



*Sea Grant Seaweed Hub:  
Market Opportunities Work Group*

10/29/20, 3-4PM EST

# *What is the Seaweed Hub?*

- A science based, non-advocacy resource for the domestic seaweed aquaculture industry
- A collaborative framework to share information, identify needs, address challenges, and find opportunities in the emerging seaweed industry
- 3 year project funded in 2019 by the National Sea Grant Program's Strategic Aquaculture Initiative

# *Who is involved in the Seaweed Hub?*



## Sea Grant Extension

East Coast: Maine, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York  
West Coast: Alaska, Washington, Oregon, California



## Steering Committee

National Sea Grant Office, State Sea Grant Programs, NOAA Fisheries, FDA Seafood Processing & Technology Policy Branch, USDA ARS National Program for Aquaculture, University of CT Extension



## Diverse Stakeholders

Seaweed farmers, processors, businesses, researchers, culinary professionals, regulatory authorities, etc.

# *How will the Seaweed Hub work with Stakeholders?*



## SURVEY

- Formal needs assessment survey to inform the Seaweed Hub process
- Open January – March 2020
- 259 respondents
- Preliminary results available on the Seaweed Hub website



## SYMPOSIUM

- Held in Providence, RI in early March 2020
- 120 stakeholders including farmers, processors, researchers, state/federal agencies, etc.
- Presentations about the status of seaweed aquaculture in the US and sharing opportunities for stakeholders



## WORK GROUPS

- 4 work groups: Market Opportunities, Regulations, Post-Harvest Opportunities, and Production Systems
- Work groups will host virtual meetings in Years 2-3 of the project
- Funding is available to the work groups



Photo: Judy Benson

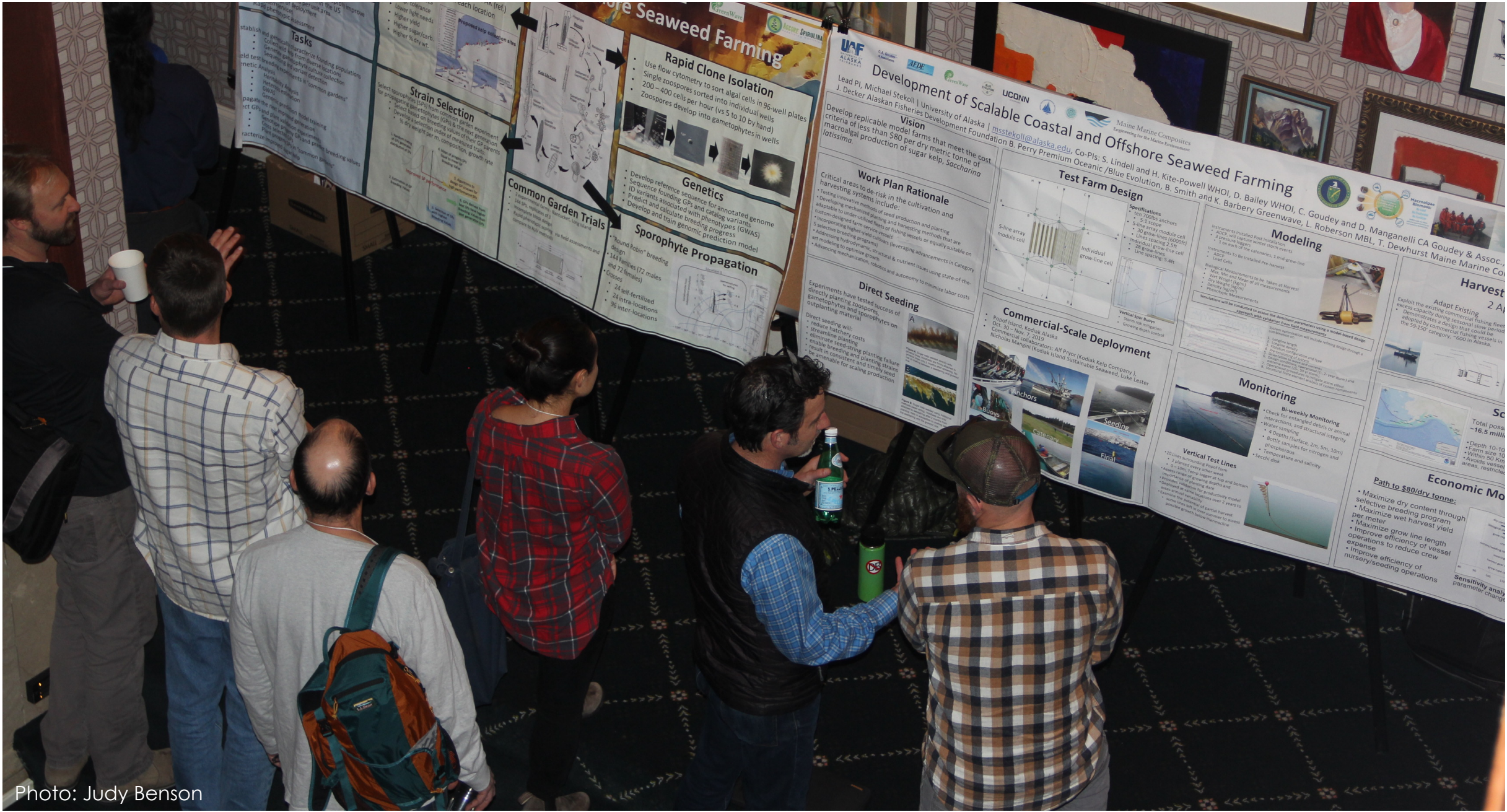


Photo: Judy Benson

### Seaweed Farming

#### Tasks

- Establish and maintain the US
- Collecting genetic material from diverse locations
- Developing genetic diversity collection
- Genetic diversity collection in "common gardens"
- Genetic diversity analysis
- Genetic diversity analysis
- Genetic diversity analysis
- Genetic diversity analysis

#### Strain Selection

- Select zoospores from common garden experiment
- Select zoospores based on breeding values of their GP alleles
- Develop a selection index of measured traits
- % of weight per trait, composition, growth rate

#### Common Garden Trials

- 140 common garden plots
- 140 common garden plots
- 140 common garden plots
- 140 common garden plots

#### Rapid Clone Isolation

- Use flow cytometry to sort algal cells in 96-well plates
- Single zoospores sorted into individual wells
- 200-400 cells per hour (vs 5 to 10 by hand)
- Zoospores develop into gametophytes in wells

#### Genetics

- Develop reference sequence for annotated genome
- Sequence founding GPs and catalog variants
- Predict and calculate breeding progress (GWAS)
- Develop and train genomic prediction model

#### Sporophyte Propagation

- "Round Robin" breeding
- 144 families (72 males and 72 females)
- Crosses
- 24 self-fertilized
- 24 intra-locations
- 36 inter-locations

### Development of Scalable Coastal and Offshore Seaweed Farming

Lead PI, Michael Stekol | University of Alaska | [mstekol@alaska.edu](mailto:mstekol@alaska.edu)  
J. Decker Alaskan Fisheries Development Foundation B. Perry Premium Oceanic/Blue Evolution, B. Smith and K. Barbery GreenWave, L. Roberson MBL, T. Dewhurst Maine Marine Co

#### Work Plan Rationale

Critical areas to de-risk in the cultivation and harvesting systems include:

- Developing mechanized planting and harvesting methods that are adaptable to under-utilized fleets of fishing vessels or equally sustainable on custom-designed farm service vessels
- Incorporating fishery service vessels (leveraging advancements in Category 5 selective breeding programs)
- Addressing hydrodynamic, structural & nutrient issues using state-of-the-art modeling to optimize growth
- Advancing mechanization, robotics and autonomy to minimize labor costs

#### Direct Seeding

Experiments have tested success of directly planting zoospores, gametophytes, and sporophytes on outplanting material

- Direct seeding will:
- Reduce hatchery costs
- Streamline planting
- Eliminate seedling planting failure
- Result in consistent and timely seed
- Be amenable for scaling production

#### Commercial-Scale Deployment

- Proof Island, Kodiak Alaska
- Oct 30 - Nov 7, 2019
- Commercial collaborators: Alf Pryor (Kodiak Kelp Company), Nicholas Vavrgini (Kodiak Island Sustainable Seaweed), Luke Lester

#### Test Farm Design

Specifications:

- ten 200m anchors
- 5:1 slope
- 5 line array module cell
- 50 grow lines (5000ft)
- Line spacing 2.5ft
- Individual grow-line cell
- 24 grow lines
- Line spacing: 5:1ft

#### Monitoring

Bi-weekly Monitoring:

- Check for entangled debris or animal interactions, and structural integrity
- Water sampling
- 4 Deaths (Surface, 2m, 5m, 10m) ophiophorous
- Temperature and salinity
- Sechi disk

#### Economic Mo

Path to \$80/dry tonne:

- Maximize dry content through selective breeding program
- Maximize wet harvest yield per meter
- Improve grow line length operations to reduce vessel expense
- Improve efficiency of nursery/seeding operations

#### Harvest

Adapt Existing

- Exploit the existing commercial fishing fleet stocks capacity during seasonal slow periods
- Demonstrates a design that could be adopted by commercial fishing vessels in the 55-150' category, "rood in Alaska"



Photo: Judy Benson



Photos: Judy Benson



- geographies → markets in different regions (ex. greens in south)
- market need vs. consumer wants  
retailers, distributors, brokers
- global positioning - tech?  
→ common language to market seaweed (ex. Alaska seafood)
- mechanism for distributing info  
- state level  
- regional communication  
- strategies

- messaging → nutrients
  - balance carbon/nitrogen uptake with positive food marketing
  - ex. aquaculture vs. shellfish farming
  - heavy metals...?
  - OA mitigation / coastal acidification need
  - "sequestration" (100 year timescale)
- Research on ecosystem services
- seaweed needs to be distinguished/independent from shellfish (even if they work with shellfish partners)
- The farm bureau (MFA)

**GOALS OBJECTIVES**

Support Creation of a trade group  
So that producers / collaboration  
process re-examine pillars/shares - farm umbrella (5th category)

identify standard grading that exists  
- survival info  
- carbon sequestration

What's the message? put together the value proposition  
- ecosystem services  
- nutrition

activities to create public awareness  
- framework around sustainability

**Process goals**  
- set up email list  
- slack app  
- videoconference

- Top long term priorities:**
- 1) better define ecosystem services
  - 2) trade association
  - 3) recognition / support from federal agencies

**Top medium term priorities**

**Top short term priorities**

SMALL (NICHE) VOLUME CHALLENGES	LARGE (COMMODITY) VOLUME CHALLENGES
<ul style="list-style-type: none"> <li>Education of consumers</li> <li>niche markets = need to differentiate markets from commodities</li> <li>some states can't produce commodities volume</li> </ul>	<ul style="list-style-type: none"> <li>Familiarizing US public - consumer friendly products</li> <li>opp: marketing campaign</li> <li>product before farms ↳ what is the end product / market?</li> <li>Grading? Supply chain standards</li> <li>US Brand</li> <li>competition isn't with seaweed - what else is on the plate?</li> <li>food + seaweed ↳ <u>nutritional content</u></li> </ul>

Challenges - Large volume	Opportunity
Public is not familiar with seaweed	<ul style="list-style-type: none"> <li>consumer education - studies K-12</li> <li>nutritional profiles</li> <li>open source consumer information</li> <li>marketing campaign - USDA?</li> <li>ecosystems/farmers</li> </ul>
lack of standards in supply chain	develop buzzwords "sense of place" macroalgae

Challenges - Small volume	Opportunities
Value-added processing	distinguish niche products from commodities
educating consumers and chefs	

**IDENTIFY MARKETS**

- Food → functional (active-antibiotic)
  - bioplastics
  - fish feeds
  - fertilizers
  - carbon markets
  - bio-plastic textiles
  - pet food (vs animal feed)
  - biocuticals
  - cosmetics
  - regenerative medicine
  - biofuels
  - hydrocolloid
  - research
- High value niche vs. high volume

**Challenges by market**

Fish feed → is it a good use, where the money? quality  
- large companies, need large volume

Pet food → premium pet food products  
- need volume  
- consistent grade needed  
- even smaller MKTs need substantial production (1-25mm products)  
- nutritional profile - why do they want it?  
- origin story

**Scale**

**focus groups**

**Customer Value driver**  
"What would they be open to listening to you about?"

Challenge: Finding a layer of **SCALE**  
opportunity? focus groups

"Biomass" vs. "product"

Challenges - Large volume	Opportunity
Competition with other products (vegetables etc.)	<ul style="list-style-type: none"> <li>origin story of products</li> <li>"US" brand</li> </ul>
scale - meeting demand in large volume markets	<ul style="list-style-type: none"> <li>collectives? cooperatives?</li> <li>points of entry?</li> </ul>
knowing markets before producing	<ul style="list-style-type: none"> <li>what do markets need?</li> <li>consumer validation</li> <li>focus groups</li> </ul>

Challenges - Large volume	Opportunities
labeling does not accurately reflect contents/nutrition	
certain scales don't support diverse markets	

**Food**

**Challenges**  
- short season  
- need to concentrate on top (feed) markets  
- Seasonality/Geography - diff. strains depends on location

**Education**  
- fresh market has specific challenges

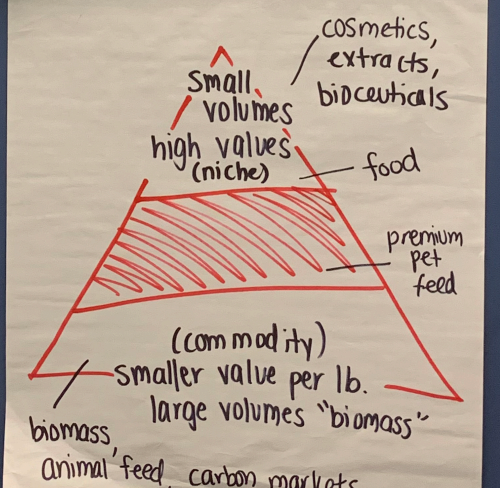
**Scale**

**Cosmetic market**

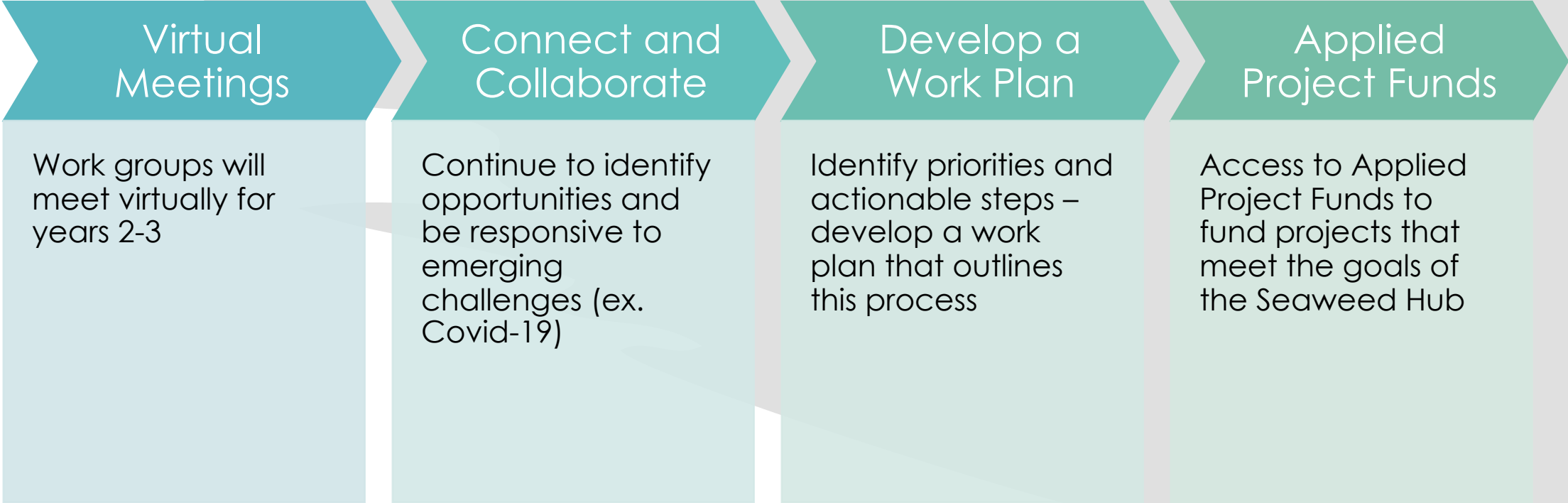
**Challenges**  
- customer approval  
- education  
- messaging  
- scale

**Opportunity** → open source consumer information

**Challenge** nutrition → nutritional profiles change seasonally Regional nutritional profile info  
↳ available for open source  
- nutritional panels don't capture all info about seaweed  
- quality of product? farmer speak, multi-use



# Work Groups: Next Steps



# *What are Applied Project Funds?*

- Applied project funds are non-competitive funds meant to assist Work Groups in implementing their work plan
- \$10,000 available to each work group
- Applied projects must meet the goals and priorities of the Seaweed Hub
- Small-scale/pilot projects that can be completed in a short timeframe (2 years)

# *Applied Project Funds Process*

1

Work groups collaboratively develop a project idea (or ideas) and a plan of work

2

Work groups submit the plan of work to the Seaweed Hub Steering Committee for approval

3

Applied project funds are made available to the work group through the UConn (Seaweed Hub PI)

4

Applied project funds used to fund work group project in years 2-3

# *Market Opportunities Work Group: Symposium Recap*

- Day 1 Objective: Generate Ideas – Identify “Big Picture” Challenges and Opportunities
- Discussion:
  - What markets currently exist?
  - Relation of scale and volume to market opportunities
  - “Niche markets” and “commodity markets”

## Challenges

## Opportunities

Tapping into new markets

- Consumer education
- Distinguish “niche”
- Diversify into multiple product lines

Access to infrastructure/processing

- Partner with other local products for distribution
- Co-op/collective opportunities for processing

Consumer interest may be short-term

- Develop value-added products that are already familiar to consumers

## *Small Volume “Niche Markets”*

*Large Volume  
“Commodity  
Markets”*

Challenges	Opportunities
Need to know/understand markets before producing at scale	<ul style="list-style-type: none"><li>• Consumer validation, focus groups – life cycle analysis</li></ul>
Mismatch between “large scale” seaweed operations and “small commodity” markets	<ul style="list-style-type: none"><li>• Identify points of entry so multiple growers can access</li><li>• Co-ops to meet demand</li><li>• Scale operations to meet supply needs</li></ul>
No supply chain standards/grading exist – large buyers need consistency/quality	<ul style="list-style-type: none"><li>• Develop protocols for handling, establish quality grade(s) in the marketplace</li></ul>

*Shared Challenges*

Challenges	Opportunities
Public is not familiar with seaweed	<ul style="list-style-type: none"><li>• Consumer education</li><li>• Develop consumer friendly products</li><li>• Marketing campaign like other food products</li></ul>
Competition with other products (ex. specialty vegetables, imported seaweed, etc.)	<ul style="list-style-type: none"><li>• Unified messaging to distinguish US seaweed in the market</li><li>• Use nutritional profiles to form the basis of product stories</li></ul>
Seaweed contents/nutrition are not accurately reflected in labeling – nutritional profiles are costly	<ul style="list-style-type: none"><li>• Open source consumer information/database – nutritional profiles that are regional, seasonal, etc.</li></ul>



## Challenges

## Opportunities

Seasonal production

- Value added processing or storage
- Diversify species to extend season
- Multiple harvests
- Markets that extend season (ex. carbon markets)

Different markets for different species

- Identify end user preferences and target production of desired species

*Shared Challenges*

# *Market Opportunities Work Group: Symposium Recap*

- Day 2 Objective: Narrow Ideas – identify priorities and timeframes
- Discussion:
  - Messaging and market needs
  - Restoration and ecosystem services
  - Trade group
  - Consumer education

# *Identified Work Group Priorities*

## Short Term (0-1 Years)

- Trade Association
- Standards and Grading
- Regional Outreach Strategies

## Medium Term (1-3 Years)

- Marketing Ecosystem Services
- Regional Outreach Strategies
- Trade Association

## Long Term (3+ Years)

- Marketing Ecosystem Services
- Trade Association
- Recognition/support from federal agencies

## *Next Steps:*

### Today

- Introductions and re-introductions
- How do you define market opportunities/development?
- How does this group want to work together?

### Next Meeting

- Do these priorities still make sense? Do we need to change or modify?
- Identify actionable items and begin to develop a work plan

*“Market Opportunities”*

*“Market Development”*