

A top-down view of a wooden cutting board on a dark grey surface. The board is filled with fresh ingredients: a bunch of green asparagus tied with a white rubber band, a whole carrot, a large piece of salmon fillet seasoned with salt and pepper and garnished with lemon slices and black peppercorns, several lemon slices, and several cherry tomatoes, some whole and some cut in half. A white paper bag is partially visible in the top right corner.

SEAFOOD AND HUMAN HEALTH

A SUMMARY REPORT

AQUARIUM OF THE PACIFIC

Cover photo taken by Viktor Hanacek

Seafood and Human Health

Summary Report

Introduction

There is a strong body of evidence that long chain omega 3 fatty acids--found only in seafood--promote heart and brain health. There is also a growing body of research examining the potential for these long chain omega 3s to reduce the risk of Alzheimer's, rheumatoid arthritis, and aid in the development of muscle tissues. Seafood is also a good source of low-fat protein and essential minerals and vitamins. Leading health organizations have recognized these benefits and the US Dietary Guidelines have been updated, with current recommendations including at least two 4oz servings of seafood per week. Unfortunately, the U.S. population is currently not meeting these guidelines. This deficiency in consuming seafood can have health implications. A Harvard School of Public Health study in 2006 by Dr. Mozaffarian, showed that meeting the dietary guidelines for seafood consumption can reduce the risk of coronary death by 36%.

It is clear that we need to eat more seafood. Wild-capture fisheries have not met the demand for the last 30 years. Marine aquaculture has been filling the gap to meet the growing demand for seafood and will play an increasingly important role in providing the additional seafood needed to ensure that people have access to healthy and affordable seafood.

The Aquarium of the Pacific's Seafood for the Future program hosted a workshop in collaboration with NOAA Fisheries at the Aquarium on March 8-9, 2017 discuss the role of seafood in human health, the role of aquaculture in meeting the increasing seafood needs for human health, and the connection between seafood's role in human health and conservation. Participants outlined a guide to educate the public about these topics. Representatives from NOAA Fisheries, Delaware Sea Grant, Johns Hopkins, Seafood Nutrition Partnership, New England Aquarium, National Aquarium, and the Aquarium of the Pacific were present. Additional experts from the health and medical community will be invited to review the guide before publication.

Objectives

The group came together to address several questions:

- Do aquariums play a role in educating the public about the benefits of seafood consumption?
- What are the messages?
- Is seafood supply a public health issue?
- Is supply of long chain fatty acids (EPA/ DHA) an issue?
- What direction should public research funding focus on?

Creating and Refining Messages

Prior to the meeting, workshop organizers drafted nine questions based questions posed by the public at a recent presentation on seafood and human health by Linda Cornish from Seafood Nutrition Partnership and Chef Rick Moonen at the Aquarium. During the workshop, participants reviewed, revised, and added questions. Once the questions were agreed upon, participants formed smaller groups and addressed these questions, providing answers as appropriate to educate various audiences about these topics. Three levels were created to represent different audiences who may require different levels of detail:

Wader: information is provided in a brief and succinct statement – much like a newspaper headline.

Target audience: general public

Swimmer: Information provided at this level is still brief, but includes some additional information and detail.

Target audience: general public or stakeholders (chefs, retailers, academia, etc.).

Diver: information provided with more depth. Resources and context are provided for further reading so audiences can do their own exploration of the topic.

Target audience: Opinion leaders, educators, stakeholders (chefs, retailers, academia, etc.)

The following answers to these questions will be further refined into a guide to help informal educators and communications teams better communicate to the public the health benefits of consuming seafood. The guide will also provide more cohesive messaging about seafood and human health.

Questions and Answers

1. What are omega-3s? Why are they important for human health?

Wader:

Long chain omega 3s are a unique nutrient found only in seafood that have been shown to have brain and heart health benefits.

Swimmer:

Omega 3s are the main building blocks in brain cells, they have anti-inflammatory properties that benefit heart and brain health and help promote healthy blood flow.

Diver:

Describe Omega 3/ 6 balance. Why?

Proven research from heart and brain health.

Emerging research areas: Alzheimer, mental health, arthritis etc. with labels of strong, moderate, and weak evidence.

Fatty acid metabolism literature, Dr. Lands ([Link SNP and other missing links](#)).

2. What are the links between human health and seafood sustainability?

Wader:

Responsibly produced seafood supports human, environmental, and community health

Swimmer:

By increasing seafood production we can meet our nutrient needs while minimizing our environmental impact.

Seafood requires fewer resources, such as land and fresh water relative to other animal proteins.

Current food production is primarily land based and consumes half of the developable land and 70% fresh water but produces only 2% food supply comes from the ocean.

Diver:

We do not have sufficient land and water resources available to expand terrestrial food production; therefore we need to expand marine aquaculture in the marine environment.

Growing middle class is demanding more protein. Seafood is a less resource intensive food production method.

3. How can we increase the amount of seafood we consume/ supply without unacceptable environmental impacts?

Wader:

Wild harvests have not kept pace meeting the demand. Marine aquaculture has great potential to meet increased demand for healthy seafood.

Swimmer:

Eat lower on the food chain, eat filter feeders.

Some farms provide healthy food ecosystem benefits.

Using innovative technologies and best available science. Marine aquaculture has the potential to provide a year round supply of healthy and environmentally responsible seafood.

More than half of the global food supply comes from aquaculture.

Diver:

Difficulties expanding in US?

Scientific advancement

Provide aquaculture supply stats – how much supply/ imports

Potential to meet increase food demands.

4. What role will marine aquaculture play in meeting the growing demand for healthy seafood?

Wader:

Marine aquaculture will be the major source of healthy seafood; already aquaculture produces more than half of the global seafood supply and is growing fast.

Swimmer:

Currently aquaculture is the biggest source, while marine is increasing and freshwater is decreasing.

Why marine aquaculture, space freshwater use, land etc.

Potential for low-cost production (link to regulations).

Diver:

FAO (SOFIA 2016), NOAA stats, NGO reports (WRI).

5. What are the health benefits of eating seafood? How does one determine the healthfulness of seafood (i.e. how do you balance the good – omega-3s, protein, nutrients, etc.; with the bad – mercury, PCBs, plastics, etc)?

Wader:

Seafood is a superfood.

Seafood provides key beneficial nutrients that no other foods have.

Eating seafood at least two times a week promotes optimal health and wellness.

Swimmer:

Long list of other resources:

Use distillation of WHO/FAO

Dr. Mozafarian – Fish Intake, Contaminants, and Human Health

Dr. Hibbeln – Maternal seafood consumption

Experts have determined that benefits significantly outweigh risk.

Diver:

Dietary guidelines, NIH, WHO/FAO

FDA - Net effects report 2014

List benefits by strong, moderate, and weak evidence.

6. How does price/ supply/ quality impact the public's ability to eat more healthy seafood? How can it be more affordable? How do we address perception it affordability?

Wader:

Good value for your health

Healthy seafood for any budget

Swimmer:

Dr. Knapp - The Chignik Salmon Cooperative

Cheap sources of healthy seafood

Learn to cook it. Recipes - Eating Heart Healthy.

Diver:

Watters et al. - A Cost Analysis of EPA and DHA in Fish, Supplements, and Foods

Dr. Knapp - The Chignik Salmon Cooperative

Mozafarian - The Real Cost of Seafood

Tillman and Clark - Global diets link environmental sustainability and human health

Long term health costs? Strategy.

7. How does eating seafood compare with plant and supplements as a source of omega-3s?

Wader:

Seafood provides health benefits that no other food provides.

Swimmer:

Fatty acids, omega 3 oils, most plants have short chain Omega 3s which have their own benefits but fall short of long chain omega 3s.

Good sources of seafood/ omega 3s:

Salmons, tuna, menhaden, sardines

Fish oil tablets (always better to get from real food).

Diver:

Serving, 250mg/ day.

Research on fish oil is ongoing.

Dr. Brenna - Efficiency of conversion of alpha-linolenic acid

8. How do fresh, frozen, and canned seafood compare in terms of health benefits?

Wader:

Canned, frozen, and fresh seafood all have health benefits. Frozen and canned seafood are more convenient with a longer shelf-life but have similar nutrition to fresh seafood. Also the type of preparation, steamed, baked, fried are not all the same nutritionally. (SFP - Recipes)

Swimmer: Description of different seafood types and why they are comparable in terms of health benefits. Why frozen might be better in terms quality and a discussion of waste.

Diver: Research, shows nutrients and tradeoffs for different types of processing. How do processes impact nutrients (Add Links). Benefits for different preparations eg canning at home vs fish processor.

9. How does aquaculture seafood products compare to wild-capture seafood products in terms of human health benefits?

Wader:

Eating farm raised seafood has the similar health benefits as wild caught seafood of the same species.

Swimmer:

Feed determines the health benefits of farm raised seafood within a species
Health benefits of wild caught seafood are a function of their environment

Diver:

For farm raised fish, omega 3s are added to the feed and you can minimize risk of contaminants. What are the sources - (add links to research).

For wild caught fish, temperate, location, food availability, seasonality all impact nutrition profiles and pollution. - (add link to research).

10. What are some tips for buying high quality seafood? What questions should I ask my fishmonger about seafood to ensure the seafood to ensure the seafood I buy is high quality?

- a. Quality/ safety?
- b. Link to canned/ frozen question

Wader:

Buying seafood should be easy. Some tips for buying fresh seafood, it should look and smell fresh, buy local, and look for certifications.
Buy from sources you trust.

Swimmer:

Quality buying tips - eyes, gills, cans - etc.
Buy from sources you trust and learn what to look for. (include list)
Ask if they know country of origins, farm, boat.

Frozen and canned selections can be high quality as well.
Buy direct from fisherman or farmer if you can.

Diver:

Links to certification and traceability. More info/ context what questions and answers mean.

Add image of gorup

Further Discussion

Group discussions highlighted the need to address access to quality seafood due to geographic barriers and affordability. Some of these issues can be addressed through public perception, as canned and frozen seafood should be accessible to different areas and price ranges. Much of the public is uneasy when preparing seafood at home and views seafood as a difficult protein to prepare relative to beef, chicken, and pork. Additionally, the role of aquaculture, more specifically marine aquaculture, was discussed as a possible solution to providing access to an affordable and quality seafood supply.

Conclusion and Next Steps

This workshop was convened to discuss the current state of the public's understanding of the health benefits of consuming seafood and to create messages to educate the public. The answers developed during this workshop will be circulated for review by the participants and a guidance document will be jointly created to craft cohesive and accurate public facing messages. Tools and other resources will be developed and shared to provide the outreach in addressing the benefits of seafood for human health.

Appendix A

Workshop Participants

Name	Organization
Linda Cornish	Seafood Nutrition Partnership
Jillian Fry	Johns Hopkins - Center for a Livable Future
Doris Hicks	Delaware Sea Grant
Jonathan MacKay	Seafood for the Future/ Aquarium of the Pacific
Adina Metz	Aquarium of the Pacific
Corrine Monroe	Aquarium of the Pacific
Mike Rust	NOAA Fisheries Office of Aquaculture
Cindy Sandoval	NOAA Fisheries Office of Aquaculture
Jerry Schubel	Aquarium of the Pacific
TJ Tate	National Aquarium
Kim Thompson	Seafood for the Future/ Aquarium of the Pacific
Michael Tlusty	New England Aquarium

Appendix B

Seafood and Human Health Workshop Agenda

Aquarium of the Pacific
320 Golden Shore, Suite 100, Long Beach 90802
March 8-9, 2017

Day 1

8:30 a.m. Breakfast

9:00 a.m. Welcome and Introductions (Jerry Schubel)

9:10 a.m. Briefing on the workshop goals and objectives (Kim Thompson and Mike Rust)

9:30 a.m. Presentation – Omega 3s, Seafood, and Human Health – Doris Hicks

9:50 a.m. Presentation – Seafood as an important source of nutrients – Mike Rust

10:15 a.m. Break

10:30 a.m. Group Activity: Review and develop questions that should be addressed regarding seafood and human health

Noon Lunch

12:30 p.m. Breakout Activity: Create messages to address the approved questions regarding seafood and human health

2:30 p.m. Break

2:45 p.m. Group Activity: review and generate group consensus on the final messages

4:45 p.m. Wrap up and review Day 2 agenda

5:00 p.m. Meeting adjourned

6:00 p.m. Dinner at the Aquarium

Day 2

8:30 a.m. Breakfast

9:00 a.m. Welcome and review day 1 (Kim Thompson and Mike Rust)

9:10 a.m. Presentation - Public outreach tools and challenges - Kim Thompson, Linda Cornish, and Michael Tlusty

10:15 a.m. Group discussion: What kinds of outreach programs are best suited to tell the story? (Kim Thompson)

10:30 a.m. Break

10:45 a.m. Group discussion: Using these messages to guide NOAA's aquaculture research priorities (Mike Rust)

11:45 a.m. Wrap up and next steps

Noon Meeting adjourned, Lunch will be served.

