GREENWAVE

PURCHASING PRACTICES:

Guide for First-Time Kelp Buyers

Last updated April 26, 2024 as part of NOAA Saltonstall-Kennedy Grant

Contact GreenWave's Market Development team (marketdevelopment@greenwave.org) with questions or feedback.

INTRODUCTION

According to NOAA, seaweed farming is the fastest growing aquaculture sector in the United States[1]. Seaweed has a myriad of applications and benefits in industries such as food, agriculture, materials, cosmetics, pharmaceuticals, and nutraceuticals. While this nascent industry offers promising economic, social, and environmental benefits, it faces a number of barriers to success. One of those barriers is mismatched expectations between farmers and prospective buyers. This often results from a lack of shared understanding of the complexities of an emerging supply chain for a highly perishable crop. In 2022, GreenWave, a 501c3 nonprofit, received a NOAA Saltonstall-Kennedy grant to support market development by *Establishing Kelp Purchasing Cycle Best Practices*.

This resource serves as a roadmap for emerging kelp buyers to learn about the domestic seaweed industry and ultimately initiate conversations with farmers or suppliers. The goal is to familiarize buyers with regenerative ocean farming and share some of the many benefits and potential applications of seaweed. It is best suited for companies looking to work directly with farmers and intermediaries who prioritize sustainability, traceability, and social responsibility. By the end of this guide, buyers will be equipped with the information required to have informed conversations and purchase sample quantities for product development.

The content draws from 82 papers and external resources, as well as insights from 25 kelp farmers and buyers. It also references existing trade frameworks and GreenWave's conversations with four industry experts with experience buying and selling commodities, from organizations including Fair Trade and Equal Exchange. These stakeholders directly shaped the development and content in this guide.

PART
01

THE GROWING KELP MARKET

What is Regenerative Ocean Farming?

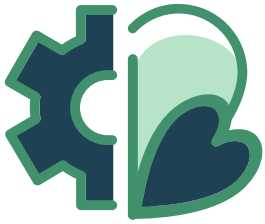
Regenerative ocean farming—a zero-input, polyculture model that grows a mix of native seaweed and shellfish species—absorbs carbon and nitrogen, rebuilds marine ecosystems, and creates viable and sustainable economic activity in coastal communities hard-hit by climate change. In the United States, the shellfish industry is well established, whereas the cultivation and sale of farmed seaweed species is a relatively new industry. Given this context, the resources and sections that follow pertain specifically to seaweed, and specifically cold water kelp species.

Seaweed vs. Kelp

Seaweed is broadly divided into red, green, and brown species. As of 2024, domestic ocean-farmed species are mostly brown seaweeds, also called kelp. Throughout this guide, you will see the terms “regenerative ocean farming,” “ocean farming,” and “kelp farming” used interchangeably. You will also see the terms “seaweed” and “kelp” used interchangeably unless otherwise specified, since both terms are common in the industry, despite our primary focus on cold water kelps.

Environmental Benefits

- Improves water quality via nitrogen and phosphorus intake
- Absorbs carbon dioxide from surrounding water via photosynthesis
- Requires zero inputs—no fertilizer, feed, land, or fresh water
- Offers a habitat for many marine species



Social Benefits

- Provides additional income stream for fishermen impacted by climate change
- Regenerates working waterfronts by creating jobs that utilize existing harbor and processing infrastructure
- Provides a traditional food source for many coastal Native people, enhances food security for remote communities

Resources on Regenerative Ocean Farming

World Wildlife Fund: Seaweed Farming Video Overview

The Nature Conservancy: Global Principles of Restorative Aquaculture

Farmer Stories: Why Regenerative Ocean Farming

NOAA: Seaweed Aquaculture

Kelp Farming 101: What Do Kelp Farms Look Like?

Urban Ocean Lab: Factsheet: Regenerative Ocean Farming and Policy Memo

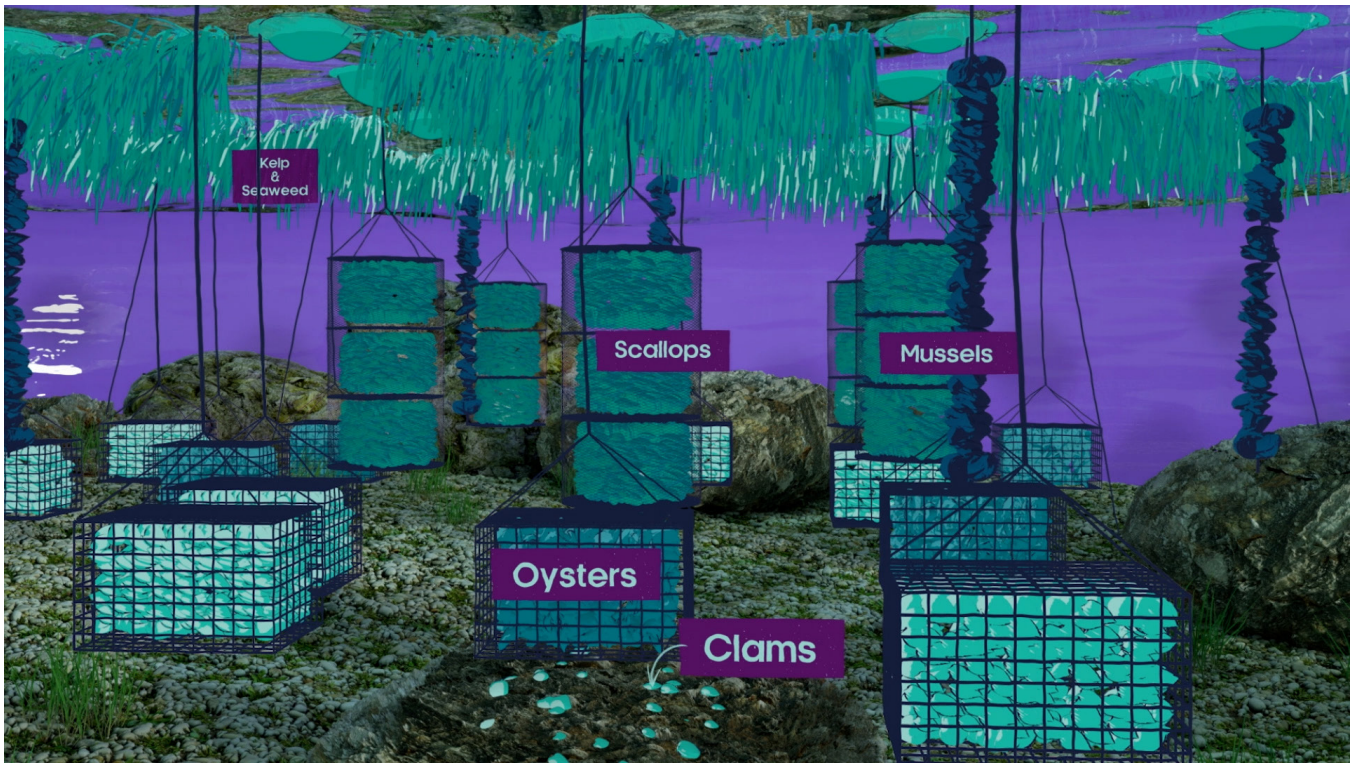


Figure 1. *Image provided by BBC Studios Natural History Unit*

Domestic Seaweed Production and Market Overview

Despite the growth of seaweed aquaculture, the domestic kelp farming industry is still emerging and the majority of seaweed on the market is currently imported.[2] The increase in production presents an opportunity to support kelp farmers in North America through purchasing their crops. Many kelp farmers report a need for additional buyers to scale their production and the industry overall.

The scale of domestic kelp production is an ever-evolving figure. Check out these resources for updated estimates and to learn more about the state of domestic production:

- Seaweed Insights
- Maine Information
- Alaska Information
- Phyconomy
- Sea Grant: Status of the Industry

Production Methods

Ocean farming

Wild harvesting

Tank cultivation

At this time, marine-farmed seaweed, or what we call "regenerative ocean farming," is the more reliable option for producing significant volumes while harnessing benefits to ocean ecosystems.[3] Globally, farmed seaweed production continues to grow, whereas wild harvest output remains relatively constant.[4] In some geographies, wild kelp populations are declining significantly, underscoring the importance of farming as opposed to depleting natural kelp beds.[5] Tank cultivation, on the other hand, requires energy and land and therefore has a larger environmental footprint.

Farmed Seaweed Species

As of 2024, domestic ocean-farmed species are mostly brown seaweeds, also called kelp. Primary species include:

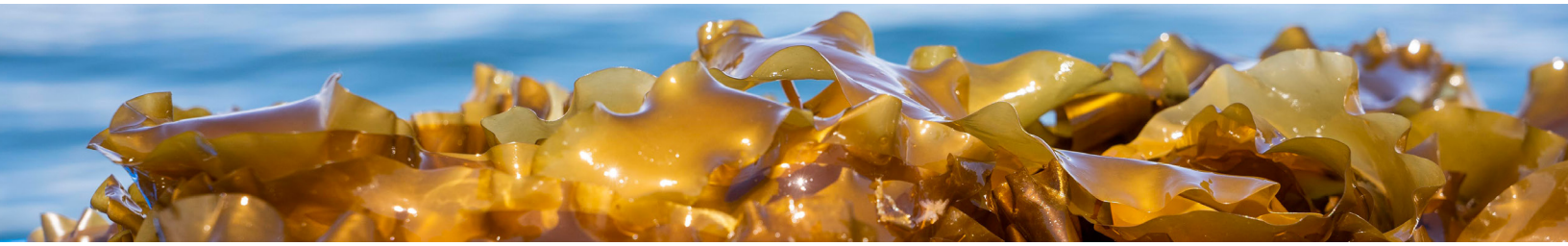
Sugar Kelp
(Saccharina latissima)
Regions: Atlantic and Pacific

Skinny Kelp
(Saccharina angustissima)
Regions: Atlantic

Winged Kelp
(Alaria spp.)
Regions: Atlantic and Pacific

Bull Kelp
(Nereocystis luetkeana)
Regions: Pacific

Giant Kelp
(Macrocystis pyrifera)
Regions: Pacific



Sugar kelp was the first marine-cultivated species in the U.S. and remains the most widely produced.[6] The species listed above are those of current focus for farming in marine environments. However, many farmers are interested in diversifying their crops based on market demand, so if there is a species that you're looking to source, you should reach out to farmers to express interest.

Blade
Flat or leaf-like structures, also known as the thallus, where photosynthesis and nutrient absorption occurs

Stipe
Stem-like, solid or hollow structure of varying lengths, forming the connection between the holdfast and blade

Holdfast
Stiff, knotty, root-like structure that affixes the kelp to a hard surface, such as ocean floor substrate

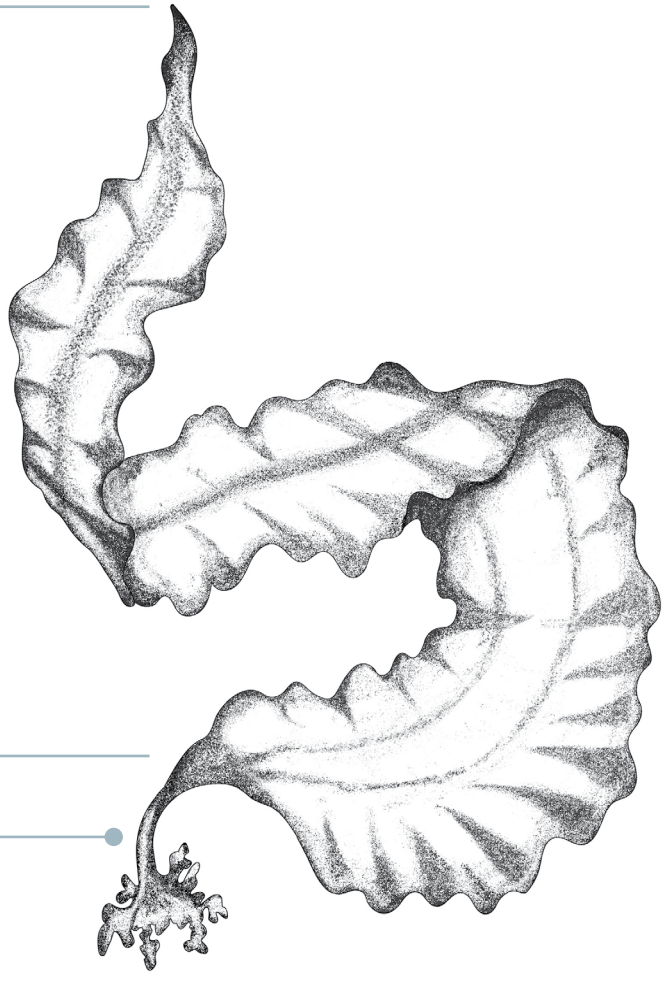


Figure 2. *Diagram of sugar kelp*

Farming Regions

Kelps are cold water species and the primary regions of production in North America include the following (See Figure 1):

- Maine
- Alaska
- Southern New England
- British Columbia
- Pacific Northwest

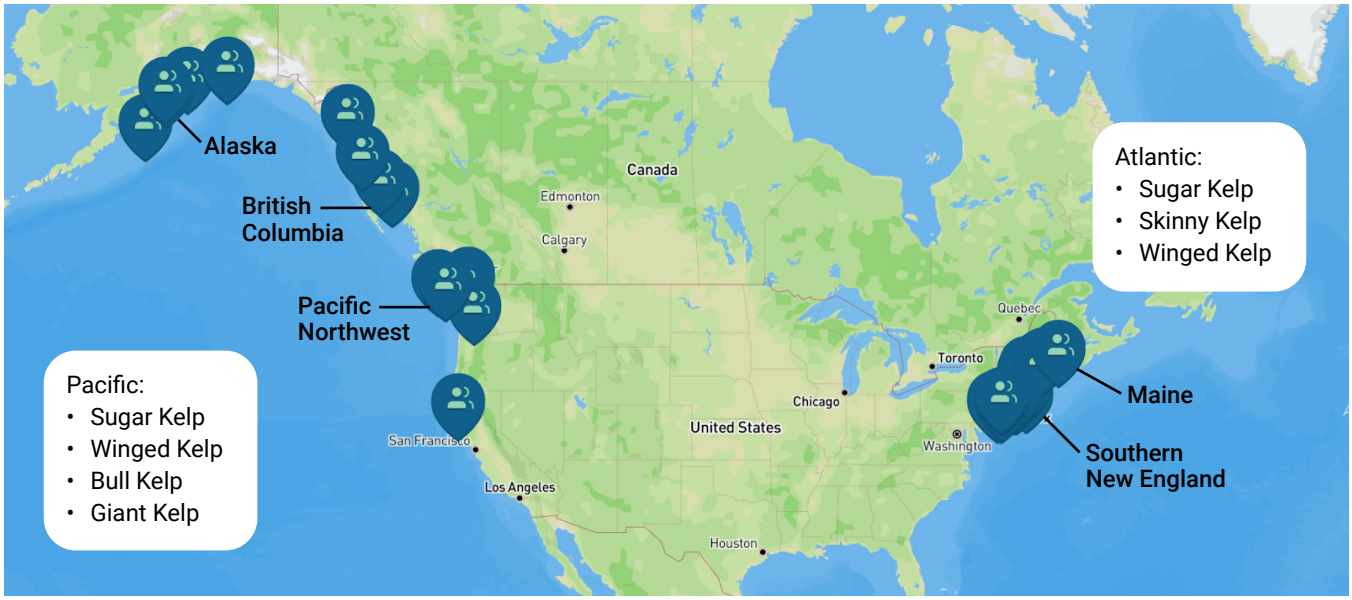


Figure 3. *Kelp Farming Regions in the United States and Canada (Seaweed Source, 2024).*

Supply Seasonality

Most kelp farmers currently operate and harvest on an annual cycle, so it's critical to plan ahead. Since outplanting typically occurs in the fall, farmers make decisions on how much kelp to grow over the summer. We recommend creating forward contracts with farmers from June–August to ensure you'll have adequate supply come harvest the following spring. See below for a glimpse into the typical kelp farming timeline.

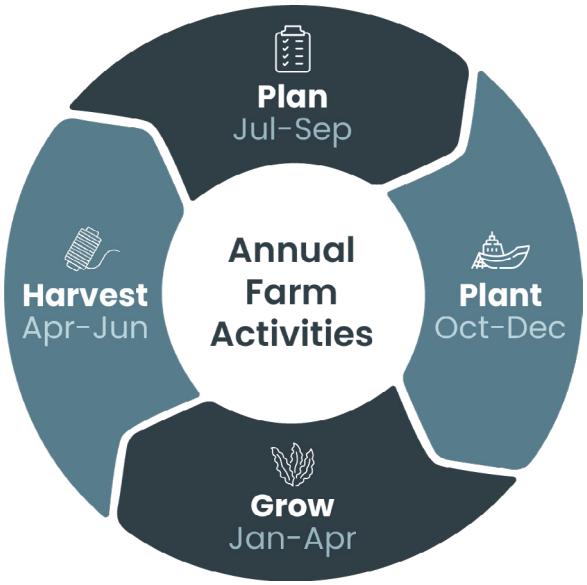


Figure 4. *Annual farming activities*

Plan (July–September):
Throughout the summer, farmers will prepare for the upcoming season by securing proper permits and ensuring equipment is in place. Farmers also work with buyers to decide how much kelp to outplant.

Plant (October–December):
Kelp is outplanted in the late fall and early winter months.

Grow (January–April):
Kelp grows naturally in the marine environment once outplanted. During this time, farmers periodically check on their farms and report growth rates to provide more accurate volume information.

Harvest (April–June):
Kelp is harvested between April and June. Once kelp is harvested, farm gear is removed from the water for the summer season.

Despite this typical timeline, there is wide variation depending on species and location. Farmers can also work with buyers to meet specific timeline requirements. Buyers looking to secure supply need to think ahead, and communicate with farmers early and often.

The Seaweed Value Chain

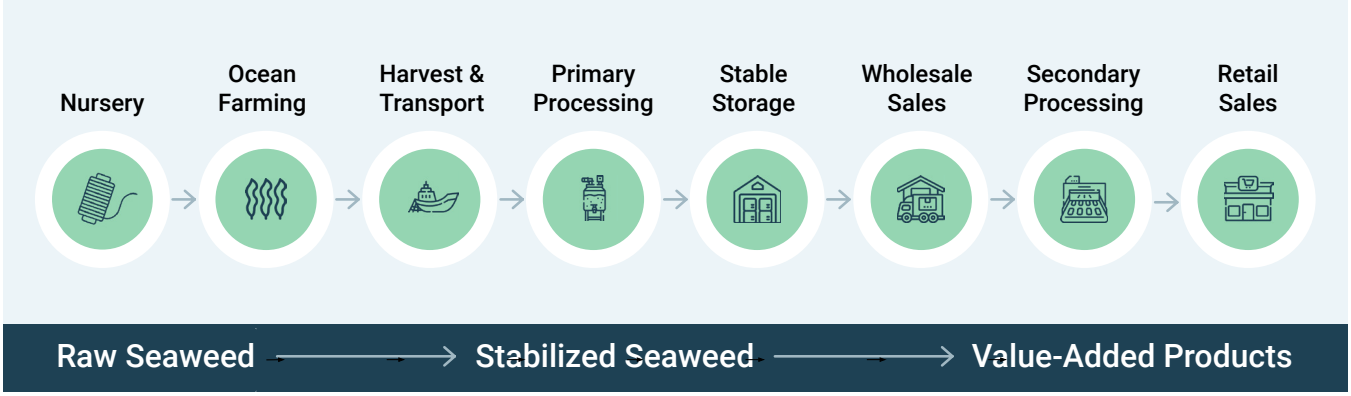


Figure 5. *The Seaweed Value Chain*

Primary Processing

- Due to kelp's perishable nature, there is a very short window (24–48 hours) between harvest and primary processing.
- Primary processing involves stabilizing kelp, with methods such as freezing, drying, and fermentation.
- When choosing a stabilization method, efficiency, preservation of kelp's bioactive compounds, and intended end use should be considered.

Secondary Processing

- Once stabilized, the shelf life of kelp can be extended for several years.
- Secondary processing involves incorporating stabilized seaweed into a value-added product or ingredient.
- Unlike primary processing, secondary processing can happen throughout the year.

PART
02

WHY SEAWEED AND REGENERATIVE OCEAN FARMING?

Functional Benefits and Application of Seaweed

No matter your industry, seaweed can improve your supply chain and product formulation. **This section focuses on the benefits of seaweed species broadly and is not specific to kelp, given the currently available research.** The industries below harness the potential of seaweed, but this is by no means an exhaustive list of potential applications. It's important to note that components, benefits, and results are highly variable based on the type of seaweed and level of inclusion. We recommend working backwards from your intended application and using the scientific papers listed below to identify the best species, components, and inclusion levels to fit your needs.

Functional Components

Due to the limited publicly available research about kelp composition, this table represents components across species. However, each species has very different characteristics. We recommend talking to potential suppliers, as many have conducted testing on their seaweed. You may also choose to conduct additional testing as you build out your supply chain. In the meantime, you can learn more about the biochemical composition of red, green, and brown seaweeds here.

Rich in minerals, including sodium, potassium, chlorine, sulfur, phosphorus, calcium, and magnesium[7, 13]	Source of iodine; brown algae contains the highest average iodine content[7]	High in fiber; with varying levels of soluble fiber[7]
Source of polyphenols, fucoxanthin, fucoidans, terpenes, phlorotannins, polysaccharides, and carotenoids[8, 9, 14]	Contains omega-3 LC-PUFA, which is rare in terrestrial biomass[9, 12]	Contains vitamins, such as C, K, E, A, B-12, and other B vitamins[10]
Source of protein, some species contain all 20 essential amino acids[9]	Rich in micronutrients, including iron, manganese, zinc, and copper[10]	Contains bioactive compounds, including pigments, sterols, peptides, and polysaccharides[10, 13]
Contains hydrocolloids, such as alginates, agar, and carrageenan[11]	Rich in antioxidants, mainly due to the presence of phenolic compounds such as flavonoids[13]	Contains plant phytohormones, including auxins, cytokinins, gibberellins, abscisic acid, and brassinosteroids[15]

Food and Health Applications

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Helps to support bone health, containing 10 times more calcium than cow's milk and is easier for the body to absorb[16, 24]	Supports heart, muscle, and digestive function via iodine, an essential trace mineral required for proper thyroid function [17, 21]	Supports digestion and blood sugar regulation via soluble fiber[18]
Provides anti-inflammatory properties that can help with blood glucose regulation via antioxidants and complex carbohydrates[18]	Provides antihypertensive, anticancer, antioxidant, and anti-inflammatory properties via omega-3 LC-PUFA[19, 21]	Supports overall health and improves nutrition via vitamins C, K, E, A, B-12, and other B vitamins[16]
Provides a nutritious, plant-based alternative to obtaining essential proteins[16, 20, 22]	Can be used as a stabilizing, thickening, emulsifying, and gelling agent, and can also be used to enhance the nutritional value and textural qualities of food products[22]	Can be used as a salt replacement, providing flavor and minerals while lowering sodium content[23, 24]

Cosmetics Applications

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Supports skin and scalp hydration via polysaccharides, which can act as humectants and moisturizers[25, 27]	Contains anti-melanogenesis properties, which improve hypo- and hyperpigmentation[25]	Contains antimicrobial properties, which can serve as a natural preservative in cosmetics products[25]
Contains bioactive compounds, including antioxidants, providing anti-aging properties[25]	Prevents collagen degradation, which helps to retain skin elasticity[25]	Contains anti-inflammatory properties, which can effectively support acne prevention[25, 26]

Pharmaceutical & Nutraceutical Applications

© WoundSource

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Balances metabolism via iodine, an essential trace mineral required for proper thyroid function[33, 29, 37]	Supports weight management and antidiabetic treatments via polyphenols and fucoxanthin[35, 30, 28]	Contains terpenes, phlorotannins, polysaccharides, and carotenoids, which are used in anticancer treatments[36, 28, 37]
Helps to create a moist healing environment via alginate fibers that make for optimal wound dressings[32]	Provides antioxidant, antiangiogenic, and anti-inflammatory protections via fucoidans and fucoxanthin[34, 35, 28, 37]	Provides protective effects for liver, brain, skin, eyes, and bone health via fucoxanthin[31, 28, 37]

Biostimulant Applications

© Pacific Northwest Organics

© AgriSea

Stimulates improved shoot growth, earlier flowering, and more uniform fruit size and ripening, contributing to higher yield and quality of crops[38, 40]	Improves post-harvest food crop quality, including shelf life and storage quality[38, 40, 41]	Increases tolerance to abiotic stressors, including drought, salinity, extreme temperatures, and nutrient deficiencies[38, 39, 40]
Promotes root nodulation, lateral growth, length, density, and overall architecture, leading to enhanced absorption of nutrients[38, 39, 40]	Enhances nutritional content of food crops through increased levels of vitamins, minerals, and micronutrients[38, 40]	Increases activity of beneficial soil microbes, including rhizobacteria and mycorrhizal fungi[38, 39, 40]

Note: While the precise causal mechanisms of seaweed biostimulants are not well understood yet, an increasingly large body of scientific work suggests that they are nonetheless extremely effective for plant and soil health.

Animal Feed Applications

Improves feed conversion ratios, leading to more rapid growth with fewer inputs[42, 47]

Improves gut health through microbial and immune modulation[44, 45, 48, 49]

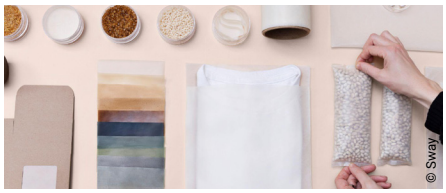
Increases levels of desirable omega-3 fatty acids in fish[43, 44]

Reduces methane production in ruminant livestock[42, 46, 48, 49]

Reduces prevalence of pathogenic bacteria counts in poultry[47, 49]

Improves color of chicken egg yolks[8] in addition to fish skin and flesh[43, 47]

Materials Applications



Forms edible films with high tensile strength via polysaccharides, such as carrageenan, alginate, and agar[50]

Holds texture and aroma and prevents discoloration in fresh food packaging[52]

Provides UV protection properties via flavonoids and mycosporine-like amino acids (MAA)[53]

Improves thermal insulation of natural building materials such as cob[54, 55]

Confers antioxidant, antimicrobial, anti-inflammatory, and anticoagulant properties to medical textiles[53]

Provides a biodegradable alternative to plastic, reducing plastic waste streams and dependence on hydrocarbon inputs[51, 53]

02 Why Seaweed and Regenerative Ocean Farming?

What functional benefits are you hoping to incorporate in your products?

Resources with in-depth looks into the components and applications of seaweed:

WWF: WWF Kelp Value Machine

USDA Food Data Central on Nutrition: Seaweed, Kelp, Raw

Science Direct: Nutritional Composition of Selected Seaweeds

NIH: Seaweed's Bioactive Candidate Compounds

What Are the Environmental Benefits of Kelp Farming?

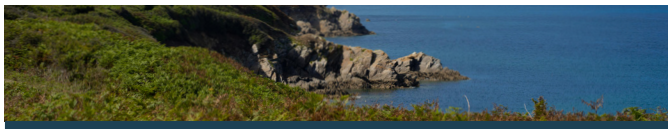
Beyond the functional applications, regenerative ocean farming has a myriad of benefits that can help your business improve sustainability metrics and replace carbon-intensive inputs. Check out this resource comparing seaweed to other feedstocks!

Here are examples of how kelp farming benefits can align with your organization's sustainability goals:

Become carbon neutral

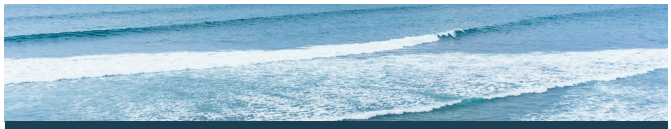
Using seaweed can reduce your reliance on other carbon-intensive inputs and ingredients. Seaweed also captures and stores carbon as it grows; however, more research is needed to understand the long-term carbon sequestration potential.

- Watch GreenWave's webinar to learn more about The Science of the Environmental Benefits of Kelp Farms



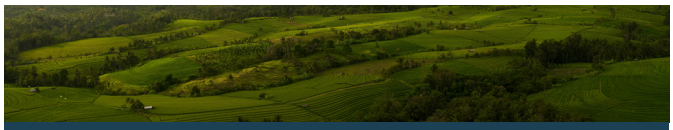
Conserve local ecosystems and protect the shoreline

Farmed kelp can dampen wave energy up to 33%, protecting coastlines against erosion and coastal storms.[57, 58]



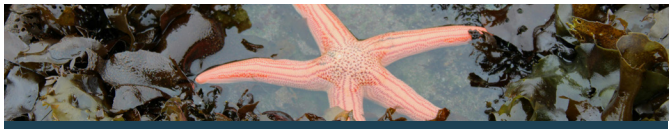
Help mitigate ocean acidification and improve water quality

Seaweed removes excess nitrogen, phosphorus, and carbon from the water through nutrient uptake, helping to mitigate harmful algal blooms and local ocean acidification.[57]



Reduce reliance on land use

Seaweed can serve as an alternative to agricultural practices with a larger carbon footprint and reduce our land-use burden.[56]



Increase biodiversity and provide habitats

Improved water quality increases the growth of seagrasses and creates habitats, promoting local marine biodiversity.[57, 59]

Reduce reliance on fossil fuels

Seaweed can act as an alternative to fossil fuel-intensive products, including fertilizers and traditional plastics.[57]

Conserve water

Unlike land-based crops, seaweed requires no fresh water to grow.

02 Why Seaweed and Regenerative Ocean Farming?

List your company's sustainability goals, whether already established or something you're working to implement.

Note how seaweed can help you reach these sustainability goals.

These resources have helpful data points on seaweed's impact on the environment:

- The Science of the Environmental Benefits of Kelp Farms
- The empirical evidence for the social-ecological impacts of seaweed farming
- Packaging Feedstocks: A Comparative Landscape
- Farming the Ocean – Seaweeds as a Quick Fix for the Climate?
- Seaweed: A potential climate change solution

How Does Seaweed Help My Company with Our Social Mission?

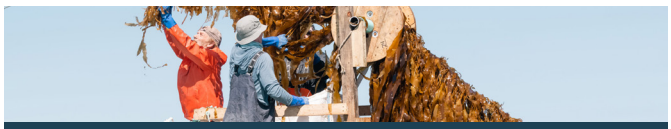
Using seaweed in your products shows a commitment to sustainable and socially responsible business practices. Working directly with farmers enables you to set up a socially responsible supply chain that serves not only your business, but those producing seaweed.

Provide economic opportunities

Seaweed provides jobs where traditional industries, such as fishing, may be declining.[60] It also represents an economic opportunity for coastal and rural communities disproportionately impacted by climate change.[61]

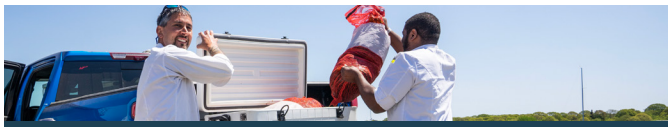
Help fishermen diversify and operate year round

Seaweed farming is complementary to many fishing and shellfish businesses, diversifying reliance on a single species and thereby increasing the resilience of small businesses. Seaweed can provide additional income for coastal residents and those making their living primarily on the water.[57]



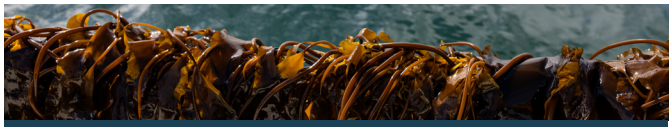
Work with small businesses

The majority of seaweed farms are small businesses. Farming seaweed can enable families to continue working on the water.



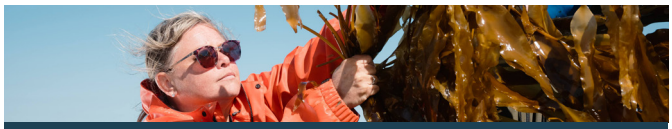
Establish direct farmer relationships

Working directly with farmers or domestic suppliers enables you to support independent businesses and tell their story to your consumers.



Support Indigenous food sovereignty

Seaweed farming is an opportunity for food sovereignty for Indigenous communities.[62] Coastal Tribes have relied on wild harvested seaweed as a food source for thousands of years. Farming provides an opportunity to reconnect with traditional foodways and is a local source of nutrient-rich food in remote communities.



Bolster diversity within the working waterfront

Seaweed farming provides opportunities for women and others historically not represented in working waterfronts.[63]

Develop a transparent supply chain

Working with local seaweed farmers ensures shorter supply chains and provides insight into the direct source of your ingredients.

Foster food security

Kelp can help feed the population far into the future. The FAO estimates that using just 0.03% of the ocean's surface can add up to 10% of the world's present food supply.[64]

02 Why Seaweed and Regenerative Ocean Farming?

How can seaweed be a part of your organization's social mission?

Take a look at these resources to learn more about how seaweed can help support your company's social mission.

- Meet the Kelp Farmers at Atlantic Sea Farms
- Seaweed Farming Benchmarking
- Cultivating Food Sovereignty Through Regenerative Ocean Farming

PART
03

ESTABLISHING YOUR SOURCING SPECIFICATIONS

What Are You Looking to Source?

You'll want to ask yourself the following questions about your sourcing needs before reaching out to farmers or suppliers. At this point in your process, you may not have all the answers, but beginning to gather this information will show suppliers you are serious when discussing potential partnerships. You may also wish to refer to the Working With Farmers section (page 28), before answering these questions.

Species

Which functional characteristics are most relevant to your company and products? Are you looking to source from a specific region or do you require large volumes? Based on these factors, which species are you most interested in sampling?

Examples

Sugar Kelp (Atlantic and Pacific, largest volumes)	Skinny Kelp (Atlantic)	Winged Kelp (Atlantic and Pacific)
Bull Kelp (Pacific)	Giant Kelp (Pacific)	

Geography

Where are you looking to source from?

Examples

USA - Alaska	USA - West Coast	Canada - Atlantic Region
USA - New England	USA - Long Island Sound	Canada - West Coast

Stability and Format

Do you have processing capacity, or will you rely on a farmer or processor to stabilize your kelp? What stabilities are you interested in sampling for product development?

Examples

Dried	Frozen	Extracted

Are there specific formats you're looking to source?

Examples

Stipe only	Blade only	Whole kelp

03 Establishing Your Sourcing Specifications

Volume

What volume are you looking to source over the next year? In 2–3 years?

Examples

Purchase by the pound (small-scale) *Restaurants, sample products, boutique retail, tourism-based companies*	Bulk orders in hundreds to thousands of pounds (medium-scale) *Food production (CPG or large foodservice), cosmetics, nutraceuticals, textiles, kelp processors*	Purchase by the ton (large-scale) *Large food production companies, biostimulants, agriculture, materials, ingredients, kelp processors*

Timeline

What's your timeline for purchase? When do you plan to create commitments to your suppliers? Keep in mind the seasonality of kelp will impact your ability to purchase at various times of the year. Plan ahead!

Examples

This year (ie. this spring harvest)	Next year (ie. next spring harvest)	In 2+ years

Certifications

Do you want to work with a farmer or supplier who is organic certified? Do you require other certifications or documentation, such as food safety, sustainability, etc.?

Quality

Do you have any specific quality requirements? For more information, refer to the GreenWave's kelp quality curriculum.

Examples

Color	Texture	Growing location
Temperature	Taste profile	Moisture
Size of blade or stipes	Trimming	Sorting
Biofouling levels	Washing	Nutritional contents
Farming practices	Harvesting practices	Storage practices

Logistics

Do you have transport or logistics capabilities that you can offer to farmer partners? Do you need your supplier to handle these logistics on your behalf? Write down your ideal arrangement and what you are willing to compromise on.

Partnership Requirements

Do you want to work directly with a farmer or an intermediary supplier? Working directly in a farmer partnership may involve more logistics and processing requirements in exchange for lower pricing.

Examples

Direct Farmer Sourcing (fresh/raw kelp)	Direct Farmer Sourcing (processed kelp)	Processor Purchasing
Purchase fresh kelp from a farmer and handle stabilization and processing (lowest pricing for kelp, requires both primary and secondary processing)	*Purchase stabilized kelp from a farmer and handle further processing (higher pricing, but purchasing a stable product that can then be easily transported and stored)*	*Purchase from an intermediary who handles direct farmer relationships and processes kelp into a format that meets your needs (higher pricing in exchange for streamlined logistics)*

Pricing

What price range makes sense for my business? What trade-offs will I accept in exchange for pricing? Am I willing to pay a premium for specific quality or certifications?

Priorities

What are my main priorities? What might I be willing to compromise on?

PART
04

WORKING WITH FARMERS

04 Working with Farmers

When building your supply chain, you have the unprecedented opportunity to drive change through your purchasing decisions. Direct trade with farmers enables you and your partners to rearrange relationship dynamics between those who produce food and those who buy it. In this emerging industry, it is in your hands to ensure that the power structures and mistakes of industrial agriculture are not repeated. By prioritizing collaborative partnerships, you can support a unified vision for an equitable, transparent, and resilient supply chain.

This section focuses primarily on direct farmer relationships, but the concepts apply to all supplier relationships. In fact, many companies take on multiple roles in the seaweed value chain, enabling the industry to move beyond a farmer versus processor dichotomy when evaluating suppliers. Working closely with partners creates tight feedback loops, supports traceability and sustainability goals, and allows you to design relationships that are optimal for both parties' unique business needs. To learn more about the benefits of direct sourcing, check out this resource from the USDA.

Having direct relationships with farmers enables:

Streamlined and open communication
Receive accurate and detailed information about your supply, negotiate directly with the farmer, and work collaboratively to shape farming practices to meet your needs

Mutual growth and support
Share resources and information, and grow in a coordinated, collaborative manner

Marketing and storytelling
Work with farmers to share their stories with customers, who are increasingly interested in where their products come from

Supply chain transparency
Have increased visibility and control over your supply chain, thereby influencing the quality and sustainability of your product

Economic benefits
Obtain the best pricing possible while simultaneously ensuring farmer profitability, allowing your suppliers to operate year after year

Values alignment
Team up with farmers whose business practices align with your own, such as specific sustainability, labor practices, or certifications

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Additional buyer responsibilities when working directly with farmers:

Increased operational complexity
Expect to transport and stabilize fresh kelp, unless the farmer is handling primary processing

Practice verification
Ensure the farmer has certifications and practices that match your needs

Aggregation of supply
Be prepared to source from multiple suppliers to secure large volumes unless you're partnering with a large operation or farmer cooperative

Advanced planning
Forecast your supply needs 8–10 months out to secure kelp from a farmer

Intentional relationship building
Prepare to spend time and energy building relationships and trust with your potential farmer partners

Based on these challenges and benefits and your answers to the sourcing questions in the previous section, you likely have a sense of whether or not direct farm partnerships are the right fit for your business. However you choose to proceed, farmers are a critical piece of the value chain. By carefully considering how to structure your partnerships, you have the opportunity to build a sustainable and scalable supply chain for your business.

Models and Lessons Learned on Land

Established models for working directly with farmers exist in land-based agriculture, and many of these practices can be modified and applied to farming in the ocean. Most established trade models were developed for companies in the global north working with suppliers in the global south. Domestic and ocean-based purchasing relationships may look different, but many best practices still apply.

Fair Trade is a widespread example of a product certification and standard for trade. It's based on the understanding that small-scale producers are among the most marginalized, yet often most important, in the global trade system.[65]
For farmers and workers, Fair Trade means:

- Prices that aim to cover the average costs of producing their crop sustainably - a vital net when market prices drop
- The Fairtrade Premium - an extra sum of money paid on top of the selling price to invest in business or community projects of their choice
- Decent working conditions and a ban on discrimination, forced labour and child labour
- Access to advance credit ahead of harvest time
- Being able to plan more for the future with more security and stronger relationships with buyers

Note: Definition of Fair Trade from Fairtrade International[65]

Farmers play an important role in shaping these standards, which exist primarily to protect both farmers and workers.[65] Although there are many benefits to certification, Fair Trade can lead to operational burden on both producers and purchasers since it requires detailed documentation to obtain certification, and payment of auditing costs and certification fees.[66]

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Another widely recognized model is direct trade, commonly referenced in coffee trading. While there is no official definition of direct trade, the primary goal is to eliminate intermediaries in the supply chain, creating direct relationships between farmers and buyers. It is often used for specialty products with a focus on high quality, as it gives buyers more visibility and input into the production process. The costs saved by avoiding intermediaries is often passed onto producers as a premium price for their product.[67]

Some practices that are often associated with direct trade include:[67]

- Minimum purchasing agreements and advanced forecasting, allowing farmers to plan for future harvests
- Close relationships, including frequent producer visits, every 1–2 years at minimum
- Traceability and a commitment to sustainable environmental and social practices
- Additional buyer support to improve quality, which could include trainings, knowledge sharing, or investment in equipment or infrastructure

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Think about what aspects of these models you might include in your own processes and list them below.

For additional information on Fair Trade and direct trade, you can refer to the following resources:

Fair Trade USA: Fair Trade Standard

World Fair Trade Organization: WFTO Trade Standard

Food Made Good: What Is Direct Trade

Beyond Fresh and Direct: How Can Sourcing Directly From Farmers Benefit Specialty Food Manufacturers?

Establishing Farmer-Forward Communication Practices

From your first contact with a farmer or supplier and throughout your partnership, intentional communication is fundamental to building relationships. Miscommunication with your suppliers can result in lost product and supplier turnover, leading to last-minute logistical scrambles, or even an inability to source sufficient quantities.

Given the historical context and power dynamics between farmers and buyers, early communication is an especially critical stage in relationship building. Purchasing relationships extend beyond one-off transactions, and begin with learning about your potential partner and their unique motivations for running their business. The more you listen and understand what drives an individual, the more effective you'll be in building trust, creating a solid foundation for growth, and negotiating later on.

Here are some tips from suppliers about effective communication, adapted from the Better Buying™ Institute, a nonprofit dedicated to improving supply chain sustainability:[68]

- **Ask about preferred communication methods**
  - Farmers may hold different "office hours," so ask potential suppliers the best way to reach them. It could be as simple as picking up the phone to call them rather than sending an email.
- **Establish quick feedback loops early on**
  - Schedule dedicated time to provide feedback after every product shipment, regardless of how small (e.g. a sample).
  - Do not hesitate to pick up the phone and call if something urgent needs to be addressed!
  - If you have a specific product development point person, think about putting them in direct contact with your supplier after initial conversations.
- **Consider how feedback is delivered**
  - Remember to share positive feedback and appreciation as well as constructive feedback.
  - When sharing constructive feedback, provide clear direction for how a supplier can improve as opposed to simply telling them what went wrong.
  - Give suppliers the opportunity to rectify critical issues when they arise.

- **Listen to and leverage your farmers' expertise**
  - Ask suppliers for ideas to solve problems.
  - If you don't initially understand a farmers' idea or concern, ask clarifying questions—there might be something you're missing!
- **Share your goals and find commonalities**
  - Make sure you understand your suppliers' motivations, and be open and transparent about yours.
  - Whenever possible, align your needs with suppliers' needs.
  - Identify long-term, big-picture goals you can help each other achieve.
- **Communicate about potential challenges and constraints**
  - Share common challenges that exist on your end as they may not be obvious to potential partners.
  - Ask farmers about production constraints such as storms, biofouling, and poor seed quality to shape expectation and build empathy.
- **Be transparent**
  - Share how you evaluate suppliers at the beginning of the relationship, and be honest about how the relationship is going.
  - Make your product specifications as clear as possible. Have multiple conversations with your suppliers to confirm understanding.
- **Avoid back and forth communication**
  - Align all team members internally before communicating with suppliers.
  - Ensure all details are finalized before issuing official documents.
  - Consider designating a single point of contact for each supplier to avoid sending confusing or conflicting messages.
- **Co-develop communication systems and processes**
  - Establish a regular meeting schedule (e.g. monthly Zoom calls) to build rapport and hold space for sharing non-urgent feedback and updates.
  - Discuss structures that might enhance meeting productivity, such as meeting agenda templates.
  - Map out a seasonal calendar that provides sufficient time for each step. When delays occur, review the timeline and adjust accordingly.

Not every conversation will be easy, especially as partnerships progress. If you'd like to learn more about how to improve your communication skills, we recommend the following resources:

Supercommunicators, by Charles Duhigg

Crucial Conversations, by By Joseph Grenny, Kerry Patterson, Ron McMillan, Al Switzler, Emily Gregory

Nonviolent Communications, by Marshall B. Rosenberg, PhD

Planning and Forecasting

The need for accurate forecasting is compounded for seaweed farmers and buyers given the seasonal harvest schedule. Farmers decide how much to outplant in the later summer and early fall, so this is an ideal time to create your forecasts together.

In addition to enabling you to secure supply, accurate forecasting allows suppliers to prepare their operations. They can ensure consistent work for their employees, and implement any necessary changes to meet your needs. Suppliers prefer working with buyers who provide detailed forecasts far enough in advance, especially those who continue to improve the accuracy of their forecasts over time.[69] For kelp, this means forecasting over the summer for the following spring harvest.

What is considered an "accurate" forecast?

The Better Buying report suggests that according to suppliers, their ideal standard for an "accurate" forecast is within 10% of the amount actually purchased.[70] This report is based on the apparel industry, so it's up to you and your partners to build in your own margin or error for a perishable crop. Given the unpredictable nature of farming in the ocean, it can be challenging for farmers to predict seaweed yields early in the season and a certain amount of flexibility is necessary for both parties. From the buyer's side, forecasting further in advance may feel more uncertain, but "there is no significant correlation between the number of days in advance of production that forecasts are provided and the accuracy of those forecasts."[70]

Develop forecasts with your supplier from the start

Multi-year forecasting from both parties can benefit your business and help you grow together with your partner. However, your primary forecast will be for the upcoming season. The more detail this forecast includes, the better. Include specific product quality needs and timelines for shipment along with volume projections. Farmers should also provide forecasts for their production volumes. Seaweed buyers recommend that you are very specific with each supplier about what they're able to deliver based on past harvests.

Over communicate and stay flexible

Aspects of your forecasts may change over time, and farmers may request changes as well. Flexibility is needed on both ends. The earlier you communicate about changes, the better. It can be beneficial to set up a regular cadence for checking in about your forecasting, such as once per month.

Last minute, large-scale forecasting changes can hurt both parties. Failing to follow through on your projections may impede your ability to work with suppliers in future seasons. In order to establish trust, you should take responsibility and work through inaccurate forecasts together.

Follow through on commitments

So if there's some room for adjustment, what does it mean to follow through on your commitment? You'll have to decide this with your supplier, but here are some recommendations adapted from the Better Buying™ report:[69]

- Commit to all orders being within a certain percentage of your forecasts. You'll have to decide what number works for you and your partners.
- Lock in your individual purchase commitments as harvest approaches. Decide what quantity from your forecast you agree to purchase on what date (you can use a specific purchase order to facilitate this).
- In the rare case where you truly cannot follow through on your commitment, get creative about how to support your supplier through this difficult time. You could think about placing a deposit for a future order, going on a payment plan, etc.

Questions to consider asking your suppliers:

1. What have been your experiences working with other buyers? How can this shape our forecasting model and processes?
2. What is your preferred timeline to receive our overall forecast? What is your preferred timeline for specific purchase orders?
3. When are you able to offer a production forecast? How does the level of accuracy change as the season progresses?
4. What level of detail should we include in our forecast?
5. What do you consider an “accurate” forecast? What is a manageable margin of error, and how does this change as order dates approach?
6. How can we track inaccuracies together to improve future forecasting?
7. How will we manage the financial and logistical implications of inaccurate forecasts in various scenarios?
8. What will our process be for incorporating changes or adjustments over time, either to supply needs or production capacity?
9. How often should we check in about our forecast? What should we cover in these check-ins?

Pricing

Pricing is often a sensitive topic, but finding a price that works for both parties is a key factor in your ability to do business together. Some suppliers have established pricing and may or may not be open to negotiation. If they are open to it, you'll want to engage in fair negotiation.

Pricing and payment terms are aspects of relationships where the power imbalance between buyers and suppliers is most visible. Downward price pressure has historically created slim or nonexistent margins for farmers, leading to increased risk of business closure. You need your suppliers to be around in the future, so ensuring they can cover their costs—and have some money left over to invest in improvements—is critical for your own business success. Covering the true cost of production enables your suppliers to think about growth opportunities for their business, and implementation of safer working conditions and more environmentally friendly practices.[71]

How to Communicate About Pricing

Open conversations with a discussion of how each party thinks about and determines pricing, rather than stating specific price point expectations.

Talk through questions such as:

- What is the actual cost of production for this farmer or supplier?
  - What does it cost the farmer today, and what it will cost them to produce the way you both want them to now and into the future?
  - How can you support your farmer to achieve profitability?
    - Asking your supplier their production costs doesn't mean you require suppliers to prove this information or report all costs, which can lead to scrutiny. However, it is okay to ask for clarity as to what goes into establishing this cost of production.
- Are you able to offer premiums for kelp of a certain quality or format?
  - Are you able to offer a lower price for biofouled kelp?
  - Are you interested in purchasing whole kelp, or some subset of blades, stipes, and holdfasts?
  - Are you willing to pay more for specific certifications, formats, or qualities?

- How does pricing relate to volume?
  - Is the farmer able to offer more competitive pricing for higher volumes, or longer-term commitments?
  - Does the buyer have expectations about how pricing might change with increased volumes?
- What is the value of data, storytelling, or marketing assets provided by the supplier? Consider environmental, social, and governance (ESG) data, photos and videos, quotes or business anecdotes.
- What are all the factors that contribute to price determination? Are there ways you can work together to control or lower those factors over time?
- Are there factors that may raise pricing in the future, such as inflation or wage increases? How can you build those into your financial models now?

Once you've answered these questions, you can discuss desired prices on both sides. This will require being transparent about what price makes sense in order for your business to maintain a reasonable margin. You can also think about the market price, prevailing differences, and certifications.

The calculation of Fair Trade price, as stated in the Fair Trade Standard[72], begins with relevant market price and adds prevailing differentials, such as quality or origin, plus certification differentials such as organic. Since there is no established market price for domestic seaweed, you can look to established businesses for pricing information and discuss pricing models with potential suppliers.

When should the price be set?

Set a target price before beginning product development. Then, pilot your estimated pricing structure when purchasing sample quantities. Even with a small purchase, both parties gain insights into their true costs, and it will ultimately be an exercise in building trust and transparency. You can then continue long-term pricing conversations with additional insights and information.

What are your payment terms?

Payment terms are another way to support your farmer partners. Farming is a capital-intensive process. Across agricultural sectors, farmers frequently encounter cash-flow issues as the harvest approaches and funds from the previous season run out. Are you willing to pay farmers a portion of the bill up front? How quickly can you pay upon receipt of the product? You'll want to negotiate with your supplier to find a solution you're both comfortable with. A common practice in land-based agriculture is to make payment within 30 days of receiving a product. Many companies agree to make payments earlier to adopt farmer-friendly practices.

Win-Win Negotiation

Although your needs will sometimes be at odds with your partner's, negotiation is an opportunity for both parties to establish an agreement where you both win. One of the best practices in negotiation is giving first. More specifically, take the time to understand and communicate what you can offer the other party first, so they are more willing to accommodate your requests later on. Understanding what's most important to your potential partner and addressing their most pressing needs will also make you a skilled negotiator. You can't expect to have an inherent understanding of this, so talk to suppliers about what you might be willing to offer or accept.

Terms to negotiate:

- **Volume** - How much kelp do you need? Can your supplier provide a lower price for larger volumes?
- **Quality** - Who determines quality and how? What can you offer for higher quality?
- **Certifications** - Do you require organic or food safety certifications? How can you support your suppliers logistically or fund the certification process?
- **Timing** - Can you be flexible with the specific date you receive the kelp? Do you need to schedule this ahead of time or can you be flexible with your supplier? Since kelp grows in the ocean, farmers must take into account the weather conditions for harvest!
- **Margin of Error** - What margin of error are both you and your supplier willing to accept for your forecast? How does this change over time?
- **Logistics** - What can you take on versus what do you expect your supplier to manage and pay for? Are you willing to handle more logistics to obtain a lower price?
- **Processing** - If you plan to outsource processing to your suppliers, how will they be compensated for work and materials?
- **Financing Opportunities** - Can you help your suppliers find loans or other financial opportunities?
- **Equipment, Materials, and Inputs** - Can you provide a suite of offerings that potential partners may leverage? Would offering equipment or materials benefit the suppliers you are working with?
- **Training or Technology** - Can you provide technology or training for suppliers to support improved efficiency or help meet your needs? Can you connect them to other resources?

- **Price** - How do the factors above impact your target price? What ideas do your suppliers have to reduce costs without placing financial pressure on their business?
- **Transportation Costs** - Are you able to pay for shipping and/or packaging? From some areas, shipping costs are very expensive and some emerging farmers may not be able to cover the costs upfront.
- **Payment Terms** - Can you send advance payments to farmers? If not, would you pay a portion up front? How quickly can you pay upon receipt of the product?

When it comes to negotiation, consider the what as well as the how. The Better Buying™ report outlines some recommended best practices as well as practices to avoid.[71]

Recommended best practices:

- Share target prices further in advance to avoid wasting suppliers time and effort.
- Be open to your suppliers suggestions and needs. What does your supplier say is reasonable? What could be changed to hit the target price?
- Stick to your commitments and avoid multiple rounds of cost negotiation or re-negotiation after an agreement is reached.
- If you must make significant changes to order volumes, quality, or format, notify your supplier as soon as possible so they have time to adjust to changes in expectations, or to find an alternative outlet for selling their product.
- Provide feedback to suppliers. If you declined to work with a supplier because of price or another factor, this is helpful for them to know.
- Provide enough time for suppliers to work out pricing based on your specific agreement.

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High-pressure strategies to avoid:

- Take it or leave it—forcing the supplier to meet your demands without willingness to negotiate
- Assuming prices will be maintained from year to year, without consideration for inflation or other increases to cost of production
- Asking for a price commitment based on a larger volume than you actually intend to order
- Fatigue-producing tactics, such as constantly calling or emailing, many rounds of negotiation, and multiple rounds of changes
- Requiring suppliers to meet specific elements of other suppliers' cost structure
- Comparing suppliers on price alone versus a holistic view of the partnership
- Not allowing sufficient time to respond to communications
- Increasing requirements without increasing price

If you'd like to learn more about negotiation, we recommend the following books:

Getting to Yes, by Roger Fisher, William Ury, and Bruce Patton

Good for You, Great For Me, by Lawrence Susskind

Never Split the Difference, by Chris Voss

Building Lasting Relationships

One of the best ways to build a scalable and sustainable business is to build lasting relationships with suppliers. Even if you're only in the beginning stages of working together, having a long-term mindset can set the tone of your partnership from the start.

The Better Buying™ report[73] and the Common Framework for Responsible Purchasing Practices[74] offer some advice in this area:

- Aim to have direct relationships with your suppliers, even when intermediaries are present. If intermediaries are present, make sure they are informed and aligned around your partnership goals.
- Be transparent about strategic plans and treat your suppliers like equal business partners. True partners bring suppliers into conversations about future business and listen to the suppliers' ideas and concerns.
- Formulate agreements on mutual responsibilities for responsible purchasing. Ask: "If I'm asking my suppliers for a specific business practice, can I uphold this practice on my end as well?"
- Hold each other accountable and honor your commitments.
- Offer meaningful incentives to motivate your suppliers.
- Share the financial burden with your suppliers.
- Avoid proprietary audits or assessments which create unnecessary logistical burden for your suppliers.
- Evaluate your partnership holistically and set up a regular cadence and structure for check-ins. Don't be afraid to pivot.
- Find win-win solutions, such as sharing storytelling opportunities or ways to improve suppliers' operations to increase efficiency.

PART
05

PARTNERSHIPS IN PRACTICE

05 Partnerships in Practice

If you've made it this far, you're ready to begin conversations with farmers. You have enough information to facilitate initial discussions and purchase sample quantities for product development.

Use the prompts and questions below to guide your first conversations with potential suppliers:

- Tell your partner about yourself and business (location, team, years in operation, founding story, what drives you, your mission, vision, and values).
- Share your future plans (what are your 1, 3, 5-year plans, why are you looking for suppliers).
- Ask your partner about their motivations, values, and goals to uncover commonalities.
- Share your projected volume needs and ask the supplier about their production capacity.
- Share your must-have certifications, food safety standards, and quality needs to see where they align with your potential supplier. If this is something you're willing to work on together, make this clear!
- Share if you have specific social and environmental benefits you want to highlight and ask about your supplier's practices. What do they prioritize? Is there missing data that you could work together to obtain?
- Share any logistical needs on both sides and what operational support you might be able to offer (timelines, specific packaging or formats, transportation, etc.).
- Ask your supplier about their sample process and share your needs. Make sure you come prepared with specifics and a willingness to pay for samples.
- Ask farmers how you can help with inputs or investments to improve production.
- Establish concrete next steps—is additional information needed? Will you proceed with sampling? When will you circle back with specific details or set a follow up meeting?
- Discuss a date when you each will decide whether or not to move forward with purchasing.

Watch *How to Work With Farmers* webinar to hear about this in practice!

Remember, relationships require work, especially in the beginning stages. Try to connect with your potential suppliers on a person-to-person level and enjoy the process. Farmers are busy people, so if you don't hear back, don't take it personally and kindly follow up. If you choose not to move forward with a partnership, let them know about your final decision or give the supplier a specific timeline for when you would like to revisit.

As you move beyond the sample stage, please refer to our guide for experienced buyers and additional GreenWave resources to learn more about creating partnerships, commitments, and contracts.

PART
06

GREENWAVE RESOURCES: LEARN MORE AND FIND SUPPLIERS

06 GreenWave Resources: Learn More and Find Suppliers

- Seaweed Source: A free web app that streamlines connections between active seaweed businesses to align kelp supply and demand.
- Value Chain Coordination: 1:1 consulting with processors and buyers to support domestic sourcing strategy and facilitate network connections.
- Intro to Kelp: Recorded webinars providing background on the kelp industry, farming, and GreenWave resources.
- Sea to Sale: Bringing Kelp to Market: Recorded webinars with industry experts focused on bringing regeneratively farmed kelp to market. Topics range from product development, to kelp impact metrics, to thriving in the blue economy.
- Regenerative Ocean Farming Hub: Curriculum, resources, and an online community for farmers, hatcheries, and the seaweed industry at large. See the "Markets and Processing" channel in the Community for post-harvest topics.

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