



Stimulating Oregon Aquaculture: Finding the Sweet Spot for Investment and Expansion

A report produced by the Oregon Aquaculture Association

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Executive Summary

The Oregon Aquaculture Association (OAA) and its partners have been working for the past several years to strengthen the Oregon aquaculture¹ program with a core focus on developing strategies for an expanded and diversified program that is keeping pace with global trends and opportunities. As a producers' Association in today's competitive marketplace, our main objective is to increase success for all forms of sustainable aquaculture including producing food for direct human consumption, supporting outdoor recreation, and stock enhancement.

We coordinate our efforts with the Aquaculture Advisory Group—a public-private partnership with aims to increase the economic impact of aquaculture in Oregon. The Association together with the Advisory Group have hosted meetings and undertaken analyses to identify a blueprint for moving forward. This paper is a summary of our current recommendations.

Our aim is to promote and facilitate a significantly expanded farmed seafood program in Oregon. We know all too well that industry faces multiple constraints relating to permitting, growing, harvesting, processing and marketing our products. Our blueprint lays out strategies for addressing these constraints.

As producers, we also know there is a best set of strategies or a “sweet spot” where we have the best chance of generating the highest returns for our efforts, while simultaneously pursuing our activities responsibly and sustainably. This paper suggests how to find the sweet spot for the state's aquaculture program. Through an iterative process, we have identified five sets of activities which, if implemented, will achieve our goal. These are:

1. Support the OAA
2. Expand the Aquaculture Knowledge Base
3. Develop Specific Aquaculture Investment, Management, and Monitoring Tools
4. Engage in Aquacultural Education/Outreach

¹ The word aquaculture, farmed seafood, and aqua-farming are used interchangeably in this document and are defined as the culture of biological organisms in freshwater, estuarine, or marine environments.

5. Structure an Oregon Aquaculture Program Supported by State Government

Following implementation, we expect the resulting modernized state program would have a combined harvest valued at \$60,000,000 within five to ten years of completing these interventions.

Setting the Stage

In collaboration with our partners², OAA has coordinated and assisted the Oregon Aquaculture Advisory Group (OAAG). For the last five years, this Group has helped chart a way forward for Oregon's aquaculture program (e.g., <http://www.oregonaquaculture.org/legislative-activities.html>). In April 2018, OAAG organized a day-long working session for stakeholders to highlight issues and strategies to support a goal of an expanded and diversified aquaculture program in the state of Oregon -- a program that would make meaningful contributions to the state's economy including producing food and supporting new employment while making innovative and sustainable use of our diverse natural resources.

During the April meeting, it was suggested a specific target should be growing the private aquaculture industry in Oregon so that it is at least proportionally equivalent to other Western states and having a farm-gate value **of \$60M, producing economic impacts of \$100M, and providing more than 3,000 jobs in the state economy**. We believe this target, a four to five-fold increase over current production, is realistic with the right investment strategies. We also believe this level of economic value would be large enough and valuable enough to attract the necessary public support to help promote long term growth.

We will not go into all the reasons why Oregon should and could be doing better. These have been documented previously³. The bottom line is that worldwide, aquaculture is producing an increasing share of the seafood we eat – today more than half of global seafood consumption is from aquaculture production. Yet, while this global trend is accelerating, the Oregon program has stagnated even though Oregon has the natural and human resources and markets to support a much larger industry.

This fact is the reason for our present work. As an association of stakeholders, we strongly believe there is ample justification for both public and private sector investment in aquaculture. We know we can do more and the following recommendations provide a blueprint for moving forward.

The Sweet Spot

For the aquaculture industry in Oregon to expand, what are the key factors for success and the general requirements for a successful aquaculture investment? Building on broad-based results from the global aquaculture industry, it can be concluded there are **seven essential elements** for successful operations:

1. Output markets
2. Inputs (feed, seed, capital, labor)
3. Information (science-based)
4. Sites (land and water of suitable quality)
5. Fair and transparent regulations and monitoring
6. Financial solvency (forward-looking business culture)

² VertueLab, ECOTRUST, Pacific Seafood, Oregon State University, and Oregon Sea Grant

³ The major recent references for the Oregon program can be found at

<http://www.oregon.gov/ODA/shared/Documents/Publications/MarketAccess/AquacultureUsersGuide.pdf>

<http://www.oregon.gov/ODA/shared/Documents/Publications/MarketAccess/AquacultureInvestment.pdf>

7. Public support

All seven elements must work in concert, and their nexus is what we are calling the “sweet spot”. We see this as representing not only the best conditions for the producer, but also for the public. Careful attention to selecting where and how to invest will not only promote profits and jobs but responsible stewardship that minimizes ecological risks and societal concerns.

While we have conceptualized this process to develop the necessary actions to grow our industry, we realize nothing operates perfectly. In everything we do, there are risks and aquaculture has several well-known risks⁴. However, the critical point is that these risks are no greater than the risks in any major economic activity; whether agriculture, forestry, or manufacturing. Significant technological advancements over the past decade allow aquaculture to be undertaken with realistic expectations of mitigating risks from unexpected events and impacts. If operators, investors, stakeholders, and citizens have the needed knowledge and tools—if we address the key issues and integrate solutions -- aquaculture’s benefits will far outweigh the costs.

Starting point

Our starting premise is that the Association is the fulcrum for growth. We say this not because we are the Association but because we have the experience, understanding, and commitment to shape our Association into a structure that truly assists stakeholders. We need to be a reliable source of science-based information. We need to help producers invest, support operators along the entire value chain, and address concerns of Oregon citizens. These will be valuable services for our membership and for our state. To be capable of providing these services, we need to expand our scope, our membership, and our tools.

Priority Action/ Projects for Growth

Aggregating the results of the April Workshop with past work focusing on supporting aquaculture in Oregon, we have been able to develop five broad categories of needed actions:

- 1) Support to OAA—the aim is to strengthen the Association to be able to undertake critical services.
- 2) Expand the Aquaculture Knowledge Base—we recognize aquaculture is a very small activity in Oregon today. We also know Oregon presents many special considerations for aquaculture (e.g., the “Oregon Way”). Finally, we fully accept that investors need knowledge to guide their investments. Accordingly, the aim of this project is to develop a database of Oregon-specific aquacultural knowledge.
- 3) Develop Specific Aquaculture Investment, Management, and Monitoring Tools—the database will serve as the basis for developing an aquacultural “tool box”. This will include templates for market and business plans at the enterprise level. There will be tools to compare investment options, comprehensive references, and spatial planning applications for investment, managing, and monitoring.
- 4) Engage in Aquacultural Education/Outreach—since aquaculture is currently a small activity, it has a very small place in education from primary through University. We know aquacultural education is critical and that it encompasses several fronts. Many popular perceptions of aquaculture are founded on a lack of science-based knowledge—this can be addressed through education.

⁴ <http://www.fao.org/docrep/012/i1136e/i1136e.pdf>

Oregon Measure 98 offers opportunities to design programs in schools that will train the skilled personnel needed to operate aqua farms in a growing industry. Finally, with roughly half the seafood we eat being farmed, it is important that students have exposure to aquaculture as a major food system.

- 5) Structure an Oregon Aquaculture Program—this is the ultimate project that builds on the previous four. It sculpts an innovative and responsible program—establishing this formally and officially in the state’s governmental and legislative systems.

More details, including approximate budgets, can be found in the workshop report “Supplement A: Oregon Aquaculture Advisory Group Workshop Results”.

Critical Next Steps

We realize knowledge and education are critical precursors for private investment and public support. Accordingly, within the context of the five-project program, we propose **immediate actions** that are cross-cutting within this program: (1) identifying specific related legislative action for the 2019 legislative session including eliminating the conditionalities linked to aquaculture approvals; (2) formalizing the pre-application conference (*one-stop-shop*); (3) updating the status and role of OAA to be optimally positioned to assist with the implementation of the state program; and (4) within the next nine months, organizing and convening a workshop for a wide spectrum of participants focusing on aquaculture investment opportunities and business planning. For more details please see “Supplement B: Immediate Actions and Critical Next Steps for Developing Oregon Aquaculture”.

Wrap-up

We are all aware of the growing demand for seafood. We are confident Oregon aqua farmers can produce a variety of products for local, national, and international markets—providing high quality food while promoting economic development for rural communities. Outside investors have looked at Oregon, appreciating our under-utilized resources and realizing that Oregon could be a “sweet spot” for aquaculture. However, the lack of a coherent program combined with a lack of basic understanding about what aquaculture can and cannot do, have deterred these would-be operators. They have taken their investments elsewhere.

We need to act if we want to benefit from the opportunities aquaculture offers. In the immediate- and medium-term, the Oregon Aquaculture Association will be the lens that focuses energies on sustainable aquaculture development in Oregon. As we achieve our aims, we will be building a foundation for the state to move forward in developing a modern and productive program. We effectively have a blank slate upon which to craft our program—a program that fits our needs and allows us to reach the sweet spot. Yet, to move forward, we need modest support that will be paid back many times over in the increase of aquacultural production and economic benefits.

Supplement A:

Oregon Aquaculture Advisory Group Workshop Results

April 2018

Introduction

The Oregon Aquaculture Advisory Group (OAAG) was established in 2013 with the goal to develop a framework for sustainable aquaculture development in Oregon. On April 10, 2018 the OAAG Executive Committee (EC) organized a workshop¹ for OAAG members plus any other Oregon stakeholders. The purpose was to identify key concerns and actions that should be addressed through development of a comprehensive strategic plan. Our focus was to determine how to develop a modern and diversified program that supports aquaculture development including producing significantly greater quantities of high-quality seafood for local consumption and export. We also aimed to develop strategies so that stakeholders could act in unison under the Oregon Aquaculture Association umbrella.

Workshop participants included economic operators, agents of public agencies, educators, researchers, and other interested parties. Discussions were framed by a background document, *Guidelines and References for Aquaculture in Oregon—Considerations when strategically developing an innovative aqua farming program*². Our efforts were also designed to be linked to such important actions as the OSU Marine Studies Initiative, ODF&W STEP, watershed management groups, and other civil society organizations. The outputs from the meeting were combined with other recommendation of the OAAG over the last five years to develop the elements of a strategic plan for implementing an Oregon aquaculture program. The following document describes the results from the workshop, provides context and process, as well as recommendations for how to move forward.

Establishing Goals and Identifying Actions

Prior to the workshop, the Executive Committee identified four goals that if achieved would lead to a healthy aquaculture program for the state. We used these goals to organize the discussion and draw out priorities from the workshop attendees. The goals included developing **strong institutions** that will support research and innovation in the industry while also providing the appropriate foundation for an Oregon-specific program; establishing a **suitable legal and regulatory framework** with appropriate enforcement and monitoring; nurturing an **enabling environment** where good information about operating a business and attracting financing is readily available; and **educating citizens** to build an informed customer base interested in buying local food and supporting the Oregon economy.

We see these goals as fundamental to expanding aquaculture in Oregon. However, to achieve these goals we recognize that multiple actions need to be taken to enact the overarching strategy. Pursuing actions in support of these goals will establish our path forward and create the conditions that are optimal for aquaculture in Oregon. Therefore, we recommend taking the following actions to lay the foundation for a healthy program:

1. Build an understanding of the markets (both output and input);

¹ See Appendix II for April Workshop Agenda

² These guidelines state, “The outcome of our work is intended to promote the development of a network of profitable and sustainable aqua businesses across Oregon making a positive contribution to the state’s economy and to the livelihoods of Oregonians.”

2. Provide science-based Information to all constituents including customers;
3. Identify suitable locations for all potential practices;
4. Create a transparent regulatory and monitoring process;
5. Build public support;
6. Attract investment

Converting Actions to a Project Framework

To provide an example of how projects could be implemented, consistent with the “Sweet Spot” strategies and projects, the EC outlined the following potential projects including implementors, cooperators, timeframe, and costs:

Project	Actions	Implementors	Cooperators	Timeframe	Approximate cost
OAA Support	Strengthening and expanding the Association website with a statewide information service	OAA Leadership	<ul style="list-style-type: none"> • Ecotrust • Oregon Best • OSU • Farmers 	3 yrs	60,000
Expand Knowledge Base	Design and conduct studies to garner needed information and establish best practices for aquaculture in Oregon	OAA Ecotrust	<ul style="list-style-type: none"> • OSU • Oregon Best • Public Agencies • Schools • Farmers 	2 yrs	275,000
Develop Tools	Identify and design tools needed to guide investors, assist operators, and serve as monitoring mechanisms	Ecotrust OSU	<ul style="list-style-type: none"> • OAA • Public Agencies • Farmers 	3 yrs	225,000
Engage in Education /Outreach	Develop curricula applicable to all levels of education, linking these to research and outreach	OAA Ag in the Classroom Foundation	<ul style="list-style-type: none"> • Ecotrust • Schools • Oregon Best • OSU • Farmers 	3 yrs	150,000
Structure Oregon Program	Draft and approve a state plan including adjusting relevant regulations and legislation as well as bureaucracies	ODA OAA	<ul style="list-style-type: none"> • Legislature • Public Agencies • Farmers 	2 yrs	80,000
				TOTAL	790,000

A time line for implementation might look like the following:

Project	Year 1	Year 2	Year 3
OAA Support			
Expand Knowledge Base			
Develop Tools			
Engage in Education/Outreach			
Structure Oregon Program			

More details about recommended projects and activities along with the workshop agenda and notes can be found in the appendices following this document.

Immediate Actions and Critical Next Steps

Most of the recommended actions that came out of the workshop and formalized in this document are focused on the long-term and are meant to be developed over time through phases (See Appendix I for more details). However, we realize there are critical immediate steps that can be taken. Accordingly we propose five specific **immediate actions** to help expand the Oregon program: (1) identifying specific related legislative action for the 2019 legislative session including eliminating the conditionalities linked to aquaculture approvals; (2) formalizing the pre-application conference (*one-stop-shop*); (3) updating the status and role of OAA to be optimally positioned to assist with the implementation of the state program; (4) within the next nine months, organizing and convening a workshop for a wide spectrum of participants focusing on aquaculture investment opportunities and business planning; and (5) over the next year OAA should hire an Executive Director to take on the actions recommended and coordinate the work of the many aligned and interested parties. For more details please see “Supplement B: Immediate Actions and Critical Next Steps for Developing Oregon Aquaculture”.

Summary

The four goals identified by the Executive Committee are the core components for our effort to develop aquaculture in Oregon. Moreover, these four axes have underscored important crosscutting elements, chief among these the need to incorporate education into all our efforts; formal education, extension, media, and other conduits. These themes and elements need to be merged into actions that will lead to tangible and sustainable outcomes. These processes will require that we continue to develop a strategic plan that identifies the pathway for expanding and diversifying the Oregon aquaculture program. As part of this pathway, it is necessary to also develop production and/or monetary targets that will make an adequate contribution to the state’s economy to pull-down services and bring-in investment. While planning and programming activities could be undertaken as a concerted, broad-spectrum effort, such an injection of effort into a little developed sub-sector of the state’s economy is unlikely. Accordingly, it is necessary to take a longer-term, more compartmentalized approach. To this end, the pathway forward is composed of five interrelated components (projects); support to producer association(s), expanding knowledge base, developing needed tools, and supporting education and outreach—these culminating in the adoption of a structured aquaculture program by the State of Oregon.

Appendix I: Projects and Activities

Potential activities for each of the five projects comprising an aqua farming program are listed below. While we know timing is important, we also know chronology is important—many of the actions needed in these projects are sequential—many are interrelated. Accordingly, when describing the projects, we have assigned actions to sequential phases: Phase 1, Phase 2, and Phase 3. Each project is partitioned into three phases roughly equal to the time attributions (i.e., each phase roughly one year)—each phase encompassing a set of related activities. Budget estimates are indicated in parenthesis next to each project.

Support OAA (\$60,000)*Phase 1*

- Profile of Industry (benchmarks)
- Review of input availability
- Disseminate Information
- Expand membership

Phase 2

- Increase and diversity information services
- Identify “favored” suppliers
- Design publicity campaign
- Organize training on critical issues

Phase 3

- Integrate tools into information service
- Organize and coordinate annual meeting
- Collaborate in manpower training programs

Expand Knowledge Base (\$275,000)*Phase 1*

- Examine existing local data and identify “holes”
- Identify sources of relevant external data
- Identify channels to use to disseminate data—existing and new

Phase 2

- Undertake market-first assessment
- Undertake resource assessment
- Undertake regulatory evaluation

Phase 3

- Collate and analyze results of Phase 2 studies
- Draft recommendations for change—some requiring legislation, others not
- Develop training materials on critical themes
- Establish role in training for various institutions and partners including OAA

Develop Tools (\$225,000)*Phase 1*

- Identify needed tools
- Review prototypes and historical use
- Contact existing users

Phase 2

- Develop investment (marketing and business) plan templates and planning tools
- Develop management tools
- Develop monitoring tools

Phase 3

- Incorporate tools (tool boxes) into user friendly interface for use and maintenance by OAA
- Train OAA in use and upkeep
- Put in place sustainable channels for public access to tool boxes

Engage in Education/Outreach (\$150,000)*Phase 1*

- Test trial inputs into existing related programs
- Craft synoptic inputs into primary and/or secondary curricula
- Identify institutions interested in expanding their aquacultural education

Phase 2

- Design suitable inputs at primary and secondary levels
- Test trial inputs at community college level
- Examine needs for a multi-tiered and integrated research and education programs
- Review roles vis-à-vis Sea Grant and Land Grant

Phase 3

- Incorporate study results and tool boxes into education programs
- Develop multi-level curricula
- Establish programs for manpower development as well as adult education
- Establish role of various institutions and partners including OAA
- Formalize extension support with staff including animal health agents

Structure Oregon Program (\$80,000)*Phase 1*

- OAA accepted as fulcrum
- Nominate ODA contact
- Re-institute pre-application conference

Phase 2

- Stipulate ODA as lead agency
- Remove legal conditionality on aqua farming

Phase 3

- Prepare state aqua farming plan
- Set up “one-stop-shop”
- Update legislation and regulations
- Update record keeping and monitoring
- Establish permanent ODA Aqua farming unit

The above-listed projects are designed to contribute to the **four goals** we identified as being crucial parts of any state program³.

³ Strong institutions; Suitable legal and regulatory framework; An enabling environment; and, An educated citizenry

Appendix II: Workshop Agenda

Oregon Aquaculture Advisory Group – April Meeting

Date: April 10, 10:00a - 4:00p

Location: Chemeketa Center for Business & Industry

Address: 626 High St NE, Salem, OR 97301

Phone: (503) 399-5181

Conference Phone Number: 866.740.1260

Access Code: 7259849

Agenda

- 10:00a Welcome and review of agenda, building logistics and expectations of workshop outputs
(*Clint and Bill*)
- 10:10a Introduction round robin (name & professional association)
- 10:25a News & Updates
- High Impact Opportunity Grant update (*Ken Vaughn*)
 - Regulatory (*Bill Hanshumaker*)
 - Marine Initiative & "Food from the Sea" (*Gil Sylvia*)
 - Others?
- 10:45a Review of recent developments in advancing Oregon Aquaculture (*Gil*)
- 10:55a Review of other states' plans (*Gil*)
- 11:10a Review Working Groups SWOT results (*Bill*)
- 11:25a Introduce summary of work materials and work group instructions (*Bill*)
- 11:30a Working lunch and breakout sessions facilitated by Executive Committee members.

Focus is on our four goals and to provide action items:

- Strong Institutions (*Jon Bonkoski*)
- Suitable Legal & Regulatory Framework (*Gil*)
- Enabling Environment (*Ken*)
- Educated Citizenry (*Bill*)

Each group use notepads to define

- *What does it mean to have [group's goal area, ex. "... strong institutions"]?*
- *Does Oregon already have a [group's goal area]?*
- *Where do we [Oregon] fall short?*
- *What do we do to accomplish the outcome?*

- 1:30p Working groups present results and discussion from breakout sessions (15 minutes each) (*Bill facilitates*)

- 2:30p Synthesize and prioritize tasks into a strategy for moving Oregon aquaculture forward
(Gil)
- 3:45p Discuss immediate next steps and future meetings *(Jon)*
- 4:00p Adjourn

Appendix III: April Workshop Notes

April 10, 2018

Notes

Oregon Aquaculture Advisory Group – Framework drafting workshop
Chemeketa Center for Business & Industry

Attendees: Ken Vaughn, John Moehl, Bill Hanshumaker, Gil Sylvia, Jon Bonkoski, Clint Bentz, Scott Patterson, Jim Johnson, Brice Allen, Randy Bentz, Meliah Masiba, Kathy Bridges, Diani Taylor, Kate Wildrick, Aaron Wildrick, Patti Snow, Katie Young, Matt Hawkyard, David Brock Smith

Phone: Laura Hoberecht, Burke Smejkal, Tom Calvanese

Notes:

- Ken with Oregon Best – state innovation entity; looking at aquaculture as a potential business activity and jobs, also want to develop new technologies to grow the state economy;
 - Submitted feasibility proposal to Business Oregon to help us explore aquaculture development – grant was not successful. Business Oregon is rewriting the RFP to attract more proposals aligned with their vision. We have opportunity to develop new proposal. This grant could fund an aquaculture innovation center – want to fund facilities or capital investment. A feasibility study will not fly
- Bill Hanshumaker – working on a research in WA, OR, CA to look at the regulatory regime for aquaculture and how it impacts Oregon as compared to other states. Started with shellfish farmers and then trout farmers – will report back in the fall. Preliminary result show regulation is more impactful in WA and CA than in OR.
- Gil Sylvia – OSU is investing to build out Marine Hatfield Center and grow a new marine program. Plan to bring 500 undergrads out to Newport. New building is a vertical tsunami evacuation site. Designing curriculum to include seafood systems looking at entire spectrum from ecosystem to consumer. Looking at the entire supply chain. Hosting workshop with public to design the center and determine the direction. OSU is building out Food from the Sea Center, which might be virtual or physical center.
- Matt Hawkyard – works with Chris Langdon to do ocean acidification resistant oysters, looking at alternative ways to grow dulce, working micro-encapsulation – working to keep water soluble nutrients and needed elements in diet from washing away when feeding aquaculture products.
- Tom Calvanese – Port of Port Orford redevelopment project will include a dulce facility.
- Last 5 years of work
 - 2013 OAG established
 - Led by Jerry Garner; ODA
 - Representatives from industry, agencies, NGO's, and universities
 - 2014 OAG produced a plan with vision and goals
 - In 2014 John Moehl did an assessment of Oregon's aquaculture industry; a majority of Oregon's aquaculture industry has been public hatcheries for salmon recovery
 - 2015 – a letter to Katy Coba provided a series of recommendations to the state legislature. One recommendation was to have ODA be the lead agency because aquaculture is agriculture
 - 2015 – John Moehl wrote a roadmap for advancing aquaculture. This workshop will build on this work and has some momentum.

- 2017 – OAAG put out a survey to understand the areas that need development, and major constraints.
- With Jerry Garners’ retirement we lost the agency champion to help lead the way.
- Caddy Mckeown (coastal caucus) co-chaired the shellfish taskforce met for a year and produced 39 recommendations and advanced \$5million package to the legislature that did not pass – some minor elements were passed to help with food safety
 - Some of the recommendations were passed but Rep. McKeown will try to pull in some of more of the list to enact funding.
- Aquaponics is working to emerge as a new green industry and hoping to advance industry along with aquaculture work.
- Add report from Shellfish taskforce to google drive
- Looked at other states – MI, OH, MA, NJ – to take guidance.
 - All state plan reviews are online [here](#)
 - The lead organizations across the plans were Sea Grant, Dept.’s of Ag, and NGOs
 - Recommendations included:
 - Coordination
 - Improve investment
 - Grow supply chain
 - Support aquaculture education
- Bill reviewed the SWOT analysis for each working group provided in agenda packet.

Afternoon wrap-up session – group read out

- Strong Institutions
 - Three types institution – Regulatory, research, market/finance
 - Strong institutions provide needed support for aquaculture practitioners through suitable regulations, informative research, and effective market and finance information.
 - Institutions need to have knowledgeable staff
 - Create a more robust “ecosystem” for supporting aquaculture
 - Provide training and technology development
 - Including job shadowing and internship opportunities
 - Provide regular funding and support
 - Draws in the public and improves perceptions – inclusive of the “Oregon way”
 - Does Oregon have strong institutions?
 - No – a lot of weak spots
 - Oregon’s public salmon hatcheries are the only strong institution but are not for food production; they are mitigation for dams and habitat loss
 - Shellfish is strongest industry in Oregon but very weak and uncoordinated relative to CA and WA
 - Producers are small individual operations
 - Plats are on public lands, but maps are out of date
 - OSU is strong research but little implementation
 - Public perception of aquaculture is poor
 - Solutions
 - Improve extension service and education

- Improve maps and spatial data
 - Provide regular funding for extension service and education
 - Work with coastal caucus to pass legislation
 - Conduct market research to show viability and potential job creation in Oregon
 - Establish a clear permitting process
 - Improve public perception through better information provided by research at OSU
 - Create a public-private partnership to coordinate effort and education
 - Engage broader group of institutions
 - Food Innovation Center
 - Farmers markets
 - Improved processing, supply chain, and marketing
- Suitable legal and regulatory framework
 - A suitable legal and regulatory framework was defined as one that supports and guides the industry in a way that is not obstructive.
 - Needs to account for adjacent state regulations to avoid overly cumbersome/unworkable rules
 - Transparent and predictable at all levels of government
 - Supports and is aligned with social license
 - Consistent with the “Oregon way”
 - Science based
 - Built on best practices
 - Coordinated at all levels of government
 - Consistent across agencies; enforces something that is practicable by industry
 - Industry should be engaged in rule making process
 - Is the legal and regulatory framework weak or strong?
 - Yes and no
 - Coordination has ebbed and flowed but currently seems to be low
 - Lack of consistent coordination; especially with feds
 - Determination for permits on new species is very slow
 - Solutions
 - Funding for inter-agency coordination on permitting decisions
 - Establish a pre-application process to provide clear guidance
 - What permits are required?
 - Timeline for approval
 - What studies on impact are required? (environmental)
 - Decision factors – what do I have to do to get a permit?
 - Update maps and zoning information
 - Build in a degree of flexibility and cooperation with those seeking permits
 - Coordinated/collaborative model – no one operated alone
 - Designating a lead agency to engage a comprehensive stakeholder group
 - Address agency turnover – better ways to bring new staff up to speed
- Enabling environment
 - What does it mean?
 - Aspirational goals for industry revenue

- Cost competitive products or specialty products
- Demand pull from new and unconventional product
- Demand for local food
- Concentrated market
- Inputs & logistics
 - Adequate feed supply
 - Energy
 - Water
 - Seed
 - Labor
 - Information & data
 - Distribution and logistics
- Quality control and branding
 - Food safety
 - Product positioning
 - Pest management
 - Chemical management
 - Food industry is model
 - Branding opportunity
- Processing
 - Adequate capacity
 - Location of processing
 - Cold storage
 - Access by small processors
 - Mobile processors
 - Overall mixed for processing – for big producers it works currently; for small producers it doesn't work
- Technology
 - Data collection
 - Tracking/education
 - Social media
 - Disease prevention
 - Feed technology
 - Waste treatment
 - Automation
 - Seed production
 - Blockchain
 - At some scale these tech needs are available for all
- Educated citizenry
 - Community education – people should know where their food comes from
 - Job shadow/internships
 - Survey OR citizens to understand perceptions
 - Develop aquaculture education and tie to STEM standards
 - Coordinate with Community Colleges
 - Integrate as theme throughout k-12 education

- Career day/field trips
- Americrops
- Discovery centers
- OMSI
- Farm visits
- Local sustainability
- Food miles
- Social contract as barrier
- Develop positive icons for aquaculture
- 4H awards at state fair like prize pigs
- Synthesis and priorities for moving Oregon aquaculture forward
 - Need to advance a political agenda and pass something through the legislature
 - Funding and support for extension service
 - Recognizing aquaculture as agriculture – have ODA designated as lead agency and reduce local regulations by removing it from the conditional use permitting process.
 - Need to develop strategy for engaging legislature
 - Need market analysis to show that aquaculture is a viable industry in Oregon and will generate economic benefits (jobs)
 - Need an aquaculture/industry fish pathologist - ODFW provides state fish pathologist for public production (hatcheries) but need one for private industry regulation process
 - Work with state to create long term funding for extension services
 - Need to strengthen and advance the industry groups - OAA

Appendix IV – Examples of Actions to Strengthen Oregon Aquaculture Program

Based on workshop results, the OAAG Executive Committee developed four categories of action:

- Action by the **Industry Alone**—here we consider the Association and the wider group of private sector and civil society actors as being the “Industry”. This includes service providers, those engaged throughout the seafood value chains, as well as citizens who are consumers and farmers’ neighbors. This category of action is considered as being feasible with no additional funding or other specific resources.
- Action by the **Industry and Partners**—this expands the group defined as the “Industry” to include the public sector; especially local, state, and federal agencies including educational and research institutions. We consider actions in this category as being undertaken without additional resources.
- Action by **Industry and Partners with additional resources**—this set of actions requires dedicated supplemental resources. These resources, generally finances and staff, are required for an established period to undertake designated tasks; these resources are needed for discrete projects and programs and are not considered long-term requirements.
- Action by **Industry and Partners with Legislature**—matters falling in this category require legislative intervention to adjust existing rules, regulations, and laws as well as to craft new legislation and allocate public funds.

We believe all action necessary to develop the Oregon program can be put in one of these four categories.

We have also examined action in terms of time, and have assigned actions to three time slots:

- **Immediate term**—these are actions that can be accomplished within one year.
- **Medium-term**—these actions require preparation and are foreseen for Years 2 and 3.
- **Longer-term**—actions in this time slot extend to Years 4 and 5.

The following tables are examples of how actions that would advance aquaculture and should be viewed as initial placeholders to be replaced with more detailed strategies and actions over time.

(1) Markets – outputs and inputs

Responsible body	Immediate term	Medium term	Longer term
Industry alone—no additional funds	Disseminate industry information		
Industry and partners—no additional funds	Nominate formal ODA contact	Adopt OAA as focal point	<ul style="list-style-type: none"> • Market clusters
Industry and partners with additional funds	Develop market tools	<ul style="list-style-type: none"> • Market-first assessment • Resource assessment • Regulatory evaluation • Support OAA 	<ul style="list-style-type: none"> • Aqua farming plan • One-stop-shop • Spatial planning • OAA core funding • OAA “Help Center”
Industry and partners with legislature	Stipulate ODA as lead agency		Statistics, monitoring and record keeping program

(2) Information

Responsible body	Immediate term	Medium term	Longer term
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Industry alone—no additional funds	<ul style="list-style-type: none"> Review input availability Disseminate industry information 	Identify suppliers and service providers	
Industry and partners—no additional funds	<ul style="list-style-type: none"> Re-institute pre-application conference Enlarge and strengthen OAA Nominate formal ODA contact 	Adopt OAA as focal point	<ul style="list-style-type: none"> Multi-tiered research & education program
Industry and partners with additional funds	<ul style="list-style-type: none"> Develop market tools Develop aqua-business planning tools 	<ul style="list-style-type: none"> Market-first assessment Resource assessment Support OAA Regulatory evaluation Phase I Education Project Identify investor “tool kit” through OAA 	<ul style="list-style-type: none"> Aqua farming plan Integrated education program Spatial planning OAA core funding OAA “Help Center” Phase II Education Project Implement tool kit with OAA
Industry and partners with legislature	Stipulate ODA as lead agency	Remove legal conditionality	<ul style="list-style-type: none"> Revise/update legislation & regulations Statistics, monitoring and record keeping program

(3) Sites

Responsible body	Immediate term	Medium term	Longer term
Industry alone—no additional funds	Review input availability	Identify suppliers and service providers	
Industry and partners—no additional funds	<ul style="list-style-type: none"> Re-institute pre-application conference Enlarge and strengthen OAA Nominate formal ODA contact 	Adopt OAA as focal point	
Industry and partners with additional funds	<ul style="list-style-type: none"> Develop market tools Develop aqua-business planning tools 	<ul style="list-style-type: none"> Market-first assessment Resource assessment Regulatory evaluation Support OAA 	<ul style="list-style-type: none"> Aqua farming plan One-stop-shop Spatial planning OAA “Help Center”
Industry and partners with legislature	Stipulate ODA as lead agency	Remove legal conditionality	Revise/update legislation & regulations

(4) Regulations and Monitoring

Responsible body	Immediate term	Medium term	Longer term
Industry alone—no additional funds	Review input availability	Identify suppliers and service providers	
Industry and partners—no additional funds	<ul style="list-style-type: none"> • Re-institute pre-application conference • Enlarge and strengthen OAA • Nominate formal ODA contact 	Adopt OAA as focal point	Compliance raining program
Industry and partners with additional funds		<ul style="list-style-type: none"> • Resource assessment • Regulatory evaluation • Support OAA • Phase I Education Project • Identify investor “tool kit” through OAA 	<ul style="list-style-type: none"> • Aqua farming plan • One-stop-shop • Spatial planning • OAA core funding • OAA “Help Center” • Phase II Education Project • Implement tool kit with OAA
Industry and partners with legislature	Stipulate ODA as lead agency	Remove legal conditionality	<ul style="list-style-type: none"> • Revise/update legislation & regulations • Statistics, monitoring and record keeping program

(5) Society

Responsible body	Immediate term	Medium term	Longer term
Industry alone—no additional funds	Disseminate industry information		
Industry and partners—no additional funds	<ul style="list-style-type: none"> • Re-institute pre-application conference • Enlarge and strengthen OAA • Nominate formal ODA contact 	Adopt OAA as focal point	<ul style="list-style-type: none"> • Multi-tiered research & education program • Integrated education program
Industry and partners with additional funds	Pilot education project	<ul style="list-style-type: none"> • Market-first assessment • Resource assessment • Regulatory evaluation • Support OAA • Phase I Education Project 	<ul style="list-style-type: none"> • Aqua farming plan • OAA core funding • OAA “Help Center” • Phase II Education Project • Implement tool kit with OAA

		<ul style="list-style-type: none"> Identify investor “tool kit” through OAA 	
Industry and partners with legislature	Stipulate ODA as lead agency		Revise/update legislation & regulations

(6) Finance

Responsible body	Immediate term	Medium term	Longer term
Industry alone—no additional funds	<ul style="list-style-type: none"> Review input availability Disseminate industry information 	Identify suppliers and service providers	
Industry and partners—no additional funds	<ul style="list-style-type: none"> Re-institute pre-application conference Enlarge and strengthen OAA Nominate formal ODA contact 	Adopt OAA as focal point	Aqua-business training
Industry and partners with additional funds	<ul style="list-style-type: none"> Develop market tools Develop aqua-business planning tools 	<ul style="list-style-type: none"> Market-first assessment Resource assessment Regulatory evaluation Support OAA Identify investor “tool kit” through OAA 	<ul style="list-style-type: none"> Aqua farming plan One-stop-shop Spatial planning Program to attract investment OAA “Help Center” Implement tool kit with OAA
Industry and partners with legislature	Stipulate ODA as lead agency	Remove legal conditionality	<ul style="list-style-type: none"> Revise/update legislation & regulations Statistics, monitoring and record keeping program