



A NEW WAVE OF SEAFOOD:

Consumer and Chef Preferences for BlueNalu's Cell-Cultured Seafood

A summary of BlueNalu's U.S. market research insights to date

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EXECUTIVE SUMMARY

Over the last three years, BlueNalu has sponsored, supported, and conducted ten independent research studies internationally and in collaboration with experts and strategic partners regarding consumer and chef attitudes, motivators, and preferences for our cell-cultured seafood products. This has included interviews and surveys with ~4,400 consumers and 75 chefs in the United States to better understand the benefits and challenges of conventional seafood and the opportunities that will be offered by BlueNalu's cell-cultured seafood for the premium foodservice marketplace. Through a blend of proprietary and published research, these marketing efforts identified considerable benefits to both consumers and foodservice operators for BlueNalu's cell-cultured seafood, which are summarized in the insights below.

CONSUMER RESEARCH SUMMARY:

- Whereas health was determined to be a primary motivator for consumer interest in selecting conventional wild or farm-raised seafood, consumers acknowledged that health and food safety risks are also a primary concern.
- Once educated and introduced to the concept of BlueNalu's cell-cultured seafood, consumers had a significantly greater willingness to select it, and expressed a willingness to pay a price premium based on its benefits.
- Personal health resonated as the strongest benefit of cell-cultured seafood with consumers. More than 80% of consumers surveyed ranked "parasite free" as very important, and approximately 70% or more ranked "mercury free", "pesticide free," and "microplastic free" as very important.
- The data from the research suggested that consumers who enjoy and select seafood in their diet most frequently are also the most likely to select BlueNalu's cell-cultured seafood.

CHEF AND FOODSERVICE RESEARCH SUMMARY:

- Chefs consistently identified conventional seafood as increasingly challenged due to variabilities in supply, quality, consistency, and yield, leading to unpredictability and significantly affecting the profitability of their restaurants. These extraordinary supply chain challenges were seen as unique to seafood, and unlike issues of other animal proteins like chicken or beef which are quite accessible, predictable, and consistent in quality.
- Chefs and foodservice operators most frequently stated that consistent and predictable quality, pricing, and supply were the biggest benefits of cell-cultured seafood products.

BLUENALU'S FOCUS ON BLUEFIN TUNA TORO:

- Chef and foodservice interviews resulted in extraordinary insights regarding the tremendous challenge with access to bluefin tuna and the significant amount of pent-up demand that would exist if supplies were available. These interviews also indicated that the pent-up demand for bluefin tuna could translate to an increase in consumption by 3x among large chains, and up to 20x among small chains and independents if a larger supply was available.
- Chefs universally chose a saku block as their ideal product form and found the toro, or the fatty belly cut of the bluefin tuna, as the most ideal product for BlueNalu to pursue.
- Were it not for the challenges in the supply chain and the limited availability of bluefin tuna, an increased consumer exposure to bluefin tuna toro would likely result in a corresponding increase in consumption.
- Consumers were 2.5 times more likely to order cell-cultured bluefin tuna toro after hearing about the product benefits of cell-cultured seafood.

Cell-cultured seafood's differentiated benefits align with those of conventional seafood products while eliminating the variety of challenges associated with our current global seafood supply chain, showcasing this unique protein as a product with immense potential to transform the seafood category. Whereas BlueNalu seeks to be a global leader in cell-cultured seafood, we also realize that seafood preferences are quite local, based on geographic access to fish, cultural influences, and other factors. In collaboration with our strategic partners, we are committed to continuing market research efforts in the United States and other regions around the world to develop the unique market entry and distribution strategies that will be required to successfully bring our cell-cultured seafood to the market in each nation. As both chefs and consumers become increasingly educated and excited about the benefits of these products, BlueNalu believes that we can meet the rising demand for healthy and delicious seafood products and forge a path towards a more resilient and conscientious food system.



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INTRODUCTION

The process for creating *real* seafood via the cell-culturing method is poised to revolutionize the way we produce and consume these products. This emerging technology involves the cultivation and production of seafood products directly from fish cells, resulting in the same taste, texture and nutritional value as their conventional counterparts. With the potential to address pressing environmental, ethical, and sustainability challenges associated with conventional seafood production, cell-cultured seafood products are garnering significant attention from consumers, food-service operators, multi-national food companies, investors, governments, and other stakeholders worldwide.

As this technology continues to mature, further research and understanding of consumer attitudes and preferences will be vital to inform product development, marketing and communication strategies, and strategic partners that can best support sales and distribution on a local and global level.

This deep dive aims to shed light on BlueNalu's most recent research findings regarding foodservice operator and consumer perceptions of the cell-cultured seafood industry. Through market research regarding the unique benefits of these products, cell-cultured seafood can shift public perceptions and lead a transition towards healthier products for people and our planet.



BlueNalu's prototype bluefin toro with nori, avocado, carrot, cucumber and sweet rice

SEAFOOD'S IMPORTANT ROLE AS A PROTEIN CATEGORY

Seafood consumption is at an all time high and continues to grow as this protein provides a vital source of nutrition for millions of people around the world (FAO, 2022). Over the past fifty years, demand for seafood has more than doubled, driven by the growing awareness of its health benefits and the desire for a balanced diet (European Commission, 2018). The recognition of seafood's health benefits, coupled with an increasing emphasis on diet and wellness, has contributed to the growing popularity of seafood worldwide. Consumers are actively seeking out seafood as a nutritious food choice, incorporating it into their meals and adopting seafood-based dietary patterns.



BlueNalu's prototype bluefin toro sashimi on a bed of shiso and topped with chive blossoms



However, the traditional seafood industry faces numerous challenges, including overfishing, illegal, unregulated and unreported (IUU) fishing, pollution, and acidification and warming waters caused by the effects of climate change.

Furthermore, with growing awareness of the risks of consuming seafood contaminated with heavy metals, microplastics, pathogens, parasites, and other harmful substances, consumers are increasingly concerned about the safety and the healthfulness of the seafood they eat. Taken together, consumers are looking for seafood that is safe, nutritious, and sustainably produced.

Over the last three years, BlueNalu has interviewed and surveyed ~4,400 consumers and 75 chefs in the United States to better understand the benefits and challenges of both conventional and cell-cultured seafood.

Our market research outlined in this whitepaper highlights the complex dynamics of conventional seafood as a unique protein category with a variety of positive and negative perceptions related to nutrition, human health, supply-chain, and more. **The results from these research efforts showcase preferences for cell-cultured seafood as a beneficial and differentiated product for both consumers and foodservice operators.**



A close-up photograph of a hand with a colorful tattoo on the forearm holding a black fork. The hand is positioned over a light-colored, textured plate containing a small, round portion of bluefin tuna tartare. The tartare is garnished with a yellow flower, green herbs, and a drizzle of dark sauce. The background is a dark wooden surface.

CONSUMER RESEARCH

CONVENTIONAL SEAFOOD'S BENEFITS & CHALLENGES

In 2020, BlueNalu conducted initial consumer research to better understand the benefits and challenges of conventional wild or farm-raised seafood for frequent seafood eaters. Qualitative research was conducted through four focus groups, each with four nationally represented consumers who consume seafood two or more times per week.

Focus group discussion determined that consumers believe seafood to be healthy, delicious, versatile, and special.

Whereas health was determined to be a primary motivator for the purchase of conventional seafood, consumers within the focus groups acknowledged that health and food safety risks are also a primary concern. This apparent conflict was a key learning regarding consumer attitudes towards conventional seafood. They also expressed that there can be difficulty in preparing seafood at home, making it more likely they would consume seafood in a restaurant setting.

Some quotes from our consumer focus groups are listed verbatim in the pages that follow.



Chef displaying nigiri with BlueNalu's prototype bluefin tuna toro

POSITIVE CONSUMER PERCEPTIONS OF CONVENTIONAL SEAFOOD

SEAFOOD IS DELICIOUS

"Seafood is my favorite food and makes up all my favorite dishes. The fresh flavors and endless variety make every meal exciting."

Fresh [fish] is preferable, anything fresh is better for you and tastes better."

SEAFOOD IS HEALTHY

"Seafood is really nutrient dense, and there are so many health benefits. I eat a good amount of it."

"I've been trying to eat healthier and exercise more, which has resulted in eating more seafood recently."

SEAFOOD OFFERS VARIETY

"I love the versatility [seafood] has. You can be so creative when it comes to seafood because it can do so many different things!"

"Seafood has such a variety. There's so many different things to try in terms of species and dishes."

SEAFOOD IS SPECIAL

"I always feel more sophisticated eating seafood. It might just be visual cues as we grow up, but I associate it with a lifestyle."

"When I go out to eat for seafood its more of a luxury. It has a different feel because we don't do it as often."

NEGATIVE CONSUMER PERCEPTIONS OF CONVENTIONAL SEAFOOD

SEAFOOD HAS INCREASING HEALTH RISKS

"While seafood is healthier for the most part, there are higher mercury levels and I have to be careful of where I'm getting it and where it's being sourced from."

SEAFOOD CAN BE UNFAMILIAR TO PREPARE AT HOME

"Preparing raw fish is something that I wouldn't do. It's a skillset that requires training."

SEAFOOD CAN BE EXPENSIVE

"The price associated with seafood holds me back sometimes, but I usually overcome that by saying my health is worth it."

SEAFOOD'S GLOBAL SUPPLY CHAIN FOOTPRINT IS TROUBLING

"This fish has been on a boat, a plane, a truck, in a factory, and then another factory... oh man."

WHY CELL-CULTURED? NOMENCLATURE FOR THESE INNOVATIVE PRODUCTS

An important consideration in the commercialization of cell-cultured products has been the common or usual name to use on package labels to meet U.S. Food and Drug Administration (FDA) regulations. However, naming these products has been the subject of considerable debate. To better inform the industry, BlueNalu sponsored the first-of-its-kind independent and peer-reviewed research conducted by Rutgers University Professor, William K. Hallman, PhD., to study the common or usual name for seafood products within this category that would meet the FDA's requirements for appropriateness and also be appealing to consumers (Hallman, 2020; Hallman, 2021). BlueNalu provided comments to the FDA citing Hallman's research in March 2021 (BlueNalu, 2021).

Five criteria were used for evaluation, including each term's ability to:

- Enable consumers to distinguish cell-based seafood from wild and farmed fish
- Signal potential allergenicity
- Be seen by consumers as an appropriate term to identify the product
- Not disparage either cell-based or conventional products
- Not evoke thoughts, images, or emotions that are inconsistent with the idea that the products are safe, healthy, and nutritious

The results suggested that of the options given, “cell-cultured seafood” and “cell-based seafood” outperformed the other descriptors. These terms enabled consumers to recognize that the products are neither wild-caught nor farm-raised, while also signaling potential allergenicity, appropriately describing the technology and process, and performing well with respect to measures of consumer acceptance, particularly in comparison to conventional products.



BlueNalu's prototype bluefin tuna toro sashimi on a bed of cabbage chiffonade

PRODUCT BENEFITS OF CELL-CULTURED SEAFOOD

As part of nomenclature research efforts, Dr. Hallman also collected proprietary marketing insights for BlueNalu (non-published) with the ~3,200 participants.

The data from this research suggested that frequent seafood eaters, who consume seafood two or more times per week, are much more likely to purchase cell-cultured seafood when compared to non-seafood eaters, with beliefs that these products will be safe, nutritious, tasty, natural, ethical, and beneficial for society.

Demographics like age, race, income, education, gender and region were poor predictors of frequent seafood consumption for conventional products.

Through these research efforts, it became clear that there is a health halo surrounding conventional seafood, however, the safety of these products have increasingly caused concern.

Once introduced to BlueNalu's cell-cultured seafood, the research showed that consumers were willing to pay a price premium based on the combination of product benefits of cell-cultured seafood. The lack of antibiotics, GMOs, mercury, microplastics or other harmful contaminants in cell-cultured seafood products were the most frequently cited benefit for consumers who enjoy seafood two or more times per week.

Findings from BlueNalu's consumer focus groups also supported Hallman's research by identifying the health and safety benefits of BlueNalu's products as the most compelling attributes when compared to conventional seafood.



BlueNalu's prototype bluefin tuna toro nigiri, torched

MOST COMMON PRODUCT BENEFITS CITED FOR CELL-CULTURED SEAFOOD

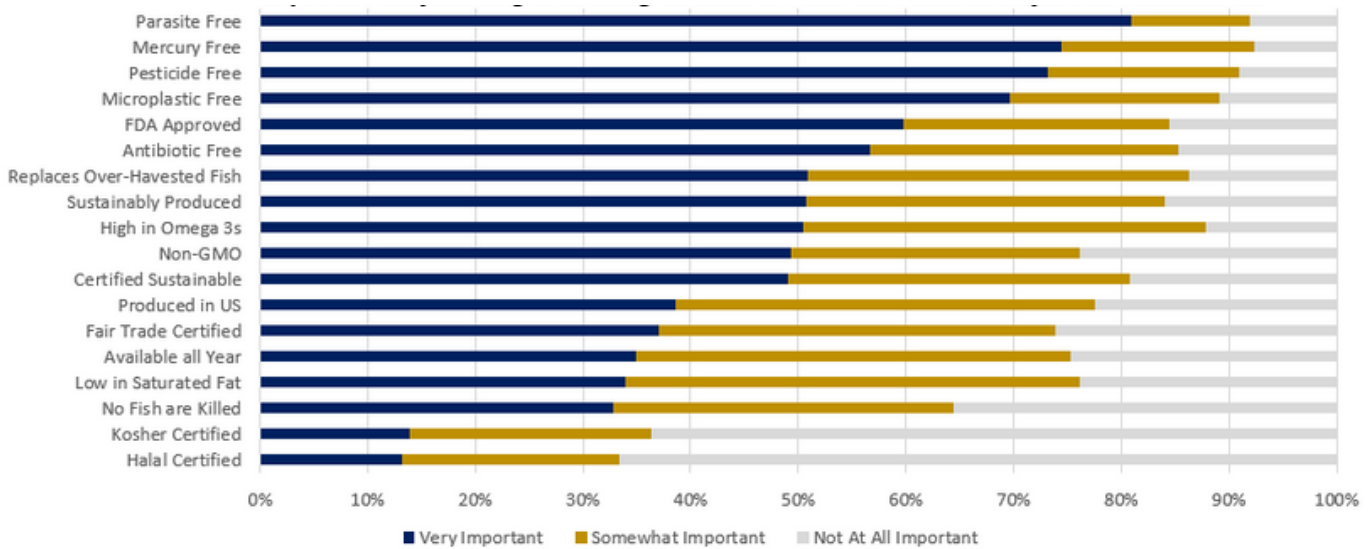


Figure 1. Most common product benefits of BlueNalu’s cell-cultured seafood when survey participants were able to select multiple answers in response to the question: “Cell- cultured seafood has a number of benefits that people may want to know about. How important to you are the following in deciding whether to order cell-cultured seafood in a restaurant?”

Source: Proprietary Research, Hallman 2022.

In late 2022, BlueNalu sponsored additional proprietary market research conducted by Dr. Hallman with ~600 consumers who self-identified as frequent sushi eaters, to assess how consumers discerned cell-cultured seafood products for this unique category. The research utilized YouGov to survey consumers who reported dining at sushi restaurants at least one time per month. The data was weighted to be representative of the national population by age, gender, race/ethnicity, education and region.

The results from the survey confirmed previous findings from BlueNalu’s focus groups that personal health resonated as the strongest benefit with consumers, particularly the “free from” benefits. Whereas all attributes were somewhat important, more than 80% of consumers ranked “parasite free” as very important, and approximately 70% or more ranked “mercury free”, “pesticide free,” and “microplastic free” as very important. (Figure 1).

Notably, other benefits associated with sustainability and animal welfare were seen as important, but were of secondary significance.



CHEF & FOODSERVICE OPERATOR RESEARCH

CONVENTIONAL SEAFOOD'S BENEFITS & CHALLENGES

An additional but equally important component of BlueNalu's market research was aimed at understanding the current landscape around seafood for chefs and foodservice operators. Therefore, BlueNalu conducted qualitative interviews with 60 chefs and culinary experts from both national chains and independent restaurants, including casual, fine-dining, and catering establishments, as well as foodservice operators from B&I (business and industry) establishments. A comprehensive discussion guide was developed and utilized to gain insight into current challenges with conventional seafood, the overall appeal of cell-cultured seafood, and the functional and emotional benefits of these new products.

Foodservice operators identified seafood as a menu item that offers versatility in flavor and application, adding sophistication to the menu.

Chefs confirmed the attitudes put forward by consumers in perceiving seafood as healthy, delicious, versatile, premium and special. Challenges were also confirmed in perceptions of seafood as potentially compromised by food safety issues and health risks associated with contamination.

Chefs consistently identified seafood as increasingly challenged due to variabilities in supply, quality, consistency and yield, leading to unpredictability and significantly affecting profitability. These challenges were seen as unique to seafood and unlike issues for other animal proteins like chicken or beef.

During interviews, many chefs identified seafood as a product that generates waste from low yield and that requires expensive skilled labor to prepare and cut. Yield when breaking down a fish in a restaurant can range from 20-95%. Waste is often attributed to offcuts like heads, tails, scales, skin and bones, depending on the type of fish and the skill of the chef (Chefs Resources, 2022).

Chefs and restaurant operators also named sustainability concerns such as overfishing and illegal, unregulated and unreported (IUU) fishing as challenges affecting supply.

Some quotes from chef and foodservice operator interviews are listed verbatim in the pages that follow.

POSITIVE FOODSERVICE OPERATOR PERCEPTIONS OF CONVENTIONAL SEAFOOD

SEAFOOD IS DELICIOUS

"Seafood is bright, citrusy, buttery, herby, and lightens flavors."

SEAFOOD IS HEALTHY

"There's definitely a health halo attached to seafood. People like having the opportunity to eat healthy."

"The perception of fish is that it's healthier than beef. People are trying to be healthier and watch what they eat."

SEAFOOD IS SPECIAL

"People don't know how to prepare seafood, so they like us to prepare it for them."

"There are many benefits. Seafood is seen as a luxury item and definitely elevates a meal."

SEAFOOD OFFERS VARIETY

"There's 100 different ways you can go with seafood. Seafood gives me more flexibility on how to express fresh ingredients."

"With seafood, there's just so much you can do. It doesn't tie you down."

NEGATIVE FOODSERVICE OPERATOR PERCEPTIONS OF CONVENTIONAL SEAFOOD

SEAFOOD QUALITY CAN BE UNPREDICTABLE

"When things are coming in wild caught, you never know what you're going to see when you open up that box..."

"You need a reliable source. We want to make sure we're getting the fish as cold and fresh as possible. Fish is highly perishable."

SEAFOOD IS VOLATILE IN PRICE AND SUPPLY

"Supply chain is really critical. When you develop a dish that's successful on your menu, you want to rely upon a consistent supply. A consistent price helps dramatically."

"When I got into the business, Chilean Sea bass was four dollars a pound. Now I am at twenty dollars a pound."

SEAFOOD TAKES EXPENSIVE AND SKILLED LABOR

"A long time ago we used to order albacore tuna fresh, but you would have to take off the skin and bloodline. As we grew, we didn't have time to do that in house and there wasn't enough time to train people on how to clean a fish."

"We don't have the labor skillset to process fish in house."

SEAFOOD HAS INCREASING HEALTH RISKS

"You want to be able to tell your guests your food is always safe, especially with mercury concerns."

SEAFOOD HAS INCREASING SUSTAINABILITY CONCERNS

"What does the future of seafood look like? Well, I hope its still here."

"As I learn more and more about ocean health, it's concerning that we're pushing ourselves out of access to really good seafood."

PRODUCT BENEFITS OF CELL-CULTURED SEAFOOD

Once introduced to BlueNalu's cell-cultured products, chefs and operators responded to BlueNalu's brand proposition with genuine interest, excitement, and wonder. Many remarked that - from both an operational and environmental perspective - cell-cultured products could provide a future-forward solution. Many of the chefs interviewed were also compelled by the sustainability proposition of cell-cultured products, recognizing the need for more emphasis on seafood sustainability in the industry.

Chefs and foodservice operators most frequently stated that consistent and predictable quality, pricing and supply were the biggest benefits of cell-cultured seafood products. Other cell-cultured seafood benefits called out by chefs included convenience and cost-savings associated with reduced back-of-house labor, and the opportunity for cell-cultured seafood to provide nearly 100% yielded products, meaning that there is no waste left behind during processing as cell-cultured products only produce the portions of the fish that consumers and chefs can utilize. This saves foodservice operators the time and money needed for staff to break down a whole fish.

"This idea is brilliant because we know exactly what is going to be in it. This is how it should be. We should worry about the ocean more and the environment, and people care more about this these days. So I think it's amazing."

– Independent Restaurant

"I want to try it. I want to see how this tastes on both sides- as chef and consumer."


– National Chain

"I am a big sustainability guy so this resonates huge. I'm always trying to use all parts of the fish we get in...I haven't seen anything like this in seafood. It's pretty rad."

– Regional Group

"I'm 100% into all of this cell-based talk. There's only one person who touches it – no contaminants, parasites or diseases. You can use all of the fish. So many great things."

– National Chain



BLUENALU'S CELL-CULTURED SEAFOOD AS A TRANSFORMATIVE SOLUTION

BLUENALU'S DEMAND-DRIVEN MODEL

As demonstrated through BlueNalu's market research with chefs and consumers, cell-cultured seafood is a unique solution that can overcome the current challenges of the conventional seafood supply chain. This advanced technology has the potential to provide a nutritious, safe and sustainable source of protein to people around the globe, while reducing pressure on wild fish stocks and minimizing the environmental impacts of fishing. As the cell-cultured seafood industry continues to develop, it offers the potential of a "third option," filling the growing gap between the existing supply of wild and farm-raised seafood and increasing consumer demand.

BlueNalu is leading the development of cell-cultured seafood through healthy, safe, and trusted products that offer increased accessibility, consistency and sustainability. Our advanced platform technology enables us to produce a wide range of cell-cultured seafood products that meet consumer demand, representing a paradigm shift in the efficiency of seafood production and the ability to consolidate multiple steps in the value chain. **This enables the creation of a demand-driven and predictable supply chain for seafood, versus the supply-restricted and unpredictable model that exists today (Figure 2).**

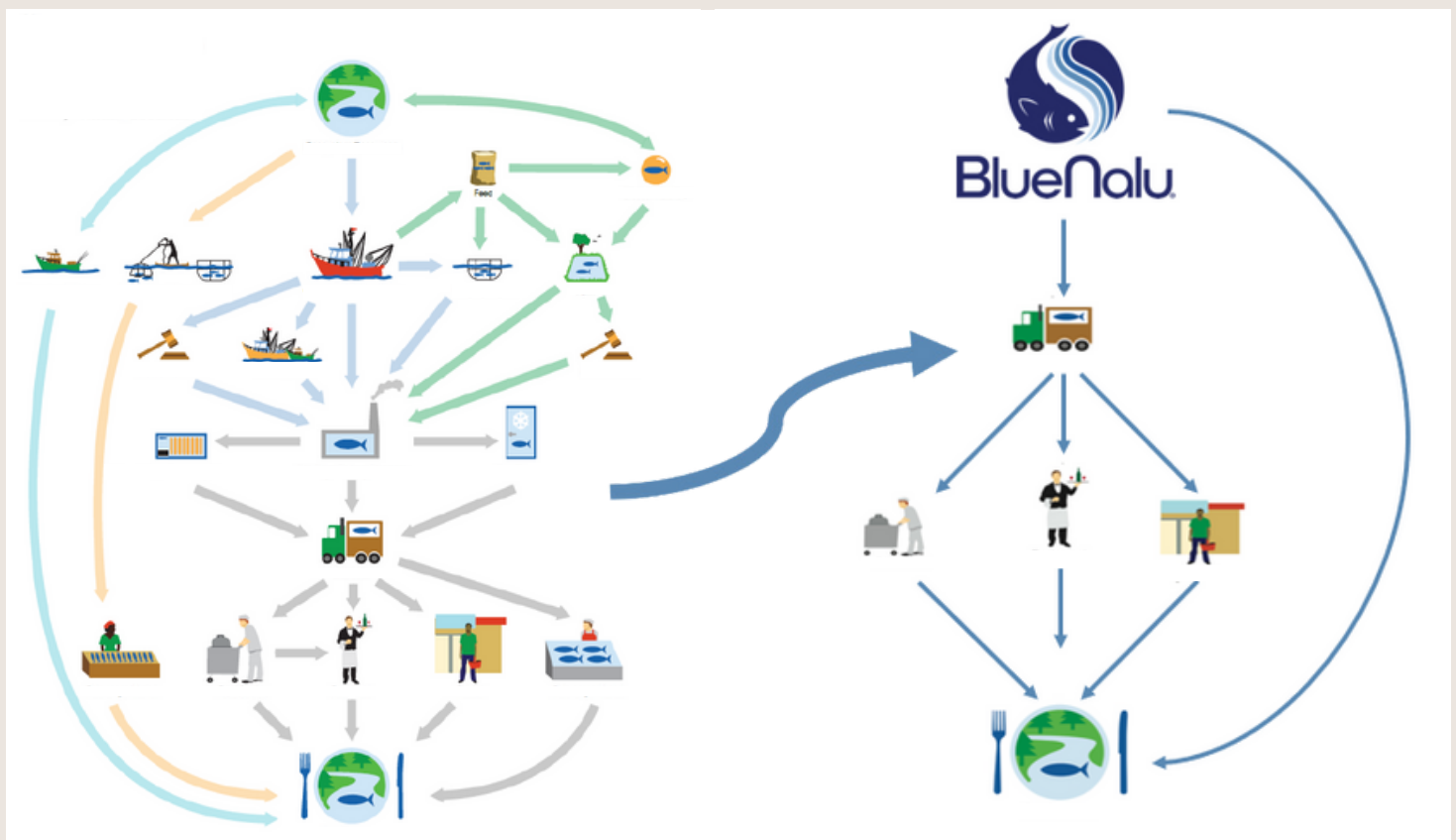


Figure 2. BlueNalu simplifies today's unpredictable and fragmented seafood supply chain. Source on left: Fisheries Research and Development Corporation, 2021.

BLUENALU'S SPECIES SELECTION

BlueNalu is differentiated by our focus on a platform technology that enables us to build a global brand for cell-cultured seafood and a wide range of product offerings. We have developed a thoughtful species selection strategy which initially involves the targeting of finfish products that are primarily imported, difficult to farm-raise, and are limited in supply but high in demand.

Through this approach, we aim to alleviate fishery pressures, displace the need for imports, generate jobs, and enhance food security in each country where we operate. This strategy has enabled BlueNalu to work in partnership with the seafood industry, thereby complementing the current wild and farm-raised seafood supply chain and offering consumers a third form of seafood via cell-cultured processes.

Considering these factors, including the difficulty of fish to be farm-raised, overfishing of existing wild stocks, traceability issues, dwindling supply, high demand, culinary value, and price premiumization, BlueNalu has identified bluefin tuna as its first product to market.

For more information on bluefin tuna please reference BlueNalu's first deep dive.

BLUEFIN TUNA: THE MOST PRIZED FISH IN THE SEA





BLUENALU'S FOCUS ON BLUEFIN TUNA TORO

CHEF RECEPTIVENESS TO BLUENALU BLUEFIN TUNA TORO

In late 2021 and early 2022, BlueNalu conducted in-house qualitative interviews with 17 bluefin tuna experts in both national and international roles, primarily in sushi and fine dining establishments but also spanning consulting, distribution, catering, and corporate roles. The objective of these interviews was to identify the opportunities and challenges associated with sourcing, preparing and serving bluefin tuna and the value of this product to the culinary community. In addition, BlueNalu's interviews garnered feedback into the ideal bluefin tuna product that BlueNalu should offer to foodservice in terms of cut, form, price and weight.

Chefs cited numerous supply chain challenges for bluefin tuna due to IUU and overfishing, fraud, environmental contamination and other factors. Some believed that foodservice operators currently purchase bluefin tuna at unsustainable levels and a high price.

These interviews also resulted in extraordinary insights regarding the tremendous challenge with access to this greatly desired species, and the significant amount of pent up demand that would exist if supplies were available. Conversations indicated that volume for bluefin tuna could increase 3x among large chains, and up to 20x among small chains and independents if a larger supply was available.



Traditional saku of BlueNalu's prototype bluefin tuna toro, sliced

In discussions around product cut, chefs universally chose a saku block as their ideal product form.

In Japan, the term "saku" refers to a block-shaped cut of fish. Saku, commonly associated with tuna, is frequently used as a product form in sushi bars.

Saku's consistent and uniform shape, devoid of bones, skin or blood line, makes it a preferred choice among Japanese chefs, particularly for sashimi and other delicately sliced presentations. Typically, foodservice operators source a whole bluefin or loins (quarters), which need extensive back of the house labor to break down – a skill that has become increasingly difficult to find in foodservice settings. A saku block greatly reduces this labor when coming from a safe and trusted source, while providing the most flexibility to craft a variety of menu items.

Chefs found the toro, or the fatty belly cut of the bluefin tuna, as the most ideal product for BlueNalu to pursue. Unlike other cuts like the less fatty and more common red, lean "akami," which can be easily replaced by yellowfin or bigeye tuna, the toro is a specialized cut that can be found only on the bluefin tuna, resulting in high demand and a price premium for its delicious, fatty taste and creamy texture.

Discussions with chefs illuminated the opportunity presented by cell-cultured bluefin tuna toro to extend menu utilization in non-Japanese fine-dining restaurants for the first time at scale, given that 80% of the world's supply of this fish has historically been consumed in Japan (Paris, 2019).

CONSUMER RECEPTIVENESS TO BLUENALU BLUEFIN TUNA TORO

BlueNalu's sponsored proprietary research with Dr. Hallman in late 2022 included questions to further understand consumer perceptions of and familiarity with bluefin tuna toro and consumer willingness to try a cell-cultured toro product.

The research utilized YouGov to survey ~600 adults who reported dining at sushi restaurants at least one time per month. The data was weighted to be representative of the national population by age, gender, race/ethnicity, education and region.

Data reported from the survey showed tuna to be the most popular type of sushi among consumers. The survey also specifically assessed consumer familiarity with bluefin tuna's toro portion.

It was demonstrated that many respondents do not typically consume bluefin tuna toro due to its lack of availability and/or their general lack of familiarity. However, the research showed that there is a very high correlation between consumers who were familiar with bluefin tuna toro and their "liking it a great deal," which was the highest possible response. **This research implies that were it not for the challenges in the supply chain and the limited availability of bluefin tuna, an increased exposure to bluefin tuna toro would likely result in a corresponding increase in consumption.**

The survey also found that consumers were 2.5 times more likely to order cell-cultured bluefin tuna toro after hearing about the product benefits of cell-cultured seafood.



BlueNalu's prototype bluefin tuna toro in a maki roll



BlueNalu's prototype bluefin tuna toro sashimi on a bed of cabbage chiffonade

THE IMPORTANCE OF CHEFS & FOODSERVICE

BlueNalu's research demonstrates that consumers look to chefs and culinary influencers for inspiration and guidance when it comes to their food choices.

Dr. Hallman's research with consumers found that almost 70% of people who enjoy toro also enjoy omakase, or letting the sushi chef decide what they should eat. These results suggest that consumers who enjoy toro tend to trust the sushi chef and also engage with more experimental food choices when dining on sushi.

Furthermore, the sushi chef was ranked as a top influencer in the participants' decision to order cell-cultured toro. Other key influencers included a friend, a nutritionist, and a doctor. During the focus groups conducted in 2021, consumers also validated the importance of foodservice for a launch setting, citing restaurant food safety and culinary credentials as essential selling points for product trial. Working with culinary leaders could alleviate any concerns from unfamiliar consumers still in need of education around cell-cultured seafood products.

The research showed that 75% of frequent sushi eaters try new items each time they go to a sushi restaurant. These results may suggest that consumers who enjoy sushi may also be more willing to order cell-cultured seafood if it is on the menu at a sushi restaurant.

BlueNalu recognizes the important role chefs and culinary influencers will play in popularizing cell-cultured seafood and shaping food culture at large to embrace this novel product. BlueNalu plans to launch in premium sushi and fine dining restaurants and partner with trusted chefs to bring our products to market.

CONCLUSION

As the results of our market research suggest, seafood plays an important role in the protein category with product benefits that are appealing to both chefs and consumers who value its taste, nutrition, premium or special status, and wide range of flavors, textures, and adaptability to various applications.

Despite these benefits, findings indicate a growing need among chefs for seafood products with predictable quality, consistent pricing and supply, and reduced back of house labor.

BlueNalu's research also indicates that consumers are increasingly aware of challenges associated with seafood safety, sourcing, and potential issues of contamination.

As the world faces pressing challenges related to sustainability, environmental impact, and food security, cell-cultured seafood meets chef and consumer preferences by providing a fully customizable and high quality, premium product with consistent supply and pricing and "free-from" benefits that prioritize human health and support higher-order ocean health and sustainability.



Chef presenting BlueNalu's prototype bluefin tuna toro nigiri

KEY BENEFITS OF SEAFOOD

- DELICIOUS
- HEALTHY
- SPECIAL
- OFFERS VARIETY

KEY CHALLENGES OF CONVENTIONAL WILD OR FARMED SEAFOOD



DIFFERENTIATED BENEFITS OF BLUENALU'S CELL-CULTURED SEAFOOD



Figure 3. Based on research with chefs and consumers, cell-cultured seafoods' distinctive and differentiated solution preserves the benefits of seafood while addressing today's most critical seafood supply challenges.

Cell-cultured seafood's differentiated benefits align with those of conventional seafood products while eliminating the variety of challenges associated with our current global seafood supply chain, showcasing this unique protein as a product with immense potential to transform the seafood category (Figure 3).

By fostering a deeper understanding of the advantages and possibilities of cell-cultured seafood, this whitepaper seeks to pave the way for a more sustainable and responsible future in the global seafood industry. As both chefs and consumers become increasingly educated and excited about the benefits of these products, BlueNalu believes that we can meet the rising demand for healthy and delicious seafood products and forge a path towards a more resilient and conscientious food system.

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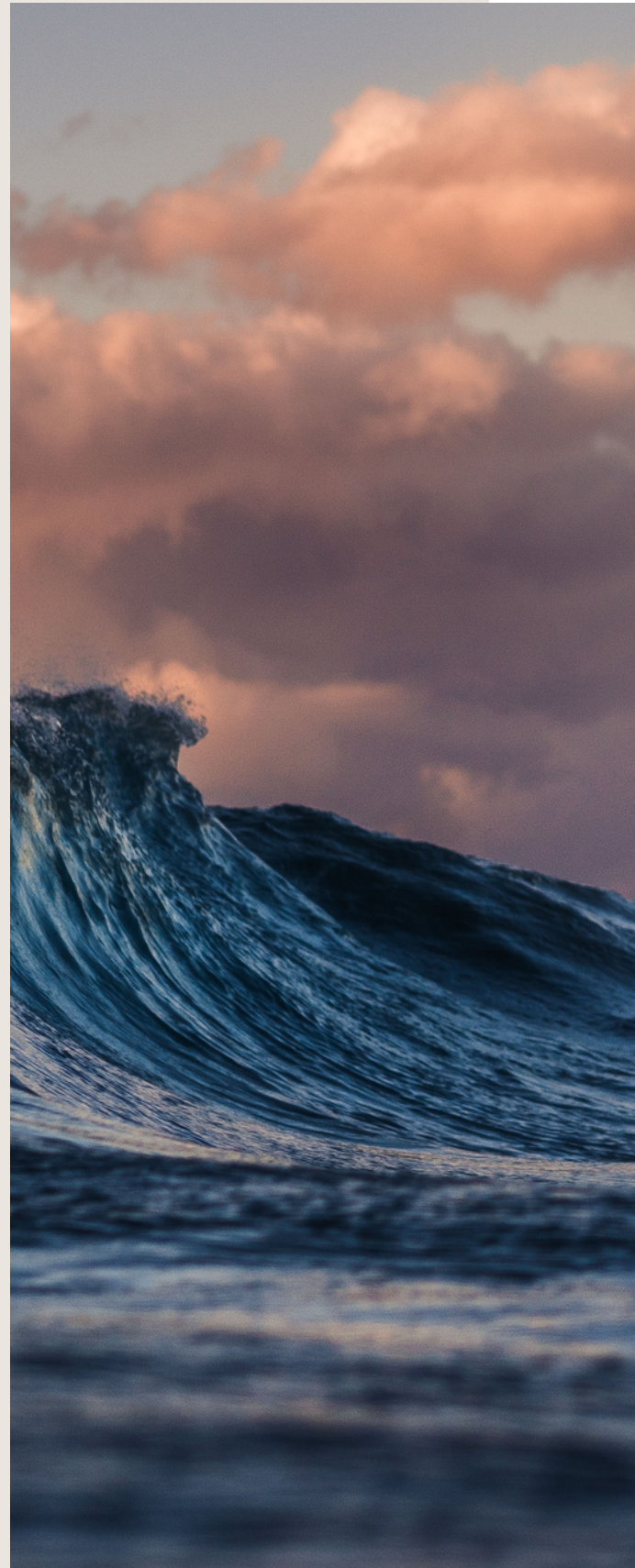
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BlueNalu is a global leader in cell-cultured seafood and is committed to transparency, safety, and collaboration. We will partner with the seafood industry to bring about the greater availability and consistency of seafood worldwide, in a way that is healthy for humans, humane for sea life and sustainable for the planet.

Based in San Diego, California, BlueNalu was formed in 2017, when its founders met in Hawaii to discuss creating an innovative company that would provide a responsible solution to the global demand for seafood. The company's name is derived from the Hawaiian word "nalu," which means both "ocean wave" and "mindfulness."

BlueNalu's team includes experts with extensive experience in each of the disciplines that will be required for global leadership in this category – including food innovation, technology commercialization, cell biology, tissue engineering, bioprocessing, large-scale manufacturing, product safety, and marketing.

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