussel (Blue)
**(Mytilus edulis)**

The most common variety in the U.S., grows abundantly in Prince Edward Island, Canada

Teardrop-shaped, bluish-black shells with tender plump meat that has a clean, slightly sweet flavor.

## Mussel (Mediterranean)
**(Mytilus galloprovincialis)**

Cultivated in the Pacific Northwest

Glossy, purple-black shells with buttery meat that has a rich, mushroomy sea flavor.

## Oyster (Blue Point, American, Atlantic)
**(Crassostrea virginica)**

Found along the entire eastern seaboard (including estuary waters) from New England to the Gulf coast

Layered, textured teardrop shell that ranges in color from white to purple to dark brown; meat has a clean, briny flavor.

## Oyster (Miyagi, Pacific)
**(Crassostrea gigas)**

Found in Pacific Northwest and California

Dappled, fluted shell with meat that has a creamy, briny, buttery taste with a cucumber finish.

## Scallop (Atlantic sea scallop)
**(Placopecten magellanicus)**

Cultivated on the Atlantic coast from Newfoundland to North Carolina

Saucer-shaped, fluted shell reddish-pink to brown in color with flesh that is mild, buttery and meaty .

Source: Food + Planet Health Professionals Aquatic Foods Toolkit, 2023.

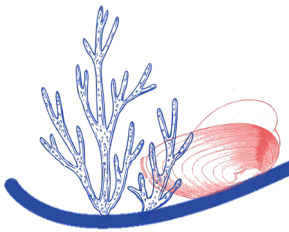
# Sociocultural Significance of Bivalves

1. **Culinary Traditions.** Regional specialties include clam chowder, oyster po' boys, and steamed mussels. These foods can also bring connection to different cultures, specifically when people emigrate.
2. **Traditional Knowledge.** Passed down through generations, the transmission of this knowledge helps preserve cultural heritage and Indigenous practices.
3. **Tourism and Hospitality.** Especially in coastal regions renowned for their seafood offerings.

Classic Cioppino Stew by Sarah Koszyk, MA, RDN
Photo Credit: Vanessa Stump
Blue Foods as Medicine Cookbook by Food + Planet, 2023.

Nature Communications. 2022. Indigenous oyster fisheries persisted for millennia and should inform future management.

# Bivalves: Food Safety



## Allergies

Shellfish allergies are much more common than bivalve allergies. Just because people have a shellfish or fish allergy, it does not automatically mean they are allergic to bivalves.

## Safety

Like other seafood, bivalves can be susceptible to environmental contaminants, such as heavy metals and food safety outbreaks.
The FDA closely monitors bivalve producers in the U.S., and they are required to maintain rigorous standards and carefully track their harvests. If harvesting on your own, check local government reports for safety data.

## Sustainability

**Monterey Bay Aquarium's Seafood Watch** ranks bivalves as a Best Choice for sustainability.

**Aquaculture Stewardship Council (ASC)** certification verifies safe, sustainable practices

**Environmental Working Group (EWG)** considers mussels a "Best Bet" and oysters as a "Good Choice"

FARMED RESPONSIBLY asc CERTIFIED ASC-AQUA.ORG ™

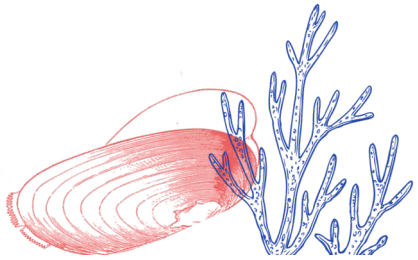
Monterey Bay Aquarium Seafood Watch

ewg Know your environment. Protect your health.

# People's Perceptions of Bivalves Differ

In some cultures, bivalves are enjoyed as everyday foods (e.g., clams in hearty coconut curry broth, a flavorful sopa di pescado). In others, they are special meals for social occasions (e.g., oysters on the half shell, a clambake). Knowledge on how to choose and prepare bivalves is shaped by cultural and demographic factors, as well as proximity to coastal areas. To meet people where they are, emphasize their nutrition benefits, recommend them in familiar formats, and make them easily accessible.

> **Consumer hesitations around taste and texture of bivalves can often be overcome by highlighting other qualities, such as nutrition, health, culinary exploration of flavors and cultures, and sustainability.**
>
> Food for Climate League Survey, 2022



# Bivalves Offer an Easy-to-Use, Everyday Protein

Crispy Shallot and Clam Pasta by Cindy Chou, RDN
Photo Credit: Cindy Chou, RDN
Food + Planet Health Professionals Aquatic Foods Toolkit, 2023.

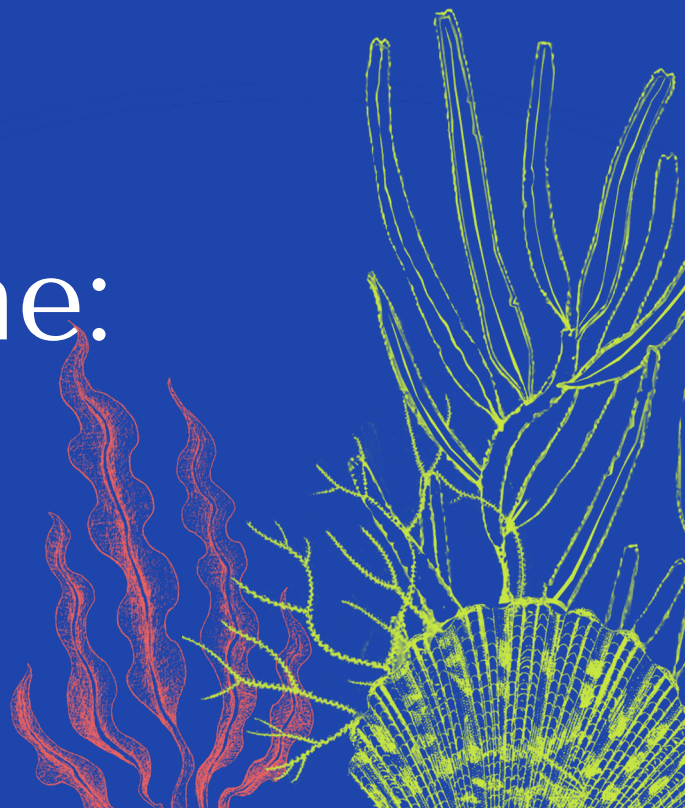
- The perks for eaters span **nutrition**, **flavor**, and **versatility**, as their rich, meaty taste makes them a healthy protein choice all sorts of dishes, such as soups, noodle dishes, curries, and even pizza.
- While fresh bivalves are often perceived as expensive or luxury foods, **canned clams and mussels can offer an affordable everyday protein option** for meals and snacks.

# Part 4

# Blue Foods as Medicine:

## Integrating Them Into Your Practice

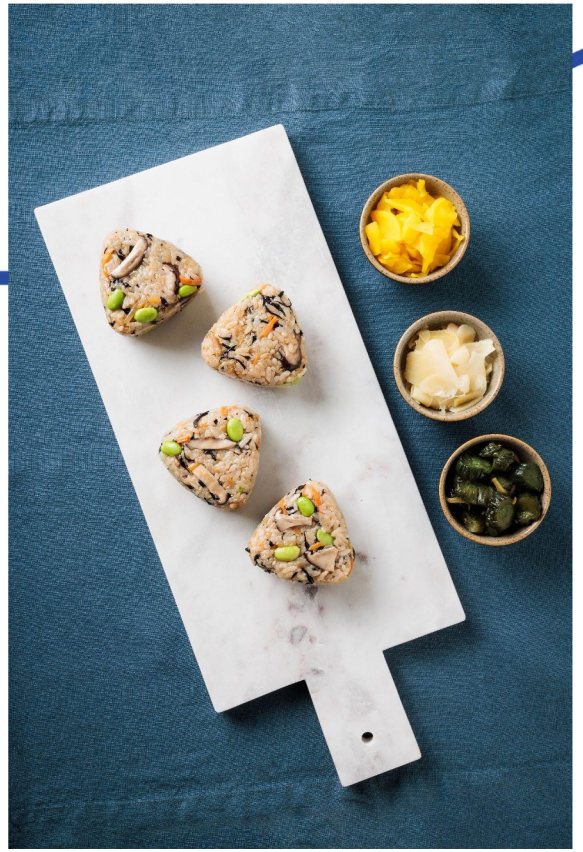
Sharon Palmer, MSFS, RDN



# Cultural Uses of Blue Foods

**Sea Vegetables in Global Food Traditions:**

- Asian: Japanese rice balls and wakame salad, Taiwanese braised kelp, Korean Seaweed soup
- European: Irish seaweed chowder, British seaweed fritters, Nordic seaweed crispbread
- Latin American: Sea grape salad, sea moss beverages, Chilean cochayuyo (kelp) salad
- North American: Sea lettuce soup, California rolls, seaweed snacks
- Indigenous: bull kelp chow chow, beans with kombu, salmon with berries and seaweed



Hijiki Onigiri by Mayuko Okai, MS, RDN
Photo Credit: Vanessa Stump
Blue Foods as Medicine Cookbook, Food + Planet, 2023

# Cultural Uses of Blue Foods

**Bivalves in Global Food Traditions**

- Mediterranean: steamed clams, mussel pilafs, bouillabaisse, mussels with wine and garlic
- Asian: Korean clam soup, Filipino mussel soup, Thai steamed mussels with coconut curry, clams in black bean sauce
- European: Nordic smoked oysters on toast, French mussels with frites, Italian clam with pasta, Spanish paella with mussels
- African: Moroccan mussels, South African mussels pots, maputo clams
- North American: clam bakes, chowders, raw oysters, oyster casseroles
- Indigenous: raw or dried them for winter; steamed over bed of hot stones covered with leaves
- Latin American: clams with garlic, red chile with mussels, sopa de pescado

Tahong Soup (Filipino Mussel Soup), Clara Nosek, MS, RDN
Photo Credit: Vanessa Stump
Blue Foods as Medicine Cookbook, Food + Planet, 2023

# Preparing Sea Vegetables

## Sea Vegetable Cooking Guide

Try these ideas for creating delicious, nourishing meals with sea vegetables.

### Kelp, Dulse granules

**Preparation Method:**
No preparation needed

**Cooking Tips:**
Serve as topping on popcorn, toast, salads, sandwich fillings, tacos for sea-like, umami flavor

### Kombu

**Preparation Method:**
Soak to rehydrate, simmer, boil

**Cooking Tips:**
Add to soups, stews, braises, sauces, noodle dishes

### Nori

**Preparation Method:**
No preparation needed

**Cooking Tips:**
Use as wrap for sushi or hand rolls, toast into snack chips, crush over salads or grain-based side dishes.

### Wakame, Hijiki, Sea Lettuce

**Preparation Method:**
Soak to rehydrate

**Cooking Tips:**
Serve cold as a salad or side dish; add to grain bowls

### Ogonori, Sea Moss

**Preparation Method:**
Blend, pickle, or cook

**Cooking Tips:**
Blend into smoothies, pickle as a side vegetable, use in creamy desserts

Photo Credit: Vanessa Stump

Source: Food + Planet Health Professionals Aquatic Foods Toolkit, 2023.

# How to Prepare Bivalves Like a Pro!

**How to Safely Clean and Prepare Fresh Bivalves for Cooking**
Keep your fresh, in-shell clams, mussels, oysters, and scallops safe in the kitchen, with these steps:

- Keep refrigerated before preparation time.
- Inspect bivalves. Look for tight shells; if partially open, tap to ensure they close. Discard or compost if shells stay open, or if they are slimy and smell off.
- Soak in salted water for 30 minutes to remove sand.
- Clean outer shells with a vegetable brush, and remove "beards" (fibers) on mussels.
- Rinse with clean water.
- Cook as directed.
- While many traditional diets and coastal communities do enjoy raw bivalves, the FDA suggests that high-risk individuals (children, pregnant women, older adults, or immunocompromised individuals) should avoid raw or undercooked bivalves to help prevent foodborne illnesses.

Photo Credit: Vanessa Stump

FDA. 2011. https://www.fda.gov/media/80766/download.

# Easy Cooking Solution: Steaming

Perhaps the easiest way to cook bivalves is to simply steam them in their shell:

- Just heat liquid in a pan (try broth with wine, aromatic herbs, garlic, and vegetables).
- Drop in the cleaned bivalves, cover with lid, and cook just until the shells open up.
- Serve them over pasta or rice, in soups or stews, or with steamed vegetables.
- Avoid overcooking so they don't get too tough and chewy.
- Bon appétit!

*"Why do I really love mussels? They force you to stop and to eat, bite by bite. They force us to come together. They are cooked and served in one pot, forcing us to share, to engage, to be present and to be mindful with our food,"*
Barton Seaver, chef and culinary educator.

Clams al Mojo de Ajo by Sylvia Klinger, DBA, MS, RD, LDN
Photo Credit: Vanessa Stump
Blue Foods as Medicine Cookbook, Food + Planet, 2023

# Messaging Tips for Blue Foods

## Highlight…Sourcing and safety

- 79% of eaters say **“safe to eat”** is the most important criterion
- Educate on **best choices, transparent and sustainable sourcing**, honest evaluations of benefits and risks

## Showcase…Time saving, culturally-relevant recipes and ideas

- Share ideas that **connect with your audience**

## Compare to…Land-based agriculture

- **Connecting aquatic foods to familiar, land-based food** production examples can help paint a clearer picture of health and sustainability

Food for Climate League. 2022.

Mango Tofu Hand Rolls by Alex Caspero, MS, RD
Photo Credit: Vanessa Stump
Blue Foods as Medicine Cookbook, Food + Planet, 2023

# Key Nutrition and Health Messages for Bivalves

- **Call them…by their name (clam, mussels, oysters, scallops)**
- **Emphasize…protein and health.**
- **Present as…easy, affordable, and convenient.**

**Mussels and clams are affordable, protein-packed, and easy to prepare. They contain 15-20 grams of protein per serving, and impressive levels of heart-healthy omega-3 fats.**

- Mussels and oysters provide **more iron than red meat, an excellent source of essential minerals such as zinc and selenium, and a good source of choline**.
- Mussels, oysters, and scallops are **excellent sources of vitamin B12, selenium, and iodine**.
- Adding clams, mussels, oysters or scallops to your plate can help you **meet the twice per week seafood recommendations** per the DGAs.

Pizza with Arugula and Mediterranean Mussels by Patricia Bannan MS, RDN
Photo Credit: Vanessa Stump
Blue Foods as Medicine Cookbook, Food + Planet, 2023

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# Key Nutrition and Health Messages for Sea Vegetables

**Call them…Sea vegetables or specific varieties, such as kelp, nori, and dulse**

**Emphasize…Nutrient-density and health benefits. Ninety-three percent of RDs viewed sea vegetables as nutrient-dense foods with untapped potential**

**Sea vegetables are versatile, climate-friendly superstars:**

- They are nutrient dense, delivering an impressive variety of **23 essential nutrients**, including vitamin A, folate, iron, and magnesium.
- Sea vegetables are a **nutritional powerhouse** and a **climate-friendly** ingredient.
- Sea vegetables are one of the best natural sources of **iodine.**
- Sea vegetables are a rich source of **bioactive compounds** (such as porphyran, fucoidan, and astaxanthin).

Photo Credit: Vanessa Stump

[6] Food and Planet. 2022.
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# The Blue Foods as Medicine Cookbook 2023

## Easy Wakame Salad

### Featuring Wakame

You can make an easy, delicious, nutritious wakame salad at home, just like you might find in a sushi restaurant. Wakame is a type of kelp packed with iodine, manganese, magnesium, and calcium. Julienned carrots, cucumbers, and edamame not only add texture and color to this salad, but a boost of nutrition.

Makes 4 servings

Prep Time: 20 min.
Cooking Time: 0 min.
Total Time: 20 min.

**Michelle Jaelin, RD**
is a Canadian media registered dietitian and nutrition communications expert who specializes in producing content on healthy Asian food and recipes and decolonizing wellness on their blog and social media @michellejaelin.

**Ingredients:**

**Wakame Salad:**
- 2 cups dried wakame
- 4 cups hot water
- 1 cup julienned carrot
- 1 cup julienned cucumber
- 1 cup shelled edamame, frozen and thawed

**Wakame Dressing:**
- 1/4 cup rice vinegar
- 2 tablespoons granulated sugar
- 2 teaspoons sesame oil
- 2 tablespoons low sodium soy sauce
- 2 tablespoons white sesame seeds

**Instructions:**

1. To make wakame salad: In a large bowl, soak dried wakame in hot water for 10 minutes until rehydrated. Once fully rehydrated, drain, rinse, and pat wakame dry with a paper towel or clean dish cloth. Chop wakame into small pieces. In a medium bowl, add wakame, carrots, cucumber, and edamame, and set aside.
2. To make wakame dressing: In a small bowl, whisk together vinegar, sugar, sesame oil, soy sauce, and sesame seeds.
3. Pour dressing over wakame salad and toss together. Cover and refrigerate for 1 hour before serving.

**Notes:**

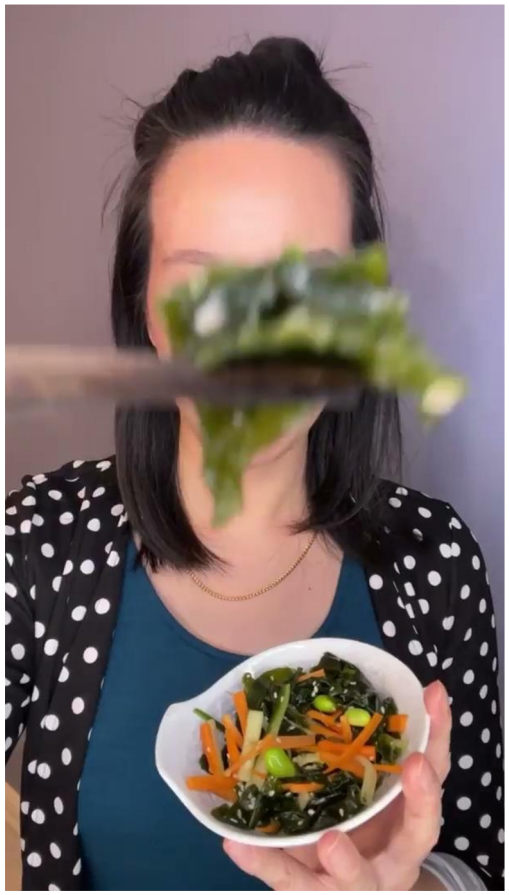
- Serve with brown rice and your choice of protein, such as tofu or salmon poke, for a meal.

**Nutritional information (per serving):**

192 calories, 5 g fat, 1 g saturated fat, 653 mg sodium, 16 g carbohydrates, 0 mg cholesterol, 9 g total sugar, 12 g fiber, 13 g protein

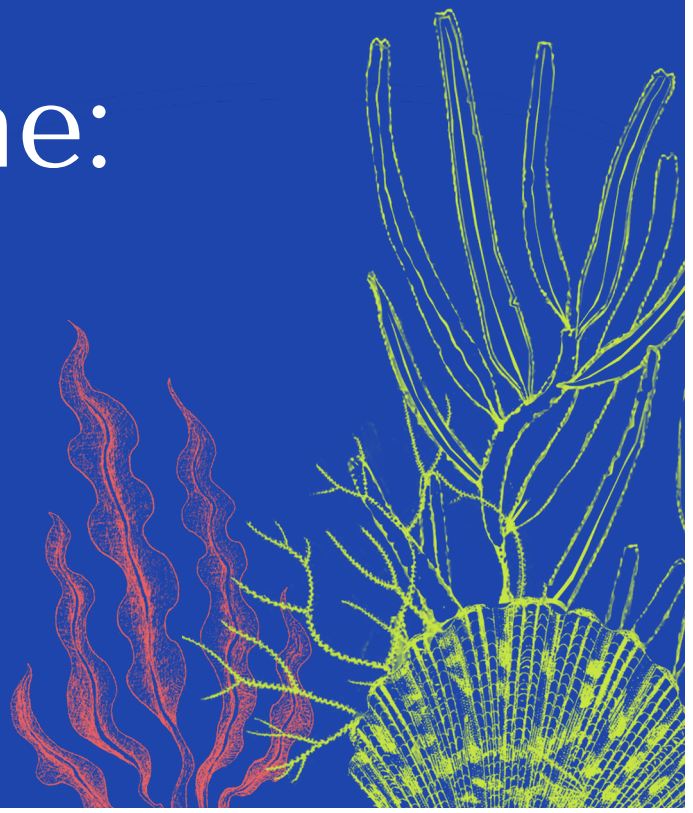
Watch the recipe video here:
bit.ly/3YdfJya





# Blue Foods as Medicine:

## Open Access Resources for Your Practice



NEW

# Blue Foods as Medicine Curriculum

FOOD + PLANET

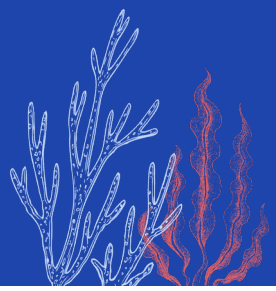
4 Part Series:
Blue Foods as Medicine
www.eataquaticfoods.org

**MODULE 1**
Blue Foods Foundations

**MODULE 2**
Blue Foods as Medicine: Sea Vegetables

**MODULE 3**
Blue Foods as Medicine: Bivalves

**MODULE 4**
Blue Foods as Medicine: Integrating Them into Your Practice



## A FREE, interactive, online curriculum for health professionals and students

- Develop an action-oriented understanding of the definition, nutritional significance, and sustainability of Blue Foods (with an emphasis on bivalves and sea vegetables)
- Explore how these foods can be a powerful treatment tool for diet-related chronic disease, prevention and longevity.
- Practitioners can use the curriculum resources to further their professional learning journey, empower their communities, teach students, educate patients, or incorporate into presentations.
- Suggested 2 hours of continuing professional education

# BLUE FOODS AS MEDICINE

20 Healthy, Delicious Recipes Featuring Sea Vegetables and Bivalves

FOOD + PLANET

## Welcome to the Delicious World of Blue Foods

### What you'll find inside...

https://eataquaticfoods.org

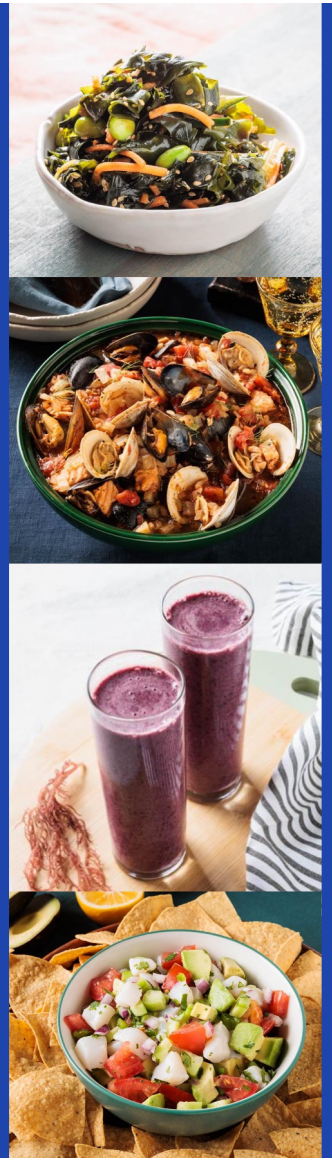
01 20 Healthy Delicious Recipes

02 Traditional & Innovative Culinary Concepts

03 Created by Culinary Dietitians

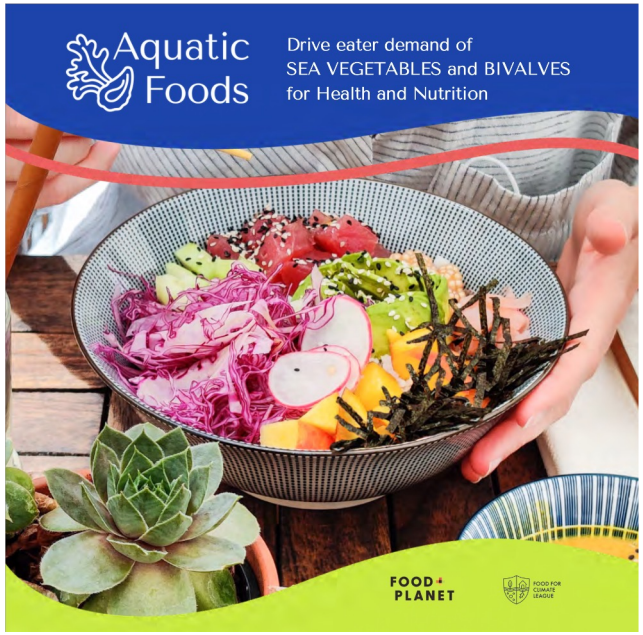
04 Blue Foods Nutrition & Shopping Guides

05 Quick, Easy Tips for Including Blue Foods



# Aquatic Foods Toolkits

## Open Access Resources, Recipes, Social Content for Health Pros





https://eataquaticfoods.org


# Webinar + Cookalong

## Blue Foods: How Sea Vegetables and Bivalves Can Help You and Our Planet

### Wednesday, October 18 at 1 pm ET

In celebration of **National Seafood Month, join us at Food + Planet and the Culinary Nutrition Collaborative** for a webinar to learn all about aquatic foods (AKA blue foods).

This webinar is pending approval for **1 CEU** by the Commission on Dietetic Registration.

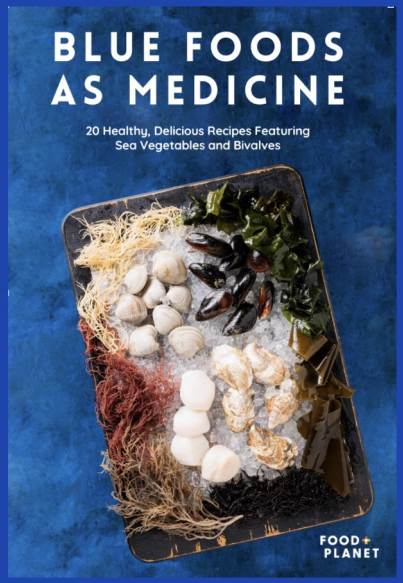
**A recording will be available for any registrants who are not able to attend live.**

**Sign up here:**
https://www.culinarynutritioncollaborative.com/

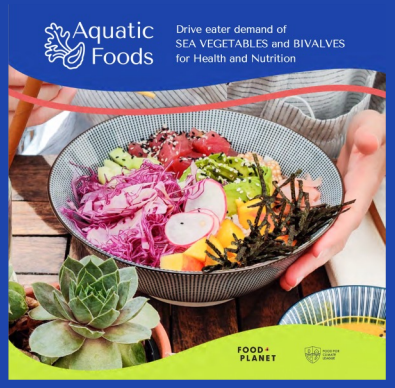
FOOD + PLANET

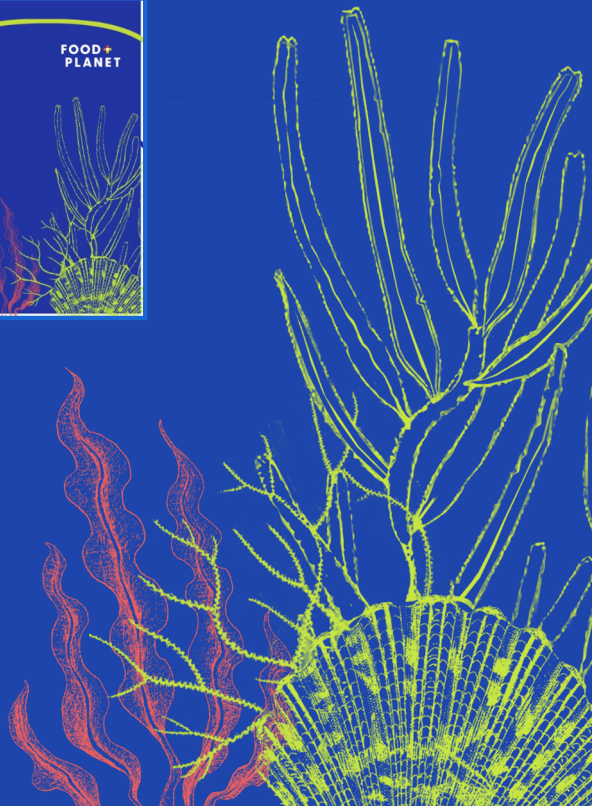
# THANK YOU!

**Free Resources**
**www.eataquaticfoods.org**







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EXCLUSIVE LIVE WEBINAR

# Menarche to Menopause:
## A Team Approach for Treating Female Athletes with RED-S Across the Lifespan

EARN
1.5 CEUs

PRESENTED BY

Val Schonberg,
MS, RDN, CSSD, LD, NCMP, FAND
Courtney Gleason,
MD

**October 3, 2023**
**2-3:30pm ET**

# Credit Claiming

You must complete a brief evaluation of the program in order to obtain your certificate. The evaluation will be available for 1 year; you do not have to complete it today.

CREDIT CLAIMING INSTRUCTIONS:

1. For RDs/DTRs, login to ce.todaysdietitian.com.
2. Click “My Courses” and select this webinar’s title.
3. Click “Take Course” on the webinar description page.
4. Select “Start/Resume” to complete the course and submit the evaluation.
5. Download and print your certificate.

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