



Deborah A. Bouchard, Ph.D.
Aquatic Animal Health Specialist
Assistant Extension Professor
University of Maine Cooperative Extension and
Aquaculture Research Institute

Promotion and Continuing Contract Packet
July 1, 2022



September 20, 2021

Promotion Review Committee (PRC)
University of Maine Cooperative Extension
5741 Libby Hall
Orono, ME 04469

Dear Dr. Carter and Promotion Review Committee:

Enclosed please find materials that will detail my work from September 2016 to September 2021 as an Assistant Extension Professor and Aquatic Animal Health Specialist. My position is a joint appointment between Cooperative Extension(CE)(51%) and the Aquaculture Research Institute (ARI)(49%). The Maine Economic Improvement Fund (MEIF) provides 100% funding for my salary. I have included a copy of the Memorandum of Understanding between Cooperative Extension and the Aquaculture Research Institute for my position in Appendix A to provide more insight into these roles. My current leadership roles also include being the Director of the Aquaculture Research Institute, an appointed position by the Vice President of Research and Dean of the Graduate School.

My position with CE and ARI began in 2009 as Laboratory Manager of the CE Animal Health Laboratory and ARI Aquatic Animal Health Industry Coordinator. In August of 2018, I completed my Ph.D. in Aquaculture and Aquatic Resources leading to my new CE/ARI joint faculty position. **I was credited with two years of experience towards my application for continuing contract.** I have included material from the credited two years in this packet representing five years from September 2016 to the present. I am now applying for promotion to Associate Extension Professor and Aquatic Animal Health Specialist with continuing contract status starting July 1, 2022.

A primary responsibility of my position includes direction and oversight of the applied research activities at the Aquatic Animal Health Laboratory (AAHL) which is part of the UMaine Cooperative Extension Diagnostic and Research Laboratory (DRL). I played a significant role in the facility design and my administrative duties overseeing personnel and operations have expanded with the opening of the DRL AAHL in the summer of 2018. I lead aquaculture industry and resource agency sponsored research as well as funded research grants that address aquaculture priorities. All operations of the AAHL including support for the professional staff and students that I oversee require that I pursue and acquire extramural funding to support all aspects of the AAHL and my research programs. Currently the AAHL is fiscally self-sustaining through industry contract research and funded grants. Between my AAHL and ARI roles, I manage yearly budgets that total \$1.97 million dollars annually on average.

Since the opening of the DRL AAHL, I have participated in over 40 tours including US and Maine Congressional and Legislative leaders, UMaine Board of Trustees, UMaine faculty, many industry research sponsors, the aquaculture industry and students alike. In December of 2020, with CE's Administration and Marketing office, I was filmed for a YouTube video to introduce the AAHL's research and teaching functions. All of these public outreach activities increase the visibility of this highly specialized facility and UMaine's excellent research capabilities. Since September 2016, I have been the lead PI and directed research on 11 industry contract projects **generating revenue of \$602,106**. Results of research provide direct answers to industry sponsors that aid in advancing vaccine development, functional feeds, and new therapies for the aquaculture industry. Completed research has also provided valuable information to assist in marine resource policy decision-making.

As an Aquatic Animal Health Specialist, my research with CE focuses on contributing to new knowledge and enhancing aquaculture and marine fisheries health, production and economic development critical to sustainable Maine food systems. Aquatic animal health is essential to a sustainable aquaculture industry, marine fisheries and food security. As can be reviewed in my packet, I have established strong collaborations with Maine Sea Grant, the Lobster Institute, the School of Marine Sciences, the School of Food and Agriculture, the Maine State Department of Marine Resources, the USDA Agriculture Research Service and other state and national programs that support sustainable aquaculture and fisheries. I am a committee member on three external policy advisory committees, two state, and one national. My CE programs span state and national research priorities. Since 2016, I led and/or collaborated on **15 successfully funded grants totaling \$10.7 million dollars**. As can be seen in my packet material, I hold a leadership role on four multi-state grants. To highlight one significant project, I am a Project Director on a Non-Assistance Cooperative Agreement with the USDA ARS resulting from federal appropriation funding to advance salmon and shellfish aquaculture in the US. The project is a five-year partnership with the USDA ARS for \$4.3 million and has the potential to be renewed every five years. I lead in administering this project and in making fiscal project decisions which have made it possible for CE to hire two new faculty members and also moved a CE professional position to more permanent funding.

During the last five years, I wrote and completed my dissertation, published five peer reviewed articles and delivered presentations at 14 speaking engagements, many as an invited speaker. I have participated in 19 newspaper, magazine or television interviews increasing the public's knowledge of aquatic animal health, UMaine research, aquaculture and fisheries in Maine. Despite the extraordinary circumstances of the pandemic, my research activities have continued. The AAHL team was busy with active aquaculture research addressing lobster and finfish health. I assisted the Maine Aquaculture Hub in hosting 10 Maine aquaculture stakeholder focus groups by Zoom to gather feedback on barriers to industry growth and to assist with updating the 10 year Maine Aquaculture Economic Development Plan. I presented to the Maine Legislative Resources Committee on UMaine aquaculture research and workforce development programs. I was invited to participate on the FEMA Region I Tribal Fisheries and Aquaculture Solutions Based Team as an aquaculture specialist to support and inform the developing tribal aquaculture interests and businesses. My participation on this committee has developed an ongoing dialogue with the Aroostook Band of Micmac, the Penobscot Nation, and the Houlton Band of Maliseet. I am presently working with Chris Schillaci, the Aquaculture Coordinator for NOAA's Greater Atlantic

Fisheries Office to seek funding sources to assist the Tribes with aquaculture development. All of this supports my CE's research and education programs.

It is my privilege to be a faculty member with Cooperative Extension and my CE/ARI joint appointment only strengthens my research and education pursuits. My aquatic animal health background and experience fill a unique gap in CE that is valuable to Maine and the nation. Thank you for your review of my reappointment and promotion packet.

Sincerely,

A handwritten signature in cursive script that reads "Deborah A. Bouchard". The signature is written in dark ink on a light-colored, slightly textured background.

Deborah A. Bouchard, Ph.D.
Aquatic Animal Health Specialist
Director, Aquaculture Research Institute

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**UNIVERSITY OF MAINE COOPERATIVE EXTENSION
Reappointment Contract Application**

I. FACE DATA

A. NAME: Deborah A. Bouchard

B. PRESENT RANK: Assistant Extension Professor

C. COOPERATIVE EXTENSION OFFICE AND LOCATION:

University of Maine Cooperative Extension Diagnostic and Research Laboratory
Aquatic Animal Health Laboratory, 17 Godfrey Drive, Orono, ME 04473
Work Phone: (207) 581-2676, Cell Phone (207) 944-3319
Email: deborah.bouchard@maine.edu

D. PROFESSIONAL EXPERIENCE

YEAR(S)	EMPLOYER(S)	POSITION(S)
2018 – present	University of Maine Cooperative Extension and Aquaculture Research Institute, Orono Maine	Aquatic Animal Health Specialist, Institute Director
2017 – 2018	University of Maine Cooperative Extension and Aquaculture Research Institute, Orono Maine	Aquatic Animal Health Industry Research Coordinator, Laboratory Manager and Institute Director
2009 – 2017	University of Maine, Cooperative Extension Animal Health Laboratory and Aquaculture Research Institute, Orono Maine	Aquatic Animal Health Industry Research Coordinator and Laboratory Manager
2006 – 2009	University of Maine, Cooperative Extension Animal Health Laboratory, Orono, Maine	Research Coordinator and Laboratory Manager
2005 – 2006	State of Maine Department of Marine Resources, Augusta, Maine	Marine Resource Scientist I
1996-2004	Micro Technologies, Inc. Richmond, Maine	President, CEO and Owner
1991-1996	Northeast Laboratory, Waterville, Maine	Laboratory Manager
1990-1991	Affiliated Laboratories, Inc., Bangor, Maine	Clinical Microbiologist
1988-1990	University of Maine, Orono, Maine	Research Associate
1984-1988	University of Maine, Orono, Maine	Coordinator of Microbiology Laboratory Instruction

E. EDUCATIONAL BACKGROUND

YEAR(S)	INSTITUTION(S)	FIELD	DEGREE
2018	University of Maine	Aquaculture and Aquatic Resources	Ph.D.
1983	University of Maine	Microbiology	B.S.

II. RECORDS OF ACTIONS

A. INITIAL PROBATIONARY APPOINTMENT

1. Date: September 1, 2018
2. Rank: Assistant Extension Professor
3. Credit towards Continuing Contract: 2 years

B. REAPPOINTMENTS

Table 1. Reappointment actions.

Starting date	Ending Date
September 1, 2018	June 30, 2019
July 1, 2019	June 30, 2020
July 1, 2020	June 30, 2021

C. PROMOTION(S)
N/A

D. CONTINUING CONTRACT RECOMMENDATIONS

Table 1. Recommendations for continuing contract

1. Promotion Review Committee’s Recommendation:		
Positive	Yes	Negative
		Date 10/07/2021
2. Program Administrator’s Recommendation:		
Positive	Yes	Negative
		Date 11/02/2021
3. Director’s Recommendation:		
Positive	Yes	Negative
		Date 12/06/2021
4. Chief Academic Officer’s Recommendation:		
Positive		Negative
		Date
5. President’s Recommendation		
Positive		Negative
		Date

E. EXCEPTION TO BOARD OF TRUSTEES POLICY

N/A

F. TRANSMITTAL LETTER

1. President
2. Chief Academic Officer
3. Director
4. Program Administrator

III. CANDIDATE'S PROFILES

A. JOB DESCRIPTION

Cooperative Extension and Aquaculture Research Institute Aquatic Animal Health Specialist Job Description

Title: Aquatic Animal Health Specialist

Academic Rank: Assistant Extension Professor

Department: Cooperative Extension

Reports to: Program Administrator

Position Type: Regular/Full time fiscal year and continuing contract eligible faculty appointment

This position is a joint appointment between Cooperative Extension (CE) and the Aquaculture Research Institute (ARI). The position is 100% of a fiscal year FTE and is split as follows: 51% Aquatic Animal Health Specialist with CE and 49% ARI (20% Director and 29% ARI Faculty). Primary responsibility includes oversight of the research and activities of the Aquatic Animal Health Laboratory that is part of the Diagnostic and Research Laboratory of Cooperative Extension. The faculty member is expected to be a project leader on State and federal grants. Collaboration is required of this faculty and this position. Collaborators include Maine Sea Grant, the School of Marine Sciences, the Lobster Institute, the School of Food and Agriculture, the Maine State Department of Marine Resources and others working in aquatic animal health and aquaculture. The faculty member may become a member of the graduate faculty through an affiliation with an academic department or school and may serve as an advisor on graduate committees.

Essential Functions

- Designs and implements a plan of work that addresses priorities in aquatic animal health
- Coordinates and directs the activities of the Aquatic Animal Health Laboratory (AAHL)
- Manages and monitors funding for the AAHL for external grants and contracts
- Develops and implements an applied research agenda that is consistent with the identified needs of the aquatic animal industry including industry sponsored research
- Shares the findings of applied research through the publication of peer reviewed journal articles, conference proceedings, abstracts, poster sessions and other venues
- Delivers educational programs in support of the aquatic animal health program that align with the UMaine Cooperative Extension mission and plan of work
- Collaborates with academic and Extension colleagues and other agency staff
- Designs and delivers presentations on various aquatic animal disease problems that enhance client knowledge and capacity for applied learning
- Secures external grants and contracts for program expansion and sustainability
- Assesses needs as an essential part of program planning, program implementation and grant development

- Builds capacity of field staff involved in aquaculture production related to aquatic animal health
- Participates in local, regional, and state program development and implementation teams
- Serves on organizational development and governance committees
- Provide timely and accurate information in response to public requests for information
- Develop and sustain a program of professional development including membership in state, national and international aquatic health organizations and committees appropriate for the position
- Makes special effort to seek, involve and serve under-served and under-represented clients.
- Ensures compliance with civil rights, affirmative action and equal opportunity requirements.
- Develops and maintains professional relationships that reflect courtesy, civility, and mutual respect
- Utilizes coaching and mentoring methods which provide an environment that is anticipatory, supportive, and encourages constructive feedback on performance
- Serves as supervisor for laboratory staff

Secondary Functions:

- Participates in Diagnostic and Research Laboratory staff meetings and in meetings of the lab managers group Extension staff meetings as appropriate
- Serves as bio-safety officer for the Diagnostic and Research Laboratory
- Performs other reasonably related duties as assigned

Required Knowledge & Skill Qualifications:

- Doctorate required in aquatic animal health, aquaculture or closely-related field
- Demonstrated excellent oral and written communication skills
- Documented ability to conduct high-quality scientific research, as evidenced by grant acquisition and publications in peer-reviewed journals
- Computer and mobile device proficiency
- Ability to work independently and as part of a team
- Ability to be self-motivated and directed
- Demonstrated success in working collaboratively with other agencies and organizations, including private industry

Preferred Qualifications

- Experience successfully conducting applied research in response to industry needs
- Post-doctoral or equivalent experience
- Knowledge and experience in commercial aquatic animal health environments
- Experience and skills in supervising others
- Experience seeking participation from and working with diverse audiences

Work Environment:

The Aquatic Animal Health Specialist is expected to:

- Work from the Diagnostic and Research Laboratory with state-wide responsibilities
- Perform work responsibilities that will occasionally include some evening and weekend commitments
- Work with colleagues and appropriate agencies to create an annual plan of work that addresses the changing issues and needs of citizens and businesses that will benefit from the Aquatic Animal Health Laboratory
- Travel in state, normally requiring a valid Maine driver’s license, is required with mileage reimbursement at the contract rate and some limited national or international travel

Work Schedule:

- University of Maine Cooperative Extension office hours are weekdays from 8:00 a.m. to 4:30 p.m. The Aquatic Animal Health Specialist will work a flexible schedule to meet the requirements of the position that may involve work beyond regular office hours including evenings and weekends

B. DISTRIBUTION OF EFFORT BY PERFORMANCE AREA

Table 2. Distribution of efforts by performance area.

Performance Area	Days	Weight (%)
I – Educational Program Development		
<ul style="list-style-type: none"> • <i>Director, Aquatic Animal Health Laboratory</i> 	68	30
II – Undergraduate and Graduate Teaching and Advising	n/a	n/a
III – Scholarship and Professional Activity	22	10
IV – Organizational, and Campus Support and Service	10	4
V – Public Service	5	2
Unassigned	12	5
Aquaculture Research Institute Director/Faculty	113	49
Total	230	100

Program Administrator:  (Dr. Richard J. Brzozowski) Date: 09/01/2021

C. PERFORMANCE DEVELOPMENT PLAN

UMAINE COOPERATIVE EXTENSION FACULTY PROFESSIONAL DEVELOPMENT PLAN

Name: **Deborah A. Bouchard**

Years Covered: **Sept 2016 to Sept 2021**

Development needs	Indicate specific development need	Indicate relevant activities to reach development goals(i.e., workshops, distance learning, professional organizations, etc.)
Subject Matter Knowledge (professional credibility and effectiveness)	Specific Goal	Proposed Activity to Reach Goal
	Increase knowledge of new and emerging aquaculture research priorities	Attend national level meetings such as Aquaculture America or World Aquaculture Society meetings
	Maintain active role(s) on Maine and National Aquaculture Service Committees	Continue participation on State of Maine Aquaculture aquatic animal health committees, and serve as Maine's lead for USDA/APHIS Commercial Aquaculture Health Program Standards
<i>Program Development Abilities</i> (essential to analyze educational needs, establish education objectives, and then plan, design, implement and evaluate effective teaching/learning experiences)	Specific Goal	Proposed Activity to Reach Goal
	Build my knowledge of Cooperative Extensions programs, processes to improve and increase the impact success of CE and ARI's aquaculture research program.	Work in collaboration with the Dean of UMCE, Richard Brzozowski and other UMCE personnel for guidance. Participate in workshops within UMCE.
Scholarship and Professional Activity (Conducts applied research and engages in scholarly activity in support of the POW)	Specific Goal	Proposed Activity to Reach Goal
	Conduct industry contract research, participate in applied research, obtain and coordinate research funds and projects for enhancing Maine's aquaculture industry to benefit the Maine Food System	Serve as lead PI on contract research, participate in grant research to support sustainable aquaculture and engage with aquaculture industry. Publish findings in peer-reviewed journals.
Interpersonal Skills (assume leadership roles for effective program management and to enhance co-worker relationships)	Specific Goal	Proposed Activity to Reach Goal
	Improve leadership and facilitation skills	Attend leadership and strategic planning workshops to strengthen collaboration between CE and ARI
Organizational Understanding (required to work effectively in and represent UMCE. For example, civil rights responsibilities, supervisory skills and new employee orientation)	Specific Goal	Proposed Activity to Reach Goal
	Improve comprehension and understanding of civil rights	Maintain up to date civil rights training and participate in UMCE civil rights training and coordination

Supervisor's Signature:



Date: 09/01/21

IV. PROGRAM SUMMARIES

PROGRAM SUMMARY 1: UNIVERSITY OF MAINE AQUATIC ANIMAL HEALTH LABORATORY

Introduction: This program summary describes my administrative role in the management of the Aquatic Animal Health Laboratory (AAHL) and my role in pursuing and acquiring extramural funding to support all operations and staff salaries of the AAHL. The research conducted at the facility advances research and development (R&D) related to aquaculture and marine fishery industries in Maine, nationally and internationally. The AAHL serves as a Contract Research Organization meeting industry sponsored research needs and providing answers for innovative development of aquatic animal health products that are licensable/patentable. The AAHL also performs applied research through grant funding in collaboration with UMaine faculty and other Maine State agencies to address a broad spectrum of aquatic animal health issues facing the industry in Maine and beyond.

Criterion 1: Conducts Issues and Needs Assessment:

To identify research priorities for aquaculture and fisheries in Maine, I seek out stakeholder input using email, in-person meetings and by serving on industry, state and national committees and advisory groups. I am routinely contacted by state and national biotechnology companies requesting contracted applied research for development of new products to mitigate the effects of aquatic animal pathogens. Through conversations and planning meetings with research sponsors, details on needs and studies are determined. Since 2016, research and program needs have been identified through an ongoing Research and Development Needs Survey (see [R&D Needs survey](#)) partnership with Maine Sea Grant, the Maine Aquaculture Innovation Center, the Maine Aquaculture Association and the Aquaculture Research Institute.

Criterion 2: Set Goals and Outcome-Based Objectives

Goal: Develop an operational structure and self-sustaining research portfolio for the AAHL focused on supporting the Maine aquaculture industry and national and international Aquatic Animal Health Biotechnology companies to ensure a safe and sustainable food supply and improve the economic viability of the state, national and international aquaculture industry.

Objectives

Short term (listed in order of priority)

- a. Assist in the design of the of the new UMCEDRL AAHL facility
- b. Develop an operational fee structure for the AAHL
- c. Create Standard Operating Procedures (SOP) specific for the AHHL facility, staff and students
- d. Increase visibility of UMCEDRL AAHL by conducting at least 10 tours and 2 formal presentations to stakeholders annually.
- e. Expand interdisciplinary research on aquatic animal pathogens by submitting at least one externally funded grant proposal annually

Long term (all equal priority)

- a. Sustain a high impact Contract Research Organization for aquatic animal health research by maintaining all completed short term objectives
- b. Generate annual revenue of at least \$186,000 through conducting a minimum of 2 industry research and/or grant supported studies annually to retain professional staff and maintain facility infrastructure and operations.

Criterion 3: Designs, Delivers, Evaluates, Refines and Reports Programs

AAHL Management Design and Delivery: In 2016/2017 I had a leadership role in the design and build of the AAHL facility which was opened in September 2018. I developed a fee structure for the AAHL contract services by tracking yearly expenditures. I created and implemented SOPs allowing for safe and functional operations of the aquaria. In 2020, with assistance from UMaine Extension marketing, I developed a YouTube video of the AHHL to promote facility research and student engagement.

AAHL Management Evaluation and Refinement: On completion of studies, I meet internally with staff and with industry sponsor(s) to review project outcomes to determine if and where improvements can be made to workflow, reporting and aquaria systems. Changes are documented in formal reports and improvements made to SOPs. As a result of the self-evaluations, improvements have been made to the AAHL biofiltration units for improved water quality functions. From follow-up interviews with industry sponsors, case report files have been amended for improved data collection. Fee structures are routinely evaluated by tracking actual expenditures in auditable excel files.

Reports programs: Programs and outcomes are reported through the Maine Program Reporting System (MPRS) under the Maine Food System. I do report on projects that lead to industry adoption and changed practices, collaborative research meetings and communities reached. Of note because sponsored contract research is proprietary it cannot be reported directly.

Criterion 4: Documents Program Impacts with Emphasis on Economic, Environmental, and Social Conditions for Maine Citizens and Others

Since September 2016, ten industry sponsored contract research studies have been completed for seven different Animal Health Biotechnology companies advancing their knowledge of their new aquatic animal health products in development and providing answers for their next steps. As an example, I have included a letter of support from ADM in Section VIII (page 41). A critical lobster bait study was completed for the Maine DMR providing data to assist decisions with policy guidelines. In 2020, I wrote, submitted and was awarded two grants to develop aquatic animal vaccines.

Since 2018, I have delivered over 40 tours (totaling over 200 people) to showcase the facility and research capabilities, met in person and via zoom with 11 (3 in 2021) new industry sponsors and hosted 3 industry sponsors at the AAHL. Since December of 2020, the UMaine Extension AAHL YouTube video has had 337 views. In 2020 through 2021, I participated as an invited guest speaker in 3 webinars where I presented on Maine aquaculture and UMaine CE/ARI research capabilities reaching over 275 attendees (See expanded CV performance area V: Public Service, page 37).

Presently, the AAHL is fiscally self-sustaining and supports 3 FTE positions and trains 3 to 4 students per year with revenue generated. I am responsible for all budget administration for the operations of the AAHL. Increases in fees have been made when necessary to ensure adequate AAHL funding. In the summer of 2021, I was able to hire an additional soft dollar professional staff member to meet the increased demand from stakeholder requests.

Criterion 6: Conducts or Collaborates on Applied Research to Support Program Development

Since 2016, I have developed and directed 11 research projects as a result of my engagement and needs assessment of industry sponsors and submitted two grant proposals. (See expanded CV, PA I, Criterion 6, page 23).

Criterion 7: Seeks and Acquires Grants, Contracts and Special

From September 2016 to present, the ten industry contracts and one State of Maine contract brought in \$602,109 of generated revenue to complete the projects. The two grants awarded total \$543,675 (See expanded CV, PA I Criterion 7, page 28)

PROGRAM SUMMARY 2: APPLIED RESEARCH ON THE HEALTH OF AMERICAN LOBSTERS

Introduction: As an Aquatic Health Specialist and Cooperating Research Associate with the Lobster Institute, a portion of my applied research program focuses on Maine's vital lobster fisheries and lobster health. Maine leads the nation with a very successful and economically important lobster fishery with an annual boat value of near \$500 million dollars and with retail generating over \$1 billion annually. My research aims at increasing knowledge for developing support tools for adaptation in a changing environment, anticipating disease responses to environmental stressors, and increasing the resilience for this vital species of paramount importance. It is important to note that any lobster research that I perform requires that I pursue and acquire extramural funding to address research needs.

Criterion 1: Conducts Issues and Needs Assessment:

To identify applied research priorities for the lobster fisheries in Maine, I seek out stakeholder input using email, in-person and virtual meetings, and by serving on state committees. I participated in the Maine Department of Marine Resources (DMR)' Lobster Research Collaborative (LRC) from 2018 through 2020. During this 3-year project, the LRC met quarterly to share research updates and discuss research and industry issues. Each meeting attracted over 50 researchers, students, fishery managers, and industry members. In 2020 for the final meeting, participants ranked (low to high priority) a list of submitted research topics, discussed the results and selected research areas of high priority. In addition, my conversations with the Kathleen Reardon and Jess Waller, DMR lobster biologists, and Heather Hamlin and Richard Wahle, UMaine faculty have provided direction for collaborative research projects.

Criterion 2: Set Goals and Outcome-Based Objectives:

Goal: UMaine Extension's AAHL through funded collaborative projects will assist in proactive, relevant and objective applied research aimed at increasing the resilience of the Maine lobster fishery.

Short term Objectives (all of equal priority)

- a. Perform two new grant funded research projects on identified priority areas that examine the putative role of a changing environment as a causative agent of lobster population declines and develop tools and methods to monitor lobster health at critical points along the lobster supply chain (catch to market) to identify stressors and stress points that correlate to lobster mortality.
- b. By 2019, deliver a training session to the Department of Marine Resources (DMR) lobster samplers and citizen scientists in the lobster fishing community to detect and track early signs of disease.
- c. By 2020, create a database that captures pictures and locations for geographical tracking of lobster abnormalities, develop protocols for health assessment monitoring of lobsters in the supply chain and deliver training to UMaine students to perform health assessments, sample collection and result analyses.
- d. By 2020, draft 2 peer reviewed manuscripts on completed applied lobster research.

Long term Objectives

- a. By 2021, on annual basis evaluate and report on 50 new database submissions and continue to compile the lobster database.
- b. By 2021, develop and implement lobster handling practices for reducing losses along the lobster supply chain increasing the profitability of the lobster industry.

Criterion 3: Designs, Delivers, Evaluates, Refines and Reports Programs

Designs and Delivers:

- a. In 2018/2019, through externally funded grants with Dr. Heather Hamlin and the Lobster Institute, I developed 2 new three-year research projects focused on the impacts of a changing environment on the lobster fishery and monitoring lobster health in the supply chain.
- b. In 2019, I conducted a training session for DMR lobster sea samplers. The session included a hands-on demonstration of lobster handling and sampling. I developed the content of the training, directions on how to correctly use sampling kits and image boards for standardized picture taking.

- c. Since 2020, DMR and UMaine have established a shared google drive database and I have reviewed over 100 database submissions on observed lobster abnormalities.
- d. In 2020, I developed protocols for monitoring and sampling of lobsters in the supply chain to be performed at lobster distribution facilities. The protocols I developed were based on input from managers/owners of 4 lobster distributing facilities.

Evaluates and refines: During the one-day workshop with DMR staff, it became apparent that the physical picture board would not be practical for use in surveys nor for the lobster industry. Working with DMR's sea samplers an alternative method for quick picture taking, GIS site tracking and sample collection was designed. In the summer of 2020, I piloted a health assessment monitoring of lobsters in the supply chain, it was determined that changes were needed in the health assessment protocol. I am currently working with the lead MS student to create a RAMP (reflex action mortality indicator) model for lobsters which will allow for more accurate predictors of mortality.

Reports programs: Programs and outcomes are reported through the Maine Program Reporting System (MPRS) under the Maine Food System.

Criterion 4: Documents Program Impacts with Emphasis on Economic, Environmental, and Social Conditions for Maine Citizens and Others

Short-term outcomes

- a. In 2019, the one-day workshop for DMR lobster sea samplers resulted in improved knowledge and skills of the eight staff members. The eight DMR researchers have in turn, shared knowledge with over 150 boat captains during their stock assessment sampling on methods for detecting and recording lobster abnormalities.
- b. Since 2020, the established shared database remains active. To date no emerging patterns have been determined. However, the database provides a means for ongoing environmental monitoring of lobster populations and will capture emerging disease trends in the lobster fishery.
- c. In the summer of 2020, I trained two UMaine graduate students and one undergraduate student on how to perform the lobster health monitoring. Based on observation of the training process the UMaine students developed proficiency in the lobster health assessment monitoring.
- d. New knowledge has been gained on the impacts of a changing environment on the American lobster. Three peer reviewed papers have been completed and published from this research (See extended CV, PA III Criterion 1 page 32)

Long-term outcomes

In 2021, the RAMP (reflex action mortality indicator) model predicting lobster mortality in the supply chain project is well into development with over 900 lobsters evaluated. We continue to build strong working relationships between the research community and fishing industry.

Curt Brown from Ready Seafood had these words to share in an email to our research group '*Dr. Bouchard is always a huge resource for the lobster industry generally and for Ready Seafood specifically. As a company that ships millions of pounds of live lobsters around the world every year, her expertise on lobster physiology has proven invaluable countless times. Additionally, it has been extremely beneficial for our company to collaborate on research projects with Dr. Bouchard to improve our Standard Operating Procedures throughout the supply chain.*'

Criterion 6: Conducts or Collaborates on Applied Research to Support Program Development

Since 2018, I am a Co-PI on two collaborative grant projects that address top priorities in lobster research (See expanded CV, PA II, Criterion 6, page 23).

Criterion 7: Seeks and Acquires Grants, Contracts and Special Funds Collaborative grants to date for this research total \$491,880 (See expanded CV Part II PA I Criterion 7 page 28)

PROGRAM SUMMARY 3: APPLIED RESEARCH FOR ADVANCING SUSTAINABLE AQUACULTURE IN MAINE AND BEYOND

Introduction: Aquaculture is one of Maine’s seven targeted technology areas as detailed in the 2010 Maine Science and Technology Action Plan. In 2020, the Maine DMR reported the value of aquaculture species in Maine at over \$88.4 million dollars and an estimated economic impact of \$140 million. Recently, the state has been selected for development by six Recirculating Aquaculture System (RAS) companies, the oyster industry has increased 8-fold in eight years, the mussel industry has tripled over the same time frame, and the number of seaweed harvesters have doubled every year for the past four years. Through my collaborations with the ARI, Maine Sea Grant, and other Maine and national organizations, my research aims at discovery and problem solving for aquaculture production, reducing barriers to industry growth, expanding workforce, and supporting innovation for a sustainable industry.

Criterion 1: Conducts Issues and Needs Assessment:

I seek out stakeholder input using email, in-person meetings and by serving on UMaine, industry, state and national committees and advisory groups. Specifically, examples include the ongoing Research and Development Needs Survey (see [R&D Needs survey](#)), feedback from the Alliance for Maine’s Marine Economy committee and participation in the Gulf of Maine Research Institute’s Aquaculture Workforce Development Project. I also attend the Maine Aquaculture Association’s “Meeting of the minds” group which includes ten representatives from aquaculture organizations from around the state. The meetings are designed specifically for open conversations with all attending to inform each other of what we are doing and also to discuss industry needs.

Criterion 2: Set Goals and Outcome-Based Objectives:

Goal: Through grant funded research collaborations, Maine’s aquaculture industry will gain new knowledge and tools that address emerging issues and support and advance a sustainable aquaculture industry.

Short term Objectives (all of equal priority)

- a. Develop three new research projects that reduce barriers to sustainable aquaculture, address workforce development needs and build capacity for land-based recirculating aquaculture (RAS).
- b. By 2019, design a Certificate in Sustainable Aquaculture for UMaine undergraduates and lifelong learners that addresses workforce development and industry competencies.
- c. By 2019, complete 5 aquaculture stakeholder focus groups to gather feedback and assess Maine’s progress in the implementation of the 2010 Maine Aquaculture Economic Development Plan.
- d. By 2019, in collaboration with Maine Sea Grant, design a Maine industry call for proposals for sector-defined responsive research priorities based on the R&D Needs Survey.
- e. By 2021, participate in the organization and delivery of three national workshops to form and guide activities of a Recirculating Atlantic salmon Network (RAS-N) that supports Atlantic salmon RAS development.

Long term Objectives

- a. By end of 2021, fully implement a Certificate in Sustainable Aquaculture.
- b. By end of 2021, update and create a new 10-year economic development plan/roadmap for the future of Maine aquaculture designed to guide the State’s aquaculture industry.
- c. By end of 2021, complete a RAS-N consensus strategic plan and concept paper that will help policymakers, federal agencies and industry identify and responsibly allocate resources to promote a sustainable land-based US Atlantic salmon industry.

Criterion 3: Designs, Delivers, Evaluates, Refines and Reports Program

Designs and Delivers (in order of completion):

- a. In 2018, I and Meggan Dwyer received funding to design a Certificate in Sustainable Aquaculture for workforce development with strong focus on experiential learning.
- b. In 2019/2020, I and ARI/CE associates designed 4 aquaculture courses and an experiential industry internship.

- c. In 2019, in collaboration with Maine Sea Grant, I assisted in the development of 2 new research project with the overarching goals of creating the foundation for reducing barriers to sustainable aquaculture and building capacity for land-based recirculating aquaculture (RAS).
- d. In 2019/2020, in collaboration with Maine Sea Grant, I assisted in delivering 10 aquaculture stakeholder focus groups to gather feedback and assess Maine’s progress in the implementation of the 2010 Maine Aquaculture Economic Development Plan.
- e. In 2019, in collaboration with Maine Sea Grant, I assisted in developing a call for proposals for the Maine aquaculture sector-defined responsive research priorities. I also served on the review committee.
- f. In 2019 and 2020, I participated in organizing two RAS-N multi-state workshops.

Evaluates and refines: Over the first year of developing our Certificate in Sustainable Aquaculture, we determined two avenues for delivery. We are now offering the courses to the lifelong learners through CE and to undergraduate students through the School of Marine Sciences. In 2019, Maine Sea Grant’s Maine Aquaculture Hub steering committee, for which I am a member, changed planned in-person focus groups meetings to a virtual platform design. We also concluded that 10 focus groups were needed. For the RAS-N workshops, the second was adapted to a virtual format and held in October 2020.

Reports programs: Programs and outcomes are reported through the Maine Program Reporting System (MPRS) under the Maine Food System

Criterion 4: Documents Program Impacts with Emphasis on Economic, Environmental, and Social Conditions for Maine Citizens and Others

Short term outcomes

- a. In 2018, I and Meggan Dwyer were awarded funding to establish a Certificate in Sustainable Aquaculture.
- b. In 2019, in collaboration with Maine Sea Grant, 2 new research projects for reducing barriers to sustainable aquaculture and building capacity for land-based recirculating aquaculture (RAS) were established.
- c. In 2019/2020, I assisted in delivering 10 aquaculture stakeholder focus groups. These focus groups gathered feedback through open discussions and surveys from over 92 organizations and 140 individuals on the aquaculture industry’s progress in implementing the 2010 Maine Aquaculture Economic Development Plan.
- d. In 2019, twenty proposals were submitted from Maine’s industry and 5 industry-led projects were funded for \$216,000 to directly address identified barriers to industry growth.
- e. In 2020 and 2021, two of the four aquaculture courses were piloted to 9 UMaine students and 8 general public members, 22 paid interns were placed with various aquaculture businesses, resource agencies and non-profit organizations.
- f. In 2019 and 2020, I participated in delivering two multi-state workshops for establishing the RAS-N. The first RAS-N workshop was attended by 55 people from industry, academic institutes and the biotechnology sector. This workshop formally established the RAS-N network consortium. The second virtual workshop expanded to 115 attendees. The main outcome of the workshop was the establishment of research priorities for RAS. The 3rd workshop is scheduled for October 2021 in Maine.

Long term outcomes

- a. The Maine Sea Grant Maine Aquaculture Hub steering committee has synthesized all feedback collected form the focus groups and we are nearing completion of a new the 10-year economic development plan for the future of aquaculture in Maine. We expect to share this with the public by the end of 2021.
- b. The RAS-N consensus strategic plan and concept paper is in draft form and will be presented at the October 2021 workshop. This work has already resulted in an additional \$10 million dollars in funding. (See expanded CV, PA II, Criterion 6, page 23).

Criterion 6: Conducts or Collaborates on Applied Research to Support Program Development.

Since 2018 for this research program, I serve as either PI or Co-PI on three collaborative grant projects that address advancing aquaculture in Maine and the nation (See expanded CV, PA II, Criterion 6, page 23).

Criterion 7: Seeks and Acquires Grants, Contracts and Special Funds The collaborative grants for this research to date total \$1,658,837 (Please see CV Part II PA I Criterion 7 page 28)

PROGRAM SUMMARY 4: APPLIED RESEARCH FOR A UMAINE AQUACULTURE EXPERIMENT STATION

Introduction: This is a new program area for me that will continue for many years to come and represents a significant collaborative research program with long term funding to advance shellfish and Atlantic salmon aquaculture in Maine and the nation. While early in only its second year, it is a major program area for me that I feel should be represented in my packet. It connects CE, ARI, SMS, the USDA ARS and UMaine facilities across the state for advancing research for the Atlantic salmon and shellfish industry sectors. Specifically, an Aquaculture Experiment Station is being established by the University of Maine ARI and CE, in partnership with the USDA ARS through a non-assistance cooperative agreement (NACA) with support dollars provided by a congressional funding appropriation. This cooperative agreement is a long-term collaborative commitment between the listed research groups and the aquaculture industry to increase sustainable production and industry stability in Maine and the nation. The Aquaculture Experiment Station will harness the expertise of CE and ARI-affiliated faculty in Orono and at UMaine's Darling Marine Center, and USDA ARS researchers based on the Orono campus and at the National Marine Cold Water Marine Aquaculture Center. My responsibilities for this project include: 1) serving as a Project Director with Co-lead Damian Brady, Associate Professor SMS, 2) administering the overall NACA program with fiscal responsibilities and 3) performing research that addresses the defined USDA ARS research priorities for the improving fish health in Atlantic salmon aquaculture.

Criterion 1: Conducts Issues and Needs Assessment:

This program's research priorities are directed by the USDA ARS National Program 106 Aquaculture Action Plan 2020-2024 <https://www.ars.usda.gov/animal-production-and-protection/aquaculture/docs/action-plan/> and our research focuses on the specific salmon and shellfish objectives described in the action plan. The USDA ARS and NIFA National Program leaders host a series of virtual listening session as well as holding in-person scoping workshops to gather stakeholder input on needed research, education, and extension activities. As reported in the action plan, six listening sessions and 15 in-person workshops were held across the nation in 2018 and 2019 to assist in the drafting of the 2020-2024 action plan. I did participate and provide input in the in-person session hosted by USDA ARS and NIFA at the National Cold Water Marine Aquaculture Center in Orono, Maine, on June 6, 2018. Although this was prior to establishing the aquaculture experiment station, the output of the meeting very much reflects the salmon and shellfish research priorities that are outlined in the 2020-2024 action plan. I also routinely have conversations with Dr. Brian Peterson, Research Leader for USDA ARS Northeastern region, to discuss research activities and to receive input and guidance for directions in activities.

Criterion 2: Set Goals and Outcome-Based Objectives:

Goal: Facilitated by the NACA research collaboration, a UMaine Aquaculture Experiment Station will be established to advance genetic improvement technologies for the Eastern oyster and other shellfish species and to develop strategies to improve fish health in Atlantic salmon aquaculture by determining susceptibility to new and emerging pathogens.

Short term (listed in order of priority)

- a. By 2020, select and acquire strategic equipment to provide infrastructure support for NACA research activities at the DMC and the UMCEDRL.
- b. By 2020, recruit 4 graduate students for NACA research projects, two to be housed at DMC for shellfish research and two on the Orono campus for salmon research
- c. By 2021, hire 1 faculty member and 2 support staff to expand the NACA research capacity for the aquaculture experiment station.
- d. By 2021, perform research to develop diagnostic tools for detection of the Atlantic salmon viral agent, infectious salmon anemia virus, ISAV HPR0 (specific aim of my research).

Long term Objectives (equal priority)

- a. By 2022, establish an experimental marine site farm for at the DMC for students and industry alike to perform research on growth performance of shellfish species and demonstrate new technologies to be applied on commercial scale levels

Criterion 3: Designs, Delivers, Evaluates, Refines and Reports Program

Designs and Delivers (in order of completion):

Short term (listed in order of priority)

- a. In 2020, the NACA team (Damian Brady, Paul Rawson and I) purchased capital and non-capital equipment for the DMC and the UMCEDRL.
- b. In 2020, graduate students were recruited to perform NACA directed research by the NACA team.
- c. In 2021, 2 new CE faculty members and 2 new support staff professionals were hired by the NACA team
- d. In 2021, research to develop diagnostic tools for detection of the Atlantic salmon viral agent, infectious salmon anemia virus, ISAV HPR0 was initiated (early in process).

Long term Objectives (equal priority)

- b. By 2022, the establishment an experimental marine site farm at the DMC was initiated and marine site equipment is in place.

Evaluates and refines:

The overall project is early in development for such a large project. For my particular research aim to develop diagnostic tools for ISAV HPR0, I am now collaborating with Dr. Thomas Rounsville (CE) who specializes in molecular diagnostic work. From performing literature searches, we have now changed direction in the developing the molecular diagnostic assay.

Criterion 4: Documents Program Impacts with Emphasis on Economic, Environmental, and Social Conditions for Maine Citizens and Others

Again, this project is early in development and implementation. However, impacts of the project to date strengthen the aquaculture research capabilities of the University of Maine.

- a. In 2020, \$375,000 dollars of capital and non-capital equipment was procured and strategically placed at the DMC and the UMCEDRL AAHL building new infrastructure research capacity. As an example, new equipment such as a Near Infrared Reflectance Spectrometer (NIRS) allows for tracking genetic and environmental influences on the concentrations of key storage materials in bivalves which is key to the shellfish research.
- b. In 2020, graduate student funding allowed for five graduate students to be recruited to perform NACA directed research, 3 for DMC for shellfish research and 2 on the Orono campus for salmon health research.
- c. In 2021, two new CE faculty members were hired. Both faculty members are Finfish Nutrition Specialists and Assistant Extension Professors. The addition of these two faculty members is a new area of research for UMaine and the state of Maine. Finfish nutrition and development of sustainable feeds is a top priority for the aquaculture industry in Maine and globally.
- d. In 2021, the two new support staff professionals expand the NACA research capacity for the aquaculture experiment station. ARI was able to hire an administrative specialist to be shared with Maine Sea Grant, and an Aquaculture Innovation Specialist was hired for the DMC to oversee and manage operations of the marine experimental farm and establishment of a shellfish hatchery.

Research has begun for both shellfish and Atlantic salmon research but it is too early to report on it.

Criterion 6: Conducts or Collaborates on Applied Research to Support Program Development

Since 2019, for this collaborative research program, I serve as Project Director on the NACA agreement establishing an Aquaculture Experiment Station in Maine. (See expanded CV, PA II, Criterion 6, page 23).

Criterion 7: Seeks and Acquires Grants, Contracts and Special Funds

The funding to date for the collaborative NACA agreement is \$4,335,000. (Please see CV Part II PA I Criterion 7 page 28)

V. EXPANDED CURRICULUM VITAE (CV)

Part I: Personal Information

Deborah A. Bouchard, Ph.D.

Aquatic Animal Health Specialist

University of Maine Cooperative Extension Diagnostic and Research Laboratory

17 Godfrey Drive, Orono, Maine 04473

Tel: (207) 581-2767; Email: deborah.bouchard@maine.edu

Brief Job Description:

Aquatic Animal Health Specialist

This position is a joint appointment between Cooperative Extension (CE) and the Aquaculture Research Institute (ARI). The position is 100% of a fiscal year FTE and is split as follows: 51% Aquatic Animal Health Specialist with CE and 49% ARI (20% Director and 29% ARI Faculty) Primary responsibility includes oversight of the research and activities of the Aquatic Animal Health Laboratory that is part of the Diagnostic and Research Laboratory of Cooperative Extension. The faculty member is expected to be a project leader on State and federal grants. Collaboration is required of this faculty and this position. Collaborators include Maine Sea Grant, the School of Marine Sciences, the Lobster Institute, the School of Food and Agriculture, the Maine State Department of Marine Resources and others working in aquatic animal health and aquaculture. The directorship is an appointment through the Office of the Vice President of Research and the Dean of the Graduate School.

Academic Background

2018 Doctor of Philosophy, Aquaculture and Aquatic Resources, University of Maine, Orono, Maine.

1983 Bachelor of Science, Microbiology, University of Maine, Orono, Maine.

Employment Experience

Dec 2019 – present Aquatic Animal Health Specialist and Director, University of Maine Cooperative Extension and Aquaculture Research Institute. University of Maine Cooperative Extension Diagnostic and Research Laboratory, Orono, Maine

Sept 2018 – 2019 Aquatic Animal Health Specialist and Director, University of Maine Cooperative Extension and Aquaculture Research Institute. Research Network Director, Sustainable Ecological Aquaculture Network, University of Maine Cooperative Extension Diagnostic and Research Laboratory, Orono, Maine

2017- 2018 Aquatic Animal Health Industry Research Coordinator, Laboratory Manager and Director, University of Maine Cooperative Extension and Aquaculture Research Institute. Research Network Director, Sustainable Ecological Aquaculture Network, University of Maine Animal Health Laboratory, Orono, Maine

2009- 2017 Aquatic Animal Health Industry Research Coordinator and Laboratory Manager, Aquaculture Research Institute and University of Maine Animal Health Laboratory, University of Maine Cooperative Extension, Orono, Maine

2006- 2009 Research Coordinator and Laboratory Manager, University of Maine Animal Health Laboratory, University of Maine Cooperative Extension, Orono, Maine

2005- 2006 Marine Resource Scientist I, State of Maine Department of Marine Resource, Augusta, Maine

1996- 2004 President, Micro Technologies, Inc., Owner and CEO of private aquatic animal health biotechnology company. Richmond, Maine

1991-1996 Aquaculture Diagnostics and Bioassay Laboratory Manager, Northeast Laboratory, Waterville, Maine
 1990-1991 Clinical Microbiologist, Affiliated Laboratories, Inc., Bangor, Maine
 1988-1990 Research Associate, University of Maine, Orono, ME
 1984-1988 Coordinator of Microbiology Laboratory Instruction, Full time instructor. University of Maine, Orono, ME

Professional Organizations

2017- present World Aquaculture Society
 1991- present American Fisheries Society (AFS), Fish Health Section

Maine and National Service Committees

1999 - present State of Maine, Aquatic Animal Health Technical Committee
 2005 - present USDA/APHIS National Infectious Salmon Anemia (ISA) Technical Board
 2012 - present State of Maine, Lobster Bait Risk Assessment Review Committee
 2017 - present USDA/ARS National Coldwater Marine Aquaculture Center Institutional Animal Care and Use Committee
 2018- present Alliance for Maine’s Marine Economy
 2019-present SEAMaine (EDA) New Opportunities and Emerging Technologies
 2020-present USDA ARS Agricultural Biosafety Compendium Committee

University of Maine

May 2019-present University Research Council
 2017 - present UMS Innovation and Economic Development Council
 2017 - present UMaine Marine Sciences Advisory Team
 2017 - present UMaine Biological Safety Committee
 2010 - present UMaine Lobster Institute Cooperating Research Associate
 2009 - present UMaine Aquaculture Research Institute Leadership Committee

Part II.

CV PERFORMANCE AREA I: EDUCATIONAL PROGRAM DEVELOPMENT

Criterion 5: Engages in professional development to enhance teaching preparedness and Effectiveness

Development needs	Indicate specific development need	Indicate relevant activities to reach development goals (i.e., workshops, distance learning, professional organizations, etc.)
	Specific Goal	Activity Completed to Reach Goal
<i>Subject Matter Knowledge</i>	Increase knowledge of new and emerging aquaculture research priorities.	<p>2nd Recirculating Atlantic salmon Network (RAS-N) Workshop, MD (via zoom) –October 2020. The second RAS-N workshop expanded on the first workshop with over 115 people in attendance from around the country. I assisted with working with stakeholders to generate a list of research needs in order of priority. Along with UMaine colleagues, I shared our design for a workforce development program.</p> <p>4th Annual Maine Aquaculture Research, Development and Education Summit, Jan 2020. I helped organize this event. I interacted with a diverse group of attendees from educators, non-profits, industry, regulators and researchers. I presented on UMaine’s aquaculture resources for industry to the attendees. This meeting is the only meeting specific to Maine aquaculture and I learned about the industry’s research, development and education needs.</p>

Development needs	Indicate specific development need	Indicate relevant activities to reach development goals (i.e., workshops, distance learning, professional organizations, etc.)
		<p>1st Recirculating Atlantic salmon Network (RAS-N) Workshop, WI -Dec 2019 The workshop brought together a consortium of academia, industry and federal labs in five states across the US. The workshop was a two day meeting of presentations and discussions on RAS development in the US where I met RAS-N partners and learned about stakeholders view of barriers to growth in the industry.</p> <p>Aquaculture 2019, New Orleans March 2019 I attended and participated in diverse sessions covering aquatic animal health, science and public policy and CE impacts and education allowing me to keep current with new and emerging issues in aquatic animal health. I had in- person meetings with representatives from four commercial companies to increase their knowledge of UMaine’s aquaculture research capabilities.</p> <p>Northeast Aquaculture Conference & Exposition, Boston MA- Jan 2019, UMaine CE/ ARI had a booth at the tradeshow. I networked and engaged with attendees to provide information on the UMCEDRL AAHL research and contract capabilities. I learned about programs for aquaculture work force development training which I used to incorporate into two workforce development proposals which were awarded this year (see expanded CV criterion 7).</p> <p>Aquaculture Innovation Workshop, Miami FL – Dec 2018 This workshop provided significant information on developing recirculating aquaculture systems (RAS) and targeted research needs. I learned the latest developments for RAS and I met in person with the two new RAS companies coming to Maine to learn about their research needs.</p> <p>East Coast Molluscan Health Initiative Workshop, Cap May NJ- Oct. 2018 I was invited as an aquatic animal health specialist to participate in panel discussion for interstate molluscan hatchery test certification processes and completion of hatchery certification. This provided me the opportunity to learn about other East coast state’s shellfish regulations. I provided an overview of Maine’s hatchery certification and biosecurity practices.</p>
<i>Scholarship and Professional Activity</i>	Strategic planning skills	<p>Indiana University Philanthropy Workshop, Webinar May/June 2021 Indiana University Lilly Family School of Philanthropy fundraising for leadership training program. The workshops consisted of four -three hour sessions on learning the process for fundraising for University of Maine Leadership. I gained an understanding of how philanthropy works and also how to work with UMaine’s Foundation office for raising dollars for specific asks. I shared this information with ARI’s leadership committee.</p> <p>UMaine Academic Leadership Series: AD’s, Chairs & Directors Training: Dec 2020 through present: 5 to 6 gatherings throughout the academic year through the Provost’s office that are on topics relevant to the work of associate deans, department chairs, and school/center/institute directors. I gain knowledge on topics ranging from professional development opportunities to ongoing/upcoming initiatives at UMaine. Topics have included Defining Tomorrow, Research Learning Experiences, the Harold Alfond Foundation (HAF) gift, and others. I share this information with my ARI and CE units during organizational meetings.</p> <p>ARI strategic planning retreat December 2019: I participated in a strategic planning retreat to develop a strategic framework to use as a guide in annual planning, adaptive management and institutional evaluation for ARI. I worked with a consultant before the workshop to prepare and learn about strategic planning. This exercise helped solidify the team and solicit buy in</p>

Development needs	Indicate specific development need	Indicate relevant activities to reach development goals (i.e., workshops, distance learning, professional organizations, etc.)
		<p>for ARI's path forward at all levels of membership. It was a valuable learning tool for me in strategic planning.</p> <p>August 2018, Completed my PhD in Aquaculture and Aquatic Resources Dissertation title 'Investigating Present-Day Health Issues of the American Lobster (<i>Homarus americanus</i>). My research covered the significance of emerging diseases affecting the American lobster. I have presented results of my research to my peers, state agencies, at conferences, and used the research results for acquiring additional research funding. According to UMaine's Digital Commons my dissertation has been downloaded 126 times from Maine, national and international sources acknowledging the value of the research and increasing understanding of lobster health.</p>

Criterion 6: Conducts or collaborates on applied research to support program development

Collaborative Research:

September 2021 – August 2026 USDA Agriculture and Food Research Initiative, Sustainable Agricultural Systems (SAS), Sustainable Aquaculture Systems Supporting Atlantic salmon (SAS²) PD: Yonathan Zohar Co-PDs UMaine: **Deborah Bouchard (UMaine lead)**, Meggan Dwyer, Mary Tudor, Damian Brady, Peter Van Walsum Co-PDs from other collaborating institutions: T, Wong, G. Burr, C. Frederick, A. Choudhury, J. Davidson, G. Fisher, C. Good, C. Hartleb, J. Hurley, R. Johannsson, S. Knoche, F. Moser, B. Peterson, A. Place, J. Raven, K. Saito, H. Schreier, K. Sowers, J. Stubblefield. This grant spans across 3 state universities in Wisconsin, Maryland and Maine and has industry partners throughout the US. At UMaine the grant includes ARI, Maine Sea Grant, Cooperative Extension, the Wabanaki Center, School of Marine Sciences, Center for Cooperative Aquaculture Research and the College of Engineering and it engages and supports salaries for staff, faculty, graduate students and student interns in all listed. I am the UMaine Co-PD and I lead the workforce development and education objective, the aquatic animal health program objective and I also serve on the overall project steering committee. This grant was built solidly on the foundation of the collaborative success of the 2019-2022 NOAA Sea Grant, Maryland Sea Grant, Building capacity of land-based Atlantic salmon aquaculture in the US. This grant is not yet part of my Program Summary 3 as it is newly awarded and has not yet started.

July 2021 – June 2024 USDA AFRI, Cellulose Nanomaterials: A Novel Adjuvant and Delivery System For Aquaculture Vaccine Applications. PI Deborah Bouchard, Co-PIs Mason, Bricknell, Turner. This new project is a collaboration with CE, ARI, and UMaine Biochemical Engineering. The proposed research capitalizes upon the UMaine's research expertise, facilities, and industry partnerships in two complementary areas: aquaculture/fish health and cellulose nanomaterial science and engineering. I am the Lead PI and I am responsible for all project oversight and research design working closely with Co-PIs. The goal of this interdisciplinary project is to develop a new, safe and efficacious generation of vaccines for aquaculture by leveraging the characteristics of novel nanomaterials as depots and/or adjuvants. Through my role in ARI/CE, I have considerable and diverse relationships with industry partners in and beyond Maine. Working with UMaine's Office of Innovation and Economic Development, I aim to develop licensing agreements and commercialization strategies through direct industry sponsorship and/or programs such as the USDA Small Business Technology Transfer (STTR). This project engages one post-doctorate, two graduate students and 3 undergraduate students and I will provide mentorship for these students.

October 2020 – October 2021 UMaine and Northeastern University(NU) Seed Grant Program, A Novel Adjuvant for Aquaculture Vaccines Using Engineered Bacteria Targeting the STING Pathway, PI Jiahe Li, **PI Deborah Bouchard (UMaine lead)**, Co-PI Bricknell. This seed grant project is a collaboration with UMaine CE, ARI and Northeastern University. I am the Lead PI for UMaine and am responsible for all fish *in vivo* work

and experimental design. During the one-year grant period, we piloted the safety and efficacy of a novel, cost-effective, easily deployable and highly potent vaccine adjuvant platform by engineering non-pathogenic *E. coli* as a microbial factory and delivery vector to produce cyclic dinucleotides (CDNs). In this proposal, we will leverage multidisciplinary approaches in synthetic biology, fish immunology, and microbiology to address three gaps in the current fish vaccine formulations: (1) cost-effectiveness, (2) potency, and (3) improved animal welfare allowing us to seek additional funding for commercialization strategies. We have completed the *in vivo* work and are now performing all analyses. I also mentored 3 NU graduate students on methods for fish vaccination.

July 2020-2024 USDA ARS Non-Assistance Cooperative Agreement, Genetic Improvement of North American Atlantic Salmon & the Eastern Oyster for Aquaculture Production. PD Deborah Bouchard, Co-lead Damian Brady, Co-PI Paul Rawson. I am the Project Director for a Non-assistance Cooperative Agreement with the USDA ARS. The partnership is a collaboration between UMaine CE, ARI and the USDA ARS. I am responsible for overall project oversight, fiscal management, directing aquatic animal health research and reporting. This cooperative agreement is a long-term commitment between UMaine and federal researchers and the aquaculture industry to increase sustainable aquaculture production and industry stability. Funding is from a congressional appropriation and is renewable every 5 years. Research for this partnership has two broad aims; enhancing oyster aquaculture and improving the efficiency and sustainability of salmon aquaculture. I lead the AAHL team and we will work with the USDA ARS National Cold Water Marine Aquaculture Center to improve the production efficiency and sustainability of Atlantic salmon aquaculture by advancing research to determine the susceptibility of Atlantic salmon to new and emerging pathogens and to develop strategies to improve fish health. The project has provided funding for two new CE faculty members, graduate students and student interns. I and Richard Brzozowski are presently on-boarding the two new CE faculty members. I was the first to meet and introduce them to UMaine. I have spent time traveling with them to aquaculture facilities around the state and introducing them to other faculty and researchers. I have provided some training for navigating the UMaine web system and/or have provided the directions for all required training. I meet with them at least 3 times a week to assist in establishing their laboratories.

July 2020 – June 2022 USDA ARS Research Support Agreement, Developing new techniques to detect off-flavor in water and Atlantic salmon tissues. PI Deborah Bouchard, Co-PI Robert Harrington. I am the PI for a 2-year project aimed at developing new techniques to detect off-flavor in water and Atlantic salmon tissues. Mitigating off-flavor in fish is a top priority for land-based recirculating aquaculture systems (RAS) as determined by a stakeholder generated list of research priorities in 2020. Our aim is to develop a more cost effective and quicker method to detect off flavor in Atlantic salmon grown in recirculating aquaculture systems (RAS). With this additional funding provided by the USDA ARS, we will examine methodologies to optimize off flavor detection in Atlantic salmon. Research for this project was delayed by COVID. It was originally planned for 1 year but we have been awarded funding for a second year for July 2021 through June 2022.

September 2020- 2022 NOAA Saltonstall Kennedy, Improving Business Practices to Reduce Mortality in the Lobster Supply Chain. PI Richard Whale, Co-PIs Brady, D.C., **Bouchard, D**, Jury, S, Gutzler, B. This project is a collaboration with CE, School of Marine Sciences, the Lobster Institute, St Joseph's College and Wells NERRS. Maine's lobster industry has asked the University of Maine's Lobster Institute and its affiliated faculty to help address the heightened mortality problem of lobsters in the supply chain from capture to kitchen referred to collectively by the industry as "shrink". Our research team is characterizing conditions experienced by lobster through the supply chain – from on-board live-tanks to dock-side crates at buying stations to dealers' shore-based holding facilities and to trucks in transit. Objectives of the study are to develop tools to monitor for stress points in the supply chain, provide these monitoring tools to harvesters, and to then mitigate these stress points with defined best practices in handling. As a Co-PI, my role is to develop protocols for and participate in the health assessment monitoring of lobsters in the supply chain and to train graduate and undergraduate students for sample collection and result analyses. The overall project goal is to enhance profitability of the lobster industry by reducing losses along the supply chain.

September 2019-2022 NOAA Sea Grant, Maryland Sea Grant, Building capacity of land-based Atlantic salmon aquaculture in the US. Multistate with Maine as sub-contract. Co-PIs Zydlewski, Bartlett, **Deborah Bouchard**, Mary Tudor. On a national level, Maine Sea Grant, the ARI and CE are key collaborators in a NOAA Sea Grant project with Maryland, Maine and Wisconsin for building capacity of land-based Atlantic salmon aquaculture in the US. The project has established a public/private Recirculating Aquaculture Salmon Network (RAS-N). The network consortium, made up of industry stakeholders, academic institutes and the biotechnology sector and brings together critical knowledge and skills for success in domestic salmon RAS. The RAS-Network is analyzing the current status of RAS technology and identifying barriers to its development as stated by industry. The final product will be to provide a clear national plan to ensure economic, environmental and social success. I am a member of the internal Steering Committee whose charge is to evaluate the progress of all RAS-N activities, the level of coordination of all multi-region partners, and the general effectiveness of outreach, extension and educational models toward the overarching project aims. Now beginning the 3rd year of the project, industry priorities have been determined and a draft white paper for a national plan has been created.

September 2019-2022. NOAA Sea Grant, Sea Grant/ ARI Workforce Transdisciplinary Hub; NOAA Sea Grant; PI Gayle Zydlewski, **Co-PIs Deborah Bouchard (10%)**, Belle, Cowperthwaite, Davis, Johnson, Morse. Project funding received through the National NOAA Sea Grant aquaculture program by Maine Sea Grant established the Maine Aquaculture Hub project. The Maine Aquaculture Hub is coordinated by 6 Maine organizations and was created to strengthen aquaculture in Maine. I serve on the overall project Steering Committee and also the grant proposal development and the review committee for grants provided directly to the industry. The Maine Aquaculture Hub has three major objectives: (1) address barriers to sustainable aquaculture, (2) training for the next generation of farmers through the Aquaculture in Shared Waters (AQSW) program, (3) create a 10-year roadmap for the future of aquaculture in the state.

July 2019 - September 2021. Aquaculture Workforce Development Certificate Program: Applied Aquaculture Modules, NOAA Atlantic States Marine Fisheries Commission; PI Deborah Bouchard Co-PI Meggan Dwyer and UMaine System Program Development Funds. Aquaculture Workforce Development Certificate Program; Shared PI role **Deborah Bouchard** and Rebecca Van Beneden, Co-PI Meggan Dwyer. These two combined projects are a collaboration with CE, ARI, and School of Marine Sciences. I serve as the Lead PI and oversee project deliverables. The ARI is well into developing a Certificate in Sustainable Aquaculture that includes hands-on intensive courses in aquatic animal husbandry, aquatic animal health, shellfish culture and recirculating aquaculture systems. I will develop and teach the aquatic animal health course offered for the first time in the winter of 2022. The courses will be offered to both the general public through UMaine CE and to UMaine students through the School of Marine Sciences. This certificate program concludes with an Industry Internship Program that provides paid undergraduate industry internships at aquaculture businesses, regulatory agencies and nonprofits throughout Maine. This program is uniquely poised to address workforce development needs by placing interns directly within industry to grow occupational competencies.

September 2018 - August 2021. NOAA Sea Grant. An integrated approach to addressing sea lice in the commercial culture of Atlantic salmon; PI: Beth Bisson, Project Leader: Heather Hamlin, **Co-PIs: Deborah Bouchard**, Ian Bricknell, Aaron Strong. The project is a collaboration with CE, School of Marine Sciences, the Aquaculture Research Institute, and Maine Sea Grant and Cooke Aquaculture. As a Co-PI, I assist with project management, experimental design, and I am the point of contact for the industry to develop an integrated approach to addressing sea lice in Atlantic salmon culture. Objectives of the grant are to: 1) develop an ecosystem-based management practice for sea lice, 2) address barriers to stakeholder implementation of new pest management practices and develop strategies to promote acceptance, 3) Increase our understanding of alternative therapies for the treatment of sea lice. A highlight of this grant work was the Collaborative Learning Workshop which was held in September 2019. Consultant Dr. Christine Feurt facilitated the meeting, which was attended by 19 stakeholders from a variety of organizations including Cooke Aquaculture, the Department of Environmental

Protection, the USDA, the University of Maine, and Sea Grant. The meeting fostered communication among a diverse group of aquaculture stakeholders, and paved the way for future dialogue. We drafted a response survey, and created a report to summarize the findings and participant perception. The report was highly detailed, and can be used to pattern future interactions and meetings. Overall the participants felt it was a good use of their time (4.5/5.0) and each participant felt they had an opportunity to voice their questions or concerns (4.7/5.0).

September 2018 - 2020. NOAA SK. The consequences of a changing environment to the health of American lobsters. PI: Heather Hamlin **Co-PIs: Deborah Bouchard**, Cathy Billings. The project was a collaboration with CE, School of Marine Sciences, the Aquaculture Research Institute, and the Lobster Institute. The project examined the putative role of elevated ocean temperatures combined with ocean acidification as causative agents of lobster population declines. I trained eight Department of Marine Resources (DMR) lobster samplers to detect early signs of disease and collect samples for analysis. I also created a data base with DMR for tracking new and emerging lobster abnormalities and diseases.

September 2016- 2018 NRAC. A novel approach to prevent super chill in Atlantic salmon and other anadromous fish. PI: Ian Bricknell, **Co-PIs Deborah Bouchard (30%)**, Chong Lee, William Wolters, Christopher Bartlett. The project was a collaboration with CE, School of Marine Sciences, ARI, Maine Sea Grant, the USDA ARS and Cooke Aquaculture. The project investigated a novel approach to mitigating superchill events in cultured Atlantic salmon. Superchill is an unusual physiological collapse in salmon (death) that occurs in extremely cold weather in Maine's inshore coastal waters. The project investigated the addition of inert osmopotentiators, complex sugars (CS), in salmon diets to determine if the uptake of CS would lower the freezing point depression of the serum in Atlantic salmon thus reducing the impact of superchill conditions and allowing the fish to survive. All experiments were carried out successfully and collaboration between all groups was very effective. However, the limited control *in vivo* salmon studies performed by the USDA ARS using the CS formulated diets were not successful in preventing mortality. Funding ran out and additional studies could not be performed. Results of the study are public on NRAC's website and I trained two undergraduate students in laboratory techniques.

Contract Research Funding

October 2020– March 2021. Fairona Animal Health (FAH), Calgary Canada: Atlantic salmon (*Salmo salar* L.) nutrition and growth study using a natural collagen type 2 as a feed additive. PI Bouchard. I was the project director for this study with oversight of the entire project. The primary objective of this study was to examine the effects on growth rate and condition factor in Atlantic salmon fed salmon feed supplemented an FDA approved collagen native type 2 ingredient. FAH has developed a natural collagen type 2 product that has shown great promise in the terrestrial animal farming industry. The results of our *in vivo* study in Atlantic salmon demonstrated that there were no adverse reactions to the collagen supplement and all formulation fish groups grew very well. However, results also demonstrated that there were no observable enhancement in growth rate or condition factor. FAH is now considering their next steps for use of their FDA approved collagen study but will not move forward with use of this product in aquaculture.

June 2020- January 2022. WL Gore and Associates: In-field pilot study for sea lice settlement control. PI Bouchard. I am the lead project director for this study. The AAHL team has been performing contract research with WL Gore for three years. The research has evolved from laboratory petri dish based experiments to an ongoing full scale industry study at active Maine salmon farms. The research is now a collaboration with Cooke Aquaculture, WL Gore, Maine Sea Grant and the CE AAHL. The study is examining the effects of sea lice deterrents applied with WL Gore proprietary engineered units as a way of mitigating lice infestation levels. Sea lice control costs the Maine salmon industry almost \$10,000,000 dollars in treatment cost per year, approximately \$150,000 per single treatment of one site. If this new deterrent application eliminates even one treatment per year per site, it will save the industry over \$1,000,000 dollars per year, decreasing production costs and increasing

profitability. Phase I results indicated a significant effect on lice numbers. We (UMaine) presented the results to WL Gore and Cooke Aquaculture and a decision to move forward with Phase II was made. Phase II of the field study at two new sites began in June 2021 and is scheduled to go through January 2022. Through our research, WL Gore and Cooke Aquaculture have gained valuable knowledge on application of a potential environmentally safe tool for sea lice mitigation.

June 2020 – August 2020. Maine Department of Marine Resources: Lobster Bait Study. PI Bouchard I was the lead Principle Investigator for this project and directed the research. The AAHL team completed contract research to determine if a particular bait (pig hide) being used for fishing effected the health of lobsters. DMR considered this a high priority study. The AAHL was able to complete the study, present results to DMR lobster fishery staff and provide a written final report. Results indicated that short term use of the bait did not have an apparent effect on the health of lobsters. These results provided the information in order for DMR to consider marine policy decisions in regard to using this bait.

January 2020-April 2020. PeroxyChem, New Jersey, US: Peracetic acid efficacy and target animal safety study for disinfectant use in aquaculture. PI Bouchard. I was the lead Principle Investigator for this project and directed the research. With assistance from the AAHL team, we performed contract research to determine a possible effective dose of peracetic acid on lice using a standard bioassay method. The dose range was determined and using that dose range, we moved to an *in vivo* study to determine if the effective dose range was safe for Atlantic salmon. Results indicated a very narrow dose range that is safe for use in Atlantic salmon. This provided PeroxyChem with the results needed to determine next steps for this product and results needed to engage with the FDA as one step to begin the approval process.

September 2019 -December 2019. Benchmark Animal Health (BAH), Scotland UK: *P. salmonis* challenge model. PI Bouchard. I was the lead Principle Investigator for this project and directed the research. The AAHL team completed contract research working to create a challenge model for a serious salmon pathogen. In order to test vaccines, challenge models need to be created with pathogens prior to efficacy studies. Working with the sponsor and using current literature references we ran a lethal dose 50 experiment. The performed study did not achieve the endpoints desired to have a successful challenge model. BAH had scheduled two additional studies with UMaine but COVID impacted their company significantly and research on this pathogen has been discontinued.

March 2019-September 2019. Merck Animal Health (MAH), New Jersey, US, Pharmacokinetic study to evaluate 4 new formulations of SLICE®. PI Bouchard. I was the lead Principle Investigator for this project and directed the research. The AAHL team completed a contract research project that evaluated the pharmacokinetic properties of 4 new formulations of SLICE, a compound used to treat sea lice infestation. The objective of the study was to determine if any of the new formulations maintained effective levels for longer periods of time in the plasma of Atlantic salmon treated with SLICE. Results indicated that there was no increased retention in any of the formulation compared to the original formulation. Results provide MAH with the information required to determine next formulation directions.

October 2018- January 2019. Archer Daniel Midland Company (ADM): Evaluating growth rates with experimental feeds for Atlantic salmon. PI Bouchard. I was the lead Principle Investigator for this project and directed the research. The AAHL team completed a contract research pilot project to evaluate the palatability, growth rate and condition factor in Atlantic salmon with 5 experimental feed formulations provided by ADM. The study determined that all formulations were safe, palatable and growth rates compared well to all control groups. ADM is now using these results to further develop the feed additives.

March 2018 –August 2018. Benchmark Animal Health (BAH), Portland, Maine. Sea lice vaccine efficacy evaluation trial 2. PI: Bouchard. I was the lead Principle Investigator for this project and directed the research.

The AAHL team performed a complex vaccine study that tested the efficacy of 12 formulations for controlling Sea Lice. Sea lice are a major problem to the industry globally. The results of this study provided critical efficacy results with the formulations and allowed BAH to move closer to commercialization. The next step was to repeat the study with a refined set of formulations. BAH anticipated doing this in the spring of 2020 but COVID delayed this from happening. COVID financially impacted their company significantly and this research, while still a priority, is on hold.

May 2018 -September 2018. Archer Daniel Midland (ADM) Company, Illinois, US. The efficacy of experimental feeds to prevent or reduce mortality of Atlantic salmon due to piscirickettsiosis, (*Piscirickettsia salmonis* infection). PI: Bouchard. I was the lead Principle Investigator for this project and directed the research. The AAHL determined the efficiency of two of ADM’s developed feed supplements, CitriStim® and Anco®*Fit against piscirickettsiosis. Our results provided the knowledge that neither compound was effective in preventing or reducing mortality of Atlantic salmon due to piscirickettsiosis. ADM is no longer pursuing using these two supplements for use in fish feed.

October 2016 – April 2017. QinetiQ North America (QNA), Massachusetts, US. Evaluation of mechanical removal of Sea Lice with engineered equipment and UMaine’s proprietary compound (Compound X). PI: Deborah Bouchard. In 2011, I and Ian Bricknell discovered a compound (Compound X) which was effective in dislodging sea lice from Atlantic salmon. In 2011, UMaine submitted a patent application (Parasite Treatment Compound, Attorney Docket No. 3469.011P). In 2016, QNA signed a License Option and a MOU for the rights to use Compound X with the equipment they engineered for the removal of sea lice. Results of the study were very successful with over 90% removal of sea lice from infested fish. QNA was not able to raise the additional capital and in late 2018, they relinquished the license option.

Criterion 7: Seeks and acquires grants, contracts, and special funding in support of educational program development

Funding Summary

Since 2016, I have developed and/or participated in 19 grants. **Fifteen grants have been awarded for total funding of \$10,705,485.** One of the 19 grants listed is presently pending for an additional \$750,000 in funding. Please note that I indicate if I am Lead PI or if I am Co-PI. I have also added a bolded ‘***’ by the grants for which I am responsible for fiscal management. **I have also directed 11 industry contract projects that have brought in total funding revenue of \$602,106.** I am responsible for fiscal management of all contract projects.

Grants:

Date	Grant/Funding Opportunity/Title	Requested	Funded
07/03/2021	USDA-NIFA-Research Extension and Education for Undergraduates proposal – (A7401) AquEOUS: Aquaculture Experiential Opportunities for Undergraduate Students: Integrating Indigenous and Western Science through Applied Aquaculture Research, PI Meggan Dwyer, Co-PIs Ranco, Carr, Tudor. Senior Personnel Deborah Bouchard (2%) , Brady, Habte-Tsion, Hamlin, Hawkyard	\$750,000	Pending
09/2021-08/2026	USDA Agriculture and Food Research Initiative, Sustainable Agricultural Systems (SAS) Sustainable Aquaculture Systems Supporting Atlantic salmon (SAS ²) PD: Yonathan Zohar Co-PIs UMaine: Deborah Bouchard (UMaine lead)4.1% , Dwyer, Tudor, Brady, Van Walsum Co-PIs from other collaborating institutions: T, Wong, G. Burr, C. Frederick, A. Choudhury, J. Davidson, G. Fisher, C. Good, C. Hartleb, J. Hurley, R. Johannsson, S. Knoche, F. Moser, B. Peterson, A.	\$2,500,000	\$2,500,000***

	Place, J. Raven, K. Saito, H. Schreier, K. Sowers, J. Stubblefield Full Award: \$10M UMaine allocation: \$2.25M		
07/2021-06/2024	USDA AFRI, Cellulose Nanomaterials: A Novel Adjuvant and Delivery System For Aquaculture Vaccine Applications. PI Deborah Bouchard , Co-PIs Mason, Bricknell, Turner	\$494,013	\$494,013**
10/2020-09/2021	UMaine and Northeastern University Seed Grant Program, A Novel Adjuvant for Aquaculture Vaccines Using Engineered Bacteria Targeting the STING Pathway, PI Jiahe Li, PI Deborah Bouchard (UMaine lead) , Co-PI Bricknell	\$49,662	\$49,662**
10/2020 - 09/2024	USDA ARS Non-Assistance Cooperative Agreement, Genetic Improvement of North American Atlantic Salmon & the Eastern Oyster for Aquaculture Production. PD Deborah Bouchard , Co-lead Brady, Co-PIs Rawson, Dwyer	\$4,335,000	\$4,335,000**
07/2020-6/2022	USDA ARS Research Support Agreement, Developing new techniques to detect off-flavor in water and Atlantic salmon tissues. PI Deborah Bouchard	\$167,420	\$167,420**
09/2020-08/2022	NOAA Saltonstall Kennedy, Improving Business Practices to Reduce Mortality in the Lobster Supply Chain. PI Richard Whale, Co-PIs Brady, D.C., Bouchard, D (5%) , Jury, S. (St Joseph's College), & Gutzler, B. (Wells NERRs).	\$299,106	\$299,106
09/2019- 08/2022	NOAA Sea Grant, Sea Grant/ ARI Workforce Transdisciplinary Hub; NOAA Sea Grant; PI Gayle Zydlewski, Co-PIs Deborah Bouchard (10%) , Belle, Cowperthwaite, Davis, Johnson, Morse	\$1,199,996	\$1,199,996
09/2019– 08/2022	NOAA Sea Grant, Maryland Sea Grant, Building capacity of land-based Atlantic salmon aquaculture in the US. Multistate with Maine as sub-contract. Co-PIs Zydlewski, Bartlett, Deborah Bouchard (10%) , Mary Tudor Full award is \$2 million. UMaine award \$226,821	\$226,821	\$226,821
09/2019- 08/2022	NOAA Sea Grant, Maine Sea Grant/ ARI AquEOuS: Towards the establishment of Field Based Aquaculture Experimentation and Outreach Stations; PI Deborah Bouchard , Co-PIs Zydlewski, Brady, Leslie	\$1,084,260	\$ 0
09/2019- 08/2021	NOAA Sea Grant, A Techno-Economic and Life Cycle Analysis Model of RAS Facilities: Maximizing Sustainability in Land-Based Aquaculture; PI Gerard Van Walsum, Co-PI Deborah Bouchard (5%)	\$99,000	\$ 0
07/2019-06/2020	Maine Shellfish Aquaculture Research Consortium, NOAA Atlantic States Marine Fisheries Commission; PI Deborah Bouchard (25%) , Co-PIs Brady, Bowden, Beal, Dwyer, Rawson	\$400,000	\$ 0
09/2019- 08/2020	Aquaculture Workforce Development Certificate Program: Applied Aquaculture Modules, NOAA Atlantic States Marine Fisheries Commission; PI Deborah Bouchard (20%) , Co-PI Meggan Dwyer	\$123,735	\$123,735**
07/2019 -06/2020	Aquaculture Workforce Development Certificate Program; UMS Program Development Funds, Shared PI role Deborah Bouchard (10%) and Rebecca Van Beneden and Co-PI Meggan Dwyer	\$179,000	\$36,000**
1/1/2019- 9/30/22	NOAA Sea Grant, An integrated approach to addressing sea lice in the commercial culture of Atlantic salmon; PI: Beth Bisson, Project Leader: Heather Hamlin, Co-PIs: Deborah Bouchard (20%) Bricknell, Strong	\$725,367	\$725,367
09//18–08/31/20	NOAA Saltonstall Kennedy Grant Program, The consequences of a changing environment to the health of American lobsters. PI: Heather Hamlin Co-PIs: Deborah Bouchard (10%) Billings	\$192,774	\$192,774
7/2017-7/2019	Agriculture and Food Research Initiative (USDA/AFRI) Assessing alternative therapies for the treatment of parasitic copepods in commercial fish culture. PI: Heather Hamlin, Co-	\$149,967	\$149,967

	PIs: Deborah Bouchard (20%) , Ian Bricknell, Mary Tudor		
09/2016 –08/2018	Northeast Regional Aquaculture Center, A novel approach to prevent super chill in Atlantic salmon and other anadromous fish. PI: Ian Bricknell, Co-PIs Deborah Bouchard (30%) , Chong Lee, William Wolters, Christopher Bartlett	\$165,624	\$165,624**
09/2016 – 9/2017	United States Department of Agriculture, Animal Plant Inspection and Health Services, Veterinary Services. Commercial Aquaculture Health Program Standards Implementation for salmonid aquaculture. PI Deborah Bouchard	\$40,000	\$40,000**
	TOTAL	\$13,491,745	\$10,705,485

Industry Contract Work

Date	Contract company/Title	Funding	Status
06/01/21-12/31/21	WL Gore and Associates, Phase II In-field pilot study for system lice settlement control PI: Bouchard	\$46,500**	In progress
10/12/20 – 04/30/21	Fairona Animal Health, Atlantic salmon (<i>Salmo salar</i> L.) nutrition and growth study using a natural collagen type 2 as a feed additive. PI: Bouchard	\$79,189**	Complete
06/01/20 - 12/30/20	WL Gore and Associates, In-field pilot study for system lice settlement control PI: Bouchard	\$89,411**	Complete
06/10/20 – 08/23/20	Maine Department of Marine Resources Lobster Bait Study. PI Bouchard	\$18,100**	Complete
01/10/20 – 04/30/20	PeroxyChem, Peracetic acid efficacy study for disinfectant use in aquaculture. PI: Bouchard	\$46,158**	Complete
09/01/19 -12/31/19	Benchmark Animal Health, Scotland UK, <i>P. salmonis</i> challenge model PI: Bouchard	\$19,329**	Complete
03/01/19 - 09/30/19	Merck Animal Health, New Jersey, US, Pharmacokinetic study to evaluate 4 new formulations of SLICE®; PI:Bouchard 100%	\$110,680**	Complete
10/20/18 - 1/30/19	Archer Daniel Midland Company, Illinois, US, Evaluating growth rates with experimental feeds for Atlantic salmon; PI:Bouchard	\$23,926**	Complete
03/01/18 –08/30/18	Benchmark Animal Health, Portland, Maine. Sea lice vaccine efficacy evaluation trial 2 working. PI: Bouchard 100%	\$73,258**	Complete
05/10/18-09/10/18	Archer Daniel Midland Company, Illinois, US. The efficacy of experimental feeds to prevent or reduce mortality of Atlantic salmon due to piscirickettsiosis, (<i>Piscirickettsia salmonis</i> infection). PI: Bouchard	\$57,358**	Complete
10/1/16 – 03/25/17	QinetiQ North America, Massachusetts, US. Evaluation of mechanical removal of Sea Lice with engineered equipment and UMaine’s proprietary compound (Compound X). PI: Deborah Bouchard	\$38,200**	Complete
	TOTAL	\$602,109	

Criterion 8: Demonstrates educational program leadership

UNIVERSITY OF MAINE:

UMaine Lobster Institute Cooperating Research Associate 2010-Present: As an affiliate faculty research associate, I participate in applied lobster research with other Lobster Institute faculty and I participate in Lobster Institute sponsored events for the purpose of sharing information and research results.

Please see CV IV Criterion 4 page 29 for additional educational program leadership

STATE:

State of Maine, Aquatic Animal Health Technical Committee (AAHTC) 1999-Present: This committee provides expert technical advice to the Commissioners of the Departments of Inland Fish and Wildlife and Marine resources for protecting the health of wild and cultured aquatic animals and to mitigate the introduction or spread of infectious organisms. The board consists of 14 members. Government agency representatives are from Maine Departments of IFW, DMR and Agriculture, and from national organizations NOAA, USFW and USDA/APHIS. All members have experience in aquatic animal health. I served as an industry nominated member from 1999 to 2006 and from 2006 to present as the nominated member from academia (both nominations came from the Commissioner of DMR). The AAHTC has reviewed and provided advice on Chapter 24 aquatic animal health laws and regulations now formally enacted. The last two years has included many reviews for finfish import requirements for the new developing land based aquaculture industry.

State of Maine, Lobster Bait Risk Assessment Review Committee 2012-Present: This committee was established to provide recommendations to the Commissioner of the Department of Marine Resources on the level of risk associated with proposed introduction of a new lobster bait source to Maine's marine environment. Evaluation of bait risk considers the probable effect of introduction to receiving area, and the potential effects of introduction of infectious agents that the bait source might be harboring to the receiving ecosystem. The committee is made up of two staff members from DMR, and 4 aquatic animal health professionals with one member from the USDA/APHIS. I serve as an aquatic animal health professional. In 2018, the committee completed a document that outlines the steps required for bait dealers to submit to DMR for consideration of bait introduction. On average I review 2 to 4 potential new bait sources per year and provide an assessment of risk.

NATIONAL:

Agricultural Biorisk Compendium (ABC) Committee for Aquatic Animals October 2020 – present: This is a national committee lead by the USDA/APHIS and ARS to develop comprehensive US guidelines to address issues of agricultural biorisk management that are comparable to the U.S. Public Health Service's publication *Biosafety in Microbiological and Biomedical Laboratories* (BMBL) for aquatic animal pathogen research. The committee is made up of aquatic animal health specialist from across the country. I was invited to serve on this committee as I have extensive experience with aquatic pathogen research. The committee's charge is to write the Aquatic Animal Pathogen chapter for the Agricultural Biorisk Compendium. I led and wrote the sub-section on Biocontainment in Laboratory Research. The chapter is currently under review for publication.

USDA/APHIS National Infectious Salmon Anemia (ISA) Technical Committee 2005 -present: This committee oversees and implements the National ISA Program Standards which is a US mandated program for farm raised Atlantic salmon (ATS) for the control of ISAV (while national it is primarily for Maine). The technical board consists of a group of 4 voting members; the USDA ISAV Control Program Veterinarian, one Maine Department of Marine Resources representative, two industry representatives (as nominated by ATS producers) plus a non-voting chairperson. I was nominated by the industry to serve on this committee as an aquatic animal health specialist and provide advice on the evolving program standards.

USDA/APHIS Commercial Aquaculture Health Program Standards (CAHPS) Working Group 2016-present: This group represents a cooperative effort between the USDA/APHIS agency professionals and aquaculture businesses from around the country with the goal of establishing a voluntary framework for improvement and verification of the health of farmed aquatic animals produced in US commercial aquaculture sector in order to better support expansion of aquaculture business opportunities, promotion and facilitation of trade, as well as improved resource and environment protection. I am as a fish health consultant to the national CAHPS program and I am the lead coordinator for Maine's developing CAHPS program for the Atlantic salmon industry. There was a lull in activity from late 2018 to 2020. In 2020, the CAHPS program was renamed to

Comprehensive Aquaculture Health Program Standards (CAHPS). I will assist in implementation of the newly designed format.

CV PERFORMANCE AREA II: UNDERGRADUATE AND GRADUATE TEACHING AND ADVISING

I do not have a formal teaching appointment but in September of 2018, I was appointed as Associate Graduate Faculty with the School of Marine Sciences and I am also a member of the Aquaculture and Aquatic Resources Graduate Program so as to provide mentorship to graduate students. I also mentor and oversee undergraduate student employees, capstone students and interns (average of 3 to 4 per year). In the spring 2021, I taught a special topics lobster health course to 2 graduate students. (See PA II, Criterion 5 page 36 for student advising work).

CV PERFORMANCE AREA III: SCHOLARSHIP AND PROFESSIONAL ACTIVITY

Criterion 1: Scholarly Works Completed and in Progress

Book Chapter: Agricultural Biorisk Compendium: Aquatic Pathogens, May 2021; presently in review. (Please see CV I Criterion 8 Page 31 for more details)

Authors: Caird Rexroad, Section Lead, USDA Agricultural Research Service, Abu Sayed, USDA Animal Plant Health Inspection Service Alicia Marston, USDA Animal Plant Health Inspection Service, Aristeia Lubar, University of California, Arun Dhar, University of Arizona, Beth Cleveland, USDA Agricultural Research Service, Chris Good, The Conservation Fund's Freshwater Institute, David Straus, USDA Agricultural Research Service, **Deborah Bouchard**, University of Maine, Janet Warg, USDA Animal Plant Health Inspection Service, Janet Whaley, USDOC National Oceanic and Atmospheric Administration, Kathleen Hartman, USDA Animal Plant Health Inspection Service, Lester Khoo, Mississippi State University, Michael Deshotel, USDA Agricultural Research Service, Miles Lange, USDA Agricultural Research Service, Myron Kebus, Wisconsin Department of Agriculture, Trade and Consumer Protection, Ryan Carnegie, Virginia Institute of Marine Science, Stephen Reichley, Mississippi State University

UMaine You Tube Video University of Maine Cooperative Extension Aquatic Animal Health Laboratory <https://youtu.be/YKvuyw-MNTE> (337 views since December 2020).

Dissertation: Bouchard, Deborah A., "Investigating Present-day Health Issues of the American Lobster (*Homarus americanus*)" (2018) *Electronic Theses and Dissertation*. 2890.

<https://digitalcommons.library.umaine.edu/etd/2890>

According to UMaine's Digital Commons my dissertation has been downloaded 141 times from Maine, national and international sources acknowledging the value of the research and increasing understanding of lobster health.

Peer Reviewed Publications

1. Amalia M Harrington, Robert J Harrington, **Deborah A Bouchard**, Heather J Hamlin., 2020. The synergistic effects of elevated temperature and CO₂-induced ocean acidification reduce cardiac performance and increase disease susceptibility in subadult, female American lobsters *Homarus americanus* H. Milne Edwards, 1837 (Decapoda: Astacidea: Nephropidae) from the Gulf of Maine, *Journal of Crustacean Biology*, ruaa041, <https://doi.org/10.1093/jcbiol/ruaa041> (Cited 4 times)
2. Hamlin, H.J., Tudor, M.S., Tarr, E., **Bouchard, D.A.**, 2019. Influence of temperature regime and epizootic shell disease on ecdysterone concentrations in American lobster from the Gulf of Maine. *Bulletin of Marine Science*, 95: 409-420.
3. Harrington, A.M., Tudor, M.S., Reese, H.R., **Bouchard, D.A.**, Hamlin, H.J., 2019. Effects of temperature on larval American lobster (*Homarus americanus*): Is there a trade-off between growth rate and developmental stability? *Ecological Indicators*, 96: 404-411. (Cited 11 times)

4. Barker, S.E., Bricknell, I.R., Covello, J., Purcell, S.L., Wolters, W., Fast, M.D. and **Bouchard, D.A.** 2019. Sea lice, *Lepeophtheirus salmonis*; (Krøyer 1837), infected Atlantic salmon (*Salmo salar* L.) are more susceptible to infectious salmon anemia virus. *PLOS ONE* Volume 14 Issue 3 e0213232 (Cited 27 times)
5. Marín, S.L., J. Mancilla, M.A. Hausdorf, **D. Bouchard**, M.S. Tudor, and F. Kane, 2017. Sensitivity assessment of sea lice to chemotherapeutants: current bioassays and best practices. *Journal of Fish Diseases*. (Cited 5 times)

Criterion 2: Unpublished Professional Presentations (optional)

- Please see Performance Area V: Criterion 1 page 37

Criterion 3: Other Scholarly Activities

- For Professional organizations, memberships and committees please see expanded CV Part I Personal Information page 21
- USDA-ARS National Cold Water Marine Aquaculture Center (NCWMAC) Committee member on hiring committee for the Immunologist position June 2021, resulted in a successful hire.
- Sea Grant North Carolina Grant Program, Served as a peer reviewer for grant proposal June 2021
- PLOS ONE manuscript review: PONE-D-20-16484
Impact of a candidate vaccine on the dynamics of salmon lice (*Lepeophtheirus salmonis*) infestation and immune response in Atlantic salmon (*Salmo salar* L.), Dr. Jaya Kumari Swain, July 2020
- National Institute of Food and Agriculture, 2019 Aquaculture Research program. Participated on the review panel for the 2019 proposals (5 lead proposal reviews, 10 secondary and tertiary reviews, and 72 proposal discussions). July 2019
- United States Fish and Wildlife Service's (Service) Great Lakes Fish and Wildlife Restoration Act Grant Program. Served as a peer reviewer for grant proposal April 2019
- Oregon State University, Dept. of Fisheries and Wildlife. Served at an external aquaculture peer reviewer for Dr. Hillary Egna's application for full Professor, November 2018
- East Coast Molluscan Health Initiative Workshop, Cap May NJ. I was invited as an aquatic animal health specialist (1 of 3 professionals from Maine) to participate in panel discussion for interstate molluscan hatchery test certification processes and completion of hatchery certification. October 2018

CV PERFORMANCE AREA IV: COUNTY, ORGANIZATION, AND CAMPUS SERVICE

Criterion 1: Serves on organizational committees

- Member, University of Maine Cooperative Extension, Enhancing our Financial Future Committee; this was a subcommittee for building the Extension Roadmap 2020-2021
- Member, University of Maine Cooperative Extension, Extension Internship Committee, 2020-present, this is a committee to explore, design and establish a UMCE internship program

- Member, University of Maine Cooperative Extension **Peer Committee for three CE faculty members:** Dr. Alicyn Smart 2018-present, Dr. Matthew Hawkyard July 2020-present, Dr. Michael Habte-Tsion July 2020-present
- University of Maine, Dept. of Food and Agriculture. Served as a peer reviewer for Dr. Denise Skonberg's application for full Professor, October 2019
- Member, University of Maine Cooperative Extension Diagnostic and Research Laboratory Management Committee 2017-present
- Member, University of Maine Cooperative Extension Diagnostic and Research Laboratory Biosafety Committee 2017-present

Criterion 2: Serves on search and interview committees

- Aquaculture Research Institute/Cooperative Extension, Assistant Extension Professor and Fish Nutrition Specialist (Job ID: 65494), **Committee Chair**, March 2021, resulted in **two** successful hires
- Aquaculture Research Institute, Aquaculture Specialist (Job ID: 66066), Search **Committee Member**, February 2021, resulted in a successful hire
- Aquaculture Research Institute/Maine Sea Grant, Grants Manager/Fiscal Officer (Job ID: 65248), Search **Committee Member**, January 2021, resulted in a successful hire
- UM Executive Vice President of Academic Affairs and Provost, **Co-Chair** for the Search Committee February – June 2020, resulted in a successful hire
- Maine Sea Grant, Maine Aquaculture HUB Coordinator (Position 59176), Search **Committee Member**, November 2019- March 2020, resulted in a successful hire
- UM Aquaculture Research Institute Research and Outreach Programs Coordinator (id:52007), Search **Committee Member** November - March 2019, resulted in a successful hire
- UM Aquaculture Research Institute Research Assistant (Position # 24101), Search **Committee Member** December 2018, resulted in a successful hire
- UMCEDRL Molecular Diagnostic Professional (id: 23812), Search **Committee Member** March- June, 2018, resulted in a successful hire.

Criterion 3: Enhances skills and knowledge of County Executive Committees and other advisory groups

- State of Maine, Aquatic Animal Health Technical Committee. 1999 -present. Please see CV Part II PA I Criterion 8 page 30.
- USDA/APHIS National Infectious Salmon Anemia (ISA) Technical Board. 2005-present. (Please see CV Part II PA I Criterion 8 page 30)
- State of Maine, Lobster Bait Risk Assessment Review Committee. 2012-present. (Please see CV Part II PA I Criterion 8 page 30)

- Alliance for Maine’s Marine Economy (AMME). 2018-present. This is large membership of Maine companies, organizations and individuals dedicated to the growth of a vibrant marine economy for Maine. The mission of AMME is ‘To ensure that Maine seafood, fishing and aquaculture industries and the natural and innovation ecosystems on which they depend are healthy and benefit Maine people and communities.’ I am a member representing UMaine’s aquaculture research and I present on the activities of the Aquatic Animal Health Laboratory and collaborative research. AMME is where UMaine received \$1.25 million of its funding for the new aquatic animal health facilities in the UMCEDRL.
- The Seafood Economic Accelerator for Maine (SEAMaine). 2020-present. This is an industry-led initiative committed to growing Maine’s seafood economy by developing a roadmap and action plan that will ensure a vibrant, innovative and resilient marine economy. SEAMaine, a 3-year, \$2.1 million project initiated in June of 2020, is funded by the U.S. Economic Development Administration, Maine Technology Institute, and FocusMaine. SEAMaine brings together leaders from aquaculture and commercial fishing to identify strategies and targeted investments to help transition our heritage seafood economy into a modern engine for sustainable economic and job growth. I am a member of the New Opportunities & Emerging Technologies Sub-Committee. My experience with the aquaculture industry and contract research assists in identifying emerging technologies, as well as, research and innovation on the forefront of the marine economy with the potential to increase productivity, efficiency, revenues, expanded markets and jobs.

Criterion 4: Builds and sustains UMaine Cooperative Extension linkages with county, UM and UMS

- UMaine MARINE. May 2020-present: The UMaine Marine Sciences Advisory council was instrumental in creating the broader University of Maine Marine Aligned Research, Innovation, and Nationally-recognized Education or UMaine MARINE initiative. It is a unique Maine-based initiative that brings together university, industry, government, and community collaborators. The mission is to provide through innovative transdisciplinary marine research, education, and strategic partnerships, transformative solutions that improve the quality of life and enhance the social and economic wellbeing of the people of Maine and beyond. I serve on the internal steering committee, representing aquaculture.
- UMaine Faculty Senate. September 2019-present: Elected member representing Cooperative Extension. The Faculty Senate represents the Faculty of the University of Maine in developing and overseeing policies affecting the academic mission of the University of Maine.
- UMaine University Research Council. May 2019-present. This is council made of faculty members from many disciplines that review the UMS Research and Development Plan to strategize on how research and graduate studies can assist with furthering the R&D plan’s goals and objectives.
- UMS Innovation and Economic Development Council. 2017 – 2019. This is an advisory board to the UMaine President. The Council is composed of Cabinet-level members and other campus leaders. The Council is charged with establishing economic development as a strategic priority for the UMaine System.
- UMaine Marine Sciences Advisory Team (Council). 2017 – 2020. Advisory team of 8 members representing the academic, research, and commercialization aspects of marine sciences at UMaine. This team assists the Vice President of Research and Dean of the Graduate School with a strategic roadmap for better integration and synergistic optimization of various components of marine sciences for UMaine.
- UMaine Institutional Biological Safety Committee (IBC). 2017 – present. Appointed position through the UMaine President.

- Cooperating Research Associate with Lobster Institute. 2010 - present. Serve as collaborator for lobster related research.

Criterion 5: Conducts administrative roles and responsibilities including the role of county coordinator

- UMCEDRL Biocontainment Laboratory Manager 2021. I am responsible for and oversees all administrative and programmatic aspects of the HCBF including organizational, programmatic and fiscal activities, organizational operations/administration, personnel management, and internal and external communication and relationships.
- UMCEDRL Aquatic Animal Health Laboratory Director 2018-present, I am responsible for the overall direction, operation and administration of the laboratory division.
- UMCEDRL Biosafety Officer, appointed by John Rebar 2017-2019
- Supervisory responsibilities for four Cooperative Extension Professional positions for the UMCEDRL Aquatic Animal Health Laboratory and undergraduate students (average 3 to 4 per year) 2018-present
- Director, Aquaculture Research Institute. 2017 – present. Appointed position through the office of the Vice President for Research and Dean of the Graduate School. Interdisciplinary research institute with faculty associate members from UMaine, the UMaine System, and University of New England.
- Network Research Director, Sustainable Ecological Aquaculture Network (SEANET). 2017–2019. Served as the director of state-wide regional aquaculture research as part of the NSF EPSCoR Grant.
- Undergraduate and Graduate Advising: In September of 2018, I was appointed as Associate Graduate Faculty with the School of Marine Sciences and I am also a member of the Aquaculture and Aquatic Resources Graduate Program so as to provide mentorship to graduate students. I also mentor and oversee undergraduate student employees, capstone students and interns (average of 3 to 4 per year).

Student	Degree	Program	Dates	Role
Sarah Turner	MS now PhD	AAR	9/18 -present	Primary Advisor
Kathryn Liberman	MS complete	SMS	1/19 -12/20	Committee Member
Caitlin Wiafe-Kwakye	PhD Candidate	BMS	1/19-present	Committee Member
Brandy-Lee Soos	Ph.D.	BMS	3/19-present	Committee Member
Robert Morefield	Ph.D Candidate	SMS	1/20-present	Committee Member
Cynthia L. Houston	Ph. D.	C and J	10/20-present	Committee Member
Cassandra Leeman	MS	SMS	1/21-present	Committee Member

Criterion 6: Demonstrates commitment to UMaine Cooperative Extension civil rights expectations, and UMaine Extension and UM diversity goals

- I complete the annual Civil Rights Training - 2017 to present.
- I traveled to the Aroostook Band of Micmac’s Micmac Farms in Caribou, Maine in July, 2019. I was invited to tour the tribe’s trout recirculating aquaculture facility with Chief Peter-Paul and his hatchery manager. I provided advice on methods to improve functions in the facility. This introduction led to communication with the Aroostook Band of Micmac, Maliseet, Passamaquoddy and Penobscot Nations. I and colleague Scarlett Tudor organized and held a half day workshop on December 16, 2019 on UMaine’s aquaculture abilities and ways in which CE/ARI can provide assistance and educational resources to

enhance aquaculture for Maine's Tribal communities. The attendees gained knowledge of UMaine's aquaculture resources.

- I served as a committee member of a FEMA Region I Tribal Fisheries and Aquaculture Solutions Based Team from 2020 – June 2021. I was invited to participate on this committee as an aquaculture consultant to offer support and information for developing tribal aquaculture interests and businesses. From participation on this committee, I have developed an ongoing dialogue with the Aroostook Band of Micmac, the Penobscot Nation, and the Houlton Band of Maliseet. I am presently working with Chris Schillaci, the Aquaculture Coordinator for NOAA's Greater Atlantic Fisheries Office to seek funding sources to assist the Tribes with aquaculture development.
- Stemming from the above interactions and discussions, in July 2021, I assisted Meggan Dwyer, Mary Tudor and Darren Ranco (UMaine Wabanaki Center) with submitting a USDA-NIFA-Research Extension and Education for Undergraduates proposal - (A7401) AquEOUS: Aquaculture Experiential Opportunities for Undergraduate Students: Integrating Indigenous and Western Science through Applied Aquaculture Research. If awarded, the overriding goal of the 5 year project will be to engage tribal students and a diverse cohort of undergraduates across the nation in experiential science training in aquaculture. The project will incorporate Indigenous Cultural and Ecological Knowledge through a unique codesign of student projects with interdisciplinary aquaculture faculty, the aquaculture industry sector and Maine's Wabanaki Traditional Knowledge Keepers. I met with the tribes to gain their support for this proposal. Mark Sockbeson, the Penobscot Nation's Sub Chief wrote this about our proposal in an email to me *"I have discussed this proposal with Chief Francis, Candi Ewer, Director Penobscot Nation Department of Education & Career Services and John S. Banks, Director Department of Natural Resources, who love the idea of providing more training opportunities, internships and career paths for our Tribal Members. We are very much interested in participating, fully support and truly appreciate your efforts in this area."* Cara O'Donnell, the Natural Resource Director of the Aroostook Band of Micmacs (ABM) stated the following in an email to the FEMA Region I Tribal Fisheries and Aquaculture Solutions Based committee *"In early July we all met (Aroostook Band of Micmacs, UMaine ARI and NOAA) to discuss ABM goals for expanding our hatchery and potential ways to collaborate and incorporate programs offered by UM ARI. We are grateful for the specialized knowledge of the staff at ARI and the many potential opportunities to work together."*

CV PERFORMANCE AREA V: PUBLIC SERVICE

Criterion 1: Presentation and programs that do not require engagement in the full educational program development process.

Public Presentations or Panels

- **Collaborative Research Symposium Northeastern University (NU) and University of Maine Webinar.** Presented on preliminary research results for the seed grant 'A Novel Adjuvant for Aquaculture Vaccines Using Engineered Bacteria Targeting the STING Pathway' and participated in breakout session to discuss future strategies for UMaine and the Roux Foundation of NU. May 20, 2021
- **Aquaculture in the Northeast C-FARE and NAREA Webinar.** Invited panel speaker and presented broad overview of Maine's aquaculture industry and UMaine's research and extension assets. February 1, 2021. Video: <https://www.youtube.com/watch?v=6flkBIsCdzw&t=1s> ; (176 views since February 2021) Text Summary: <https://www.cfare.org/new-blog/aquaculture-in-the-northeast>
- **UMaine Aquaculture Research Institute & Aquatic Animal Health Lab to Maine State Marine Resources Legislative Committee.** Presented as Cooperative Extension and ARI for UMaine's

capabilities for research to increase sustainable aquaculture production and industry stability (Addressing Disease, New Opportunities and Workforce). January 26, 2021 (via zoom)

- **COVID-19 Economic Development Recovery Support Function Workgroup. FEMA Region 1 for Maine Tribal Fisheries and Aquaculture.** Invited panel speaker to provide information on UMaine's aquaculture assets for aquaculture research and workforce development. December 18, 2020 (virtual meeting)
- **Water Management in RAS systems – Maine and Denmark Webinar:** Presented as Cooperative Extension and ARI for UMaine's capabilities for aquaculture research in RAS and gave overview of RAS development in Maine. Participated on the panel to address questions from the audience. November 19, 2020 <https://americas.ramboll.com/webinar/aquaculture>
- **Aquaculture at UMaine to Maine State Marine Resources Legislative Committee.** Presented as Cooperative Extension and ARI for UMaine's capabilities for Aquaculture Research and Development. February 4, 2020
- **2020 Maine Aquaculture Research, Development and Education Summit.** Presented an overview of the Aquaculture Research Institute and the University of Maine's facilities across the state engaged in aquaculture research, industry engagement and workforce development. January 17, 2020
- **2019 New Faculty Orientation.** Served as panel member to discuss research at UMaine. 'How should new faculty consider establishing their research and scholarship agenda.' Lead a breakout session in my role as an Institute Director on 'What does service at UMaine look like look like'. August 22, 2019
- **SEANET Sustainability Year 5.** Presented to the American Association for the Advancement of Science (AAAS) Review Team. Presented on the sustainability of SEANET after EPSCoR grant sunsets. Highlighted collaborations and research programs that will continue. June 25, 2019
- **State House Hall of Flags, UMaine Day, College of NSFA.** Tended a booth for CE and ARI that presented information on aquaculture research at UMaine. I talked with many legislatures from across the state. January 29, 2019
- **Meet and Greet with Maine State Marine Resources Legislative Committee.** Presented as Cooperative Extension and ARI for UMaine's capabilities for marine research and resource agency interaction. January 17, 2019
- **Transition of SEANET into the Aquaculture Research Institute at the end of FY19.** Presented transition of SEANET (EPSCoR funded grant) into ARI at the yearly SEANET stakeholders meeting. December 21, 2018
- **43rd Annual Eastern Fish Health Workshop.** Invited organizer and moderator for Special Session: "Sea Lice, addressing control strategies in commercial Salmon farming, do we have a wrench or a hammer in our tool box?" April 2018
- **3rd Annual Maine Aquaculture R&D and Education Summit.** Belfast Maine. Presented 'Bioassays with Sea Lice, A Tool in Integrated Pest Management'. March 2017

Newspaper or Television Interviews

- **Maine scientists seek to develop vaccines for salmon from wood pulp.** Salmon Business August 18, 2021
<https://salmonbusiness.com/maine-scientists-seek-to-develop-vaccines-for-salmon-from-wood-pulp/>
- **Developing enhanced fish vaccines with nanocellulose.** Science Daily, August 18, 2021
<https://www.sciencedaily.com/releases/2021/08/210818153735.htm>
- **UMaine researchers to develop enhanced fish vaccines with nanocellulose.** Penobscot Bay Pilot August 19, 2021
<https://www.penbaypilot.com/article/umaine-researchers-develop-enhanced-fish-vaccines-nanocellulose/150825>
- **A new vaccine, for fish? Using Maine wood fiber? UMaine researchers are on it.** August 19, 2021

<https://www.mainebiz.biz/article/a-new-vaccine-for-fish-using-maine-wood-fiber-umaine-researchers-are-on-it>

- **UMaine researchers to develop enhanced fish vaccines with nanocellulose.** UMaine News August 17, 2021
<https://umaine.edu/news/blog/2021/08/17/umaine-researchers-to-develop-enhanced-fish-vaccines-with-nanocellulose/>
- **UMaine, Northeastern fund shared research, UMaine Today, Spring/Summer 2021**
<https://umainetoday.umaine.edu/features/2021/02/22/umaine-northeastern-fund-shared-research/>
- **A New Device Tracks Lobsters as They Move Through the Supply Chain.** Smithsonian Magazine, January 8, 2021
<https://www.smithsonianmag.com/innovation/new-device-tracks-lobsters-as-they-move-through-supply-chain-180976709/>
- **Scientists Have Designed an Active Tracker for Lobsters.** Hakai magazine, January 7, 2021
<https://www.hakaimagazine.com/news/scientists-have-designed-an-activity-tracker-for-lobsters/>
- **UMaine establishes aquaculture station.** The Ellsworth American, October 31, 2020
<https://www.ellsworthamerican.com/maine-news/waterfront/umaine-establishes-aquaculture-station/>
- **UMaine Aquaculture Research Institute partners with USDA to help aquaculture across Maine.** WABI Channel 5. October 15, 2020
<https://www.wabi.tv/2020/10/15/umaine-aquaculture-research-institute-partners-with-usda-to-help-aquaculture-across-maine/>
- **UMaine Aquaculture Research Institute, USDA Agricultural Research Service partner to help salmon and oyster aquaculture succeed in the U.S.** October 14, 2020
<https://umaine.edu/news/blog/2020/10/14/umaine-aquaculture-research-institute-usda-agricultural-research-service-partner-to-help-salmon-and-oyster-aquaculture-succeed-in-the-u-s/>
- **Entrance of Large-Scale Fisheries and Aquatic Farms Could Hamper Maine Aquaculture Industry.** US News.com October 14, 2020
<https://www.usnews.com/news/best-states/articles/2020-10-14/growth-of-large-scale-fisheries-could-hamper-maine-aquaculture-industry>
- **UMaine, Northeastern fund shared research projects of social, economic significance.** October 9, 2020
<https://umaine.edu/news/blog/2020/10/09/umaine-northeastern-fund-shared-research-projects-of-social-economic-significance/>
- **Fitbit for lobsters? UMaine tracker could improve lobster survival in the supply chain.** Mainebiz September 1, 2020 <https://www.mainebiz.biz/article/fitbit-for-lobsters-umaine-tracker-could-improve-lobster-survival-in-supply-chain>
- **For the Maine Coast, 2019 was the year of the fish.** Bangor Daily News (BDN) January 1, 2020
<https://bangordailynews.com/2020/01/01/news/midcoast/for-the-maine-coast-2019-was-the-year-of-the-fish/>
- **NOAA awards \$1.6M grants for sustainable aquaculture research in Maine.** Fox 22 WFVX Bangor, September 25, 2019
<https://www.foxbangor.com/news/item/noaa-awards-1-6m-grant-for-sustainable-aquaculture-research-in-maine/>
- **How Maine became a magnet for land-based fish farms.** Bangor Daily News (BDN) June 3, 2019
<https://bangordailynews.com/2019/06/03/news/midcoast/how-maine-became-a-magnet-for-land-based-fish-farms/>
- **Aquaculture wars: The perils and promise of the Big Fish.** The Christian Science Monitor, March 13, 2019
<https://www.csmonitor.com/Environment/2019/0313/Aquaculture-wars-The-perils-and-promise-of-Big-Fish>

- **A visit to the University of Maine Aquaculture Research Center.** Belfast Community Media December 18, 2018 <https://vimeo.com/307724127>

VI. EVALUATION OF TEACHING

N/A – No teaching appointment

VII. DEPARTMENTAL PEER COMMITTEE EVALUATION (APPLICABLE ONLY TO FACULTY MEMBERS WITH JOINT APPOINTMENTS)

As Director of the Aquaculture Research Institute, I have not yet had a 360 review.

VIII. LETTERS OF SUPPORT

Outside organizations (Maine and national)

Brian Peterson PhD, USDA ARS Research Leader, National Cold Water Marine Aquaculture Center
brian.peterson@usda.gov

Lori Gustafson DVM, PhD, USDA APHIS Veterinary Services Epidemiologist
Lori.l.gustafson@usda.gov

Sebastian Belle, PhD Executive Director, Maine Aquaculture Association
sebastian@maineaqua.org

Clients (Maine and National)

William R. Keleher, President and CEO, Kennebec River Biosciences, Maine business
wkeleher@kennebecbio.com

Alexis Slupe, Entrepreneur for Core Technology, WL Gore and Associates, Inc, National business
aslupe@wlgore.com

UMaine Internal

Dennis Harrington, CE Assistant Director and Financial Administrator
dennis.l.harrington@maine.edu

Gayle Zydlewski, PhD, Professor of School of Marine Sciences, Director of Maine Sea Grant
gayle.zydlewski@maine.edu



Stephanie Block, PhD
Product Development

John Bowzer, PhD
Research Scientist

Archer Daniels Midland Company
Decatur, IL

September 17, 2019

To whom it may concern,

We would like to acknowledge the significant contributions that the University of Maine Cooperative Extension and Aquaculture Research Institute (UMaine) and Dr. Debbie Bouchard have made to our research and development efforts. Dr. Bouchard has conducted two research experiments in collaboration with our company, Archer Daniels Midland Company (ADM). One experiment was an exploratory growth and safety evaluation of a novel feed ingredient in Atlantic salmon diets. The other experiment was a disease challenge with Atlantic salmon which required specialized research facilities and advanced expertise in conducting disease challenges. The UMaine work has positively impacted the understanding and development of two experimental products for salmon applications. ADM greatly appreciates the professionalism, attention to detail, timely reporting, and transparency that Dr. Bouchard brings to our collaborations.

Sincerely,

A handwritten signature in black ink that reads "Stephanie Block". The signature is written in a cursive style with a large initial 'S'.

Stephanie Block, PhD

A handwritten signature in black ink that reads "John Bowzer". The signature is written in a cursive style with a large initial 'J'.

John Bowzer, PhD

IX. APPENDICES
A. APPENDIX A

Memorandum of Understanding
between
UMaine Aquaculture Research Institute
and
Deborah A. Bouchard
Effective Date: **September 1, 2018**

This Memorandum of Understanding (MOU) establishes the terms and conditions associated with the **Joint Appointment of Dr. Deborah Bouchard in the Aquaculture Research Institute(ARI) and the University of Maine Cooperative Extension (CE).**

Purpose for Appointment

The reasons for this appointment include submitting proposals to various aquaculture-related foundations, businesses and institutions; collaborating on aquaculture-related research projects, and at times mentoring students.

Rationale for Appointment

A Joint Appointment will help to strengthen the relationship and partnership between ARI and CE. Dr. Bouchard is an ideal faculty member to serve in this joint appointment position because of her long and successful career of serving the aquaculture industry of Maine and beyond. Her work has benefited the health and longevity of numerous aquaculture species as well as the economic soundness of companies with interest in aquaculture.

Unit and Teaching/Research Split

This position is 100% of a fiscal year FTE to be split as follows:
51% Aquatic Animal Health Specialist with the University of Maine Cooperative Extension
49% Aquaculture Research Institute (20% Director and 29% ARI Faculty)

Responsibilities

1. Actively participate in the activities and responsibilities of the University of Maine Aquatic Animal Health Laboratory including the supervision of technical staff. For activities associated with your extension program, identify your affiliation as University of Maine Cooperative Extension. The above requirement applies but is not limited to research grant proposals and awards, publications, presentations both public and professional, university sponsored events, and media communications.
2. Actively participate in the activities and responsibilities of the ARI. For activities associated with your aquaculture research program, identify your affiliation as ARI. The above requirement applies but is not limited to research grant proposals and awards, publications, presentations both public and professional, university sponsored events, and media communications.
3. Identify your affiliation as Cooperative Extension, ARI or both for all grants and contracts administered by the Office of Research Administration (ORA). Extension and ARI are identified as "centers" associated with grants and contracts when appropriate. Prior to submitting proposals through ORA's Proposal Approval Routing System (PARS), work with University of Maine Cooperative Extension to assist with grant development and management.
4. Report on activities in the most appropriate unit reporting system based on their relationship to research and extension. Report on extension activities and program impacts through the timely submission of entries into the UMaine Extension Planning and Reporting System. Report on

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Deborah A. Bouchard
Effective Date: **September 1, 2018**

research activities and program impacts through the College of Natural Sciences, Forestry, and the ARI as requested.

Contributions expected for each unit

University of Maine Cooperative Extension:

1. Primary administrative support from the University of Maine Cooperative Extension as it relates to work that is associated with the Maine Aquatic Animal Health Research Laboratory.
2. Support will be provided by the Planning and Reporting Coordinator for the development of an Extension plan of work, impact reporting and grant/contract reviews prior to submission to the Office of Research Administration (ORA).
3. Travel support for Extension activities and commitments.
4. 51% of salary and employee benefit costs covered from UMaine Extension budget.
5. Clerical and computer support for the Extension component of the position.
6. Access to professional development funds prorated to appointment level.

Aquaculture Research Institute

1. Secondary administrative support through ARI.
2. Secondary supervision of Faculty Position by the Vice President of Research and Dean of the Graduate School with regards to ARI Director responsibilities.
3. Support for research activities and commitments from ARI.
4. 49% of salary and employee benefit costs paid by the ARI through MEIF.
5. Access to the research facilities in the University of Maine Cooperative Extension Diagnostic & Research Laboratory.

Duration and Appointment Criteria

This joint appointment will be an on-going commitment of both the University of Maine Cooperative Extension and the Aquaculture Research Institute. A desire by either party to alter their commitment to the position will require:

1. Written notification to the Dean of University of Maine Cooperative Extension and Vice President for Research and Dean of the Graduate School, one calendar year prior to any changes taking effect. Clear and compelling documentation should be provided to support the desire to change the appointment.
2. The Vice President for Research and Dean of the Graduate School and the Dean for Cooperative Extension, or their designated representatives, will negotiate any changes in the commitment to the appointment.
3. In the event that an agreement cannot be reached the Vice President for Research and Dean of the Graduate School and the Dean of Cooperative Extension will bring the issue to the UMaine Provost and request support in finding a resolution.

Evaluation of Work Performance

As the director of a university-level center spanning multiple units across the university, the Director of ARI reports to the Vice President for Research and Dean of the Graduate School,

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who has the responsibility for the evaluation of the Director of ARI role. The Aquatic Animal Health Specialist will follow the UMaine Cooperative Extension requirements and format continuing contract/tenure and post-tenure compensation. The Aquatic Animal Health Specialist will also add components to the documentation to address the work done in support of the ARI. The UMaine Cooperative Extension Program Administrator for Food Systems will provide the leadership for the evaluation process. The UMaine Cooperative Extension Promotion Review Committee (PRC) will serve as the faculty peer evaluative body for all faculty evaluation actions. When the Dean of Cooperative Extension conducts their review, it will include inputs received from the Vice President for Research and Dean of the Graduate School.

Modifications to this MOU can be made at any time by the request of any and mutual consent of the signatories below.

Deborah A. Bouchard

3/5/19

Faculty Appointee

Date

Lisa Phelps
**Interim Director, University of Maine
Cooperative Extension**

Date

3/28/19

Kody Varahramyan
**Vice President for Research and
Dean of the Graduate School**

Date

4/30/19

M. G. C.
Provost

Date

5/11/2019

CC: Deborah Bouchard Personnel File
Kody Varahramyan, Vice President of Research, Dean of the Graduate School
Lisa Phelps, Interim Director Cooperative Extension

December 6, 2021

Dr. John Volin
Executive Vice President for Academic Affairs and Provost
University of Maine
5703 Alumni Hall, Suite 201
Orono, ME 04469-5703

Dear Dr. Volin,

Dr. Bouchard has a joint appointment between Cooperative Extension (51%) and the Aquaculture Research Institute (ARI) (49%). The Maine Economic Improvement Fund (MEIF) provides 100% of Dr. Bouchard's salary. Dr. Bouchard serves as Cooperative Extension's Aquatic Animal Health Specialist and the Director of ARI, which is appointed by the Vice President of Research and the Dean of the Graduate School. After reviewing the portfolio of accomplishment submitted by Dr. Bouchard, the recommendations of the Faculty Promotion Review Committee (PRC), Dr. Bouchard's letters of support, the recommendation of Supervisor/Program Administrator Dr. Richard Brzozowski and the criteria for assessing faculty performance, we offer this assessment of her request for promotion to Associate Extension Professor and Aquatic Animal Health Specialist.

Dr. Bouchard has three clearly defined Extension programs and a new collaborative program which will establish an Aquaculture Experiment Station. All four of these programs will significantly impact Maine's aquaculture industry. We concur with the PRC and Dr. Brzozowski that Dr. Bouchard exceeds the standards for conducting issues and needs assessments with all of her programs. We also commend Dr. Bouchard for the goals and outcome-based objectives that are exceedingly well defined within all four programs.

We concur with the PRC that Dr. Bouchard has documented an impressive array of programs which vary in scope and target audiences. She clearly focuses on delivery methods that match participant needs and thoroughly evaluates her programs both for impacts and also to make any necessary adjustments. We also want to commend Dr. Bouchard for the priority she places on reporting the impacts of her programs through the Maine Planning and Reporting Systems (MPRS), in addition to the state and federal reporting she has to complete due to her grant and research work.

We concur with the PRC that Dr. Bouchard has exceeded the criterion focused on documenting program impacts with an emphasis on economic, environmental, and social conditions. Dr. Bouchard provides clearly documented data to support the impacts of her programs. In addition, in her letters of support from industry stakeholders, they also shared the impact of Dr. Bouchard's work with their businesses and the broader industry. It is evident that Dr. Bouchard's programs are having a significant positive economic impact to the participants in these programs. We also commend Dr. Bouchard's extraordinary efforts to develop the Aquatic Animal Health Lab at UMaine Extension's Diagnostic and Research Laboratory (DRL). Her leadership in developing and implementing the fee structure and standard operating procedure for this lab will serve as a model for other programs within Extension. In addition, she is responsible for obtaining the funding for and then hiring two new finfish nutrition specialists, which will also have a significant impact on the industry.

extension.umaine.edu

Dr. Bouchard clearly places a high priority on professional development and has a well-developed professional plan to further the effectiveness of her programs. Dr. Bouchard is one of the most highly collaborative faculty members at UMaine, the list of faculty she collaborates with on research programs is extensive. In addition, she also collaborates with state agencies, non-profits, federal entities, and other universities.

We concur that Dr. Bouchard exceeds the standards for the criterion in regard to grants and contracts. She has an outstanding grantsmanship record of participating in the submission of 19 proposals which totaled over \$13M and was awarded \$10.7M. Of this, she is responsible for managing over \$7.9M as a PI. She has also acquired and completed over \$600K in contracted work.

Dr. Bouchard has exhibited a great deal of leadership within her educational programs. She collaborates with the Lobster Institute, she advises two state committees, and provides leadership to three national USDA programs related to aquaculture. She is a nationally recognized expert and has served on the Agricultural Biorisk Compendium Committee for Aquatic Animals and wrote the sub-section on Biocontainment in Laboratory Research.

We note, that while Dr. Bouchard does not have a formal teaching appointment, she is Associate Graduate Faculty with the School of Marine Sciences and also a member of the Aquaculture and Aquatic Resources Graduate Program. She is to be commended for the work that she does with both undergraduate and graduate students through student employment, capstone classes and interns. In addition, she has taught a graduate special topics lobster course.

We concur with the PRC and Dr. Brzozowski that Dr. Bouchard has exceeded the criterion focused on scholarship as she has published five peer reviewed publications and one book chapter. She also has a variety of other scholarly activities including serving as a peer reviewer and conducting 11 presentations.

Dr. Bouchard continues to be an excellent Extension faculty member, administrator, and member of the broader University of Maine community. We concur with the PRC's comment "*She is an outstanding and 'best-of-the-best' UMaine faculty member, scientist, researcher, administrator, and colleague*". Her knowledge of effective Extension education programming and applied research have contributed to her making significant contributions to the Maine aquaculture industry in addition to significant contributions to UMaine and the University of Maine System. We look forward to her continued contributions to Extension, to UMaine and to the state of Maine.

Dr. Bouchard's letters of support are a valuable indication of her work and are all strong testaments to her contributions and impacts as evidenced from her peers within UMaine, stakeholders that she has worked with across the state and within the federal government. They are also in unanimous agreement that her programs and impacts are significant. We believe this quote summarizes what an Extension Specialist should aspire to: "*She is a team player that the industry relies on for answers to their questions. The NCWMAC relies on her expertise to support our animal welfare program and address out fish health questions. I view Dr. Bouchard as a friend and colleague and know her research has had positive impacts on the Atlantic salmon industry. She is a great mentor for students*

and other faculty at the University of Maine.” It is also clearly evident the value the Maine Aquaculture Association places on her work by the strongly worded letter of support.

In conclusion, we support the unanimous recommendation of the UMaine Extension Faculty Promotion and Review Committee (PRC) and Dr. Richard Brzozowski to promote Dr. Deborah Bouchard to Associate Extension Professor effective July 1, 2022.

Sincerely,



Dr. Hannah Carter
Dean
University of Maine Cooperative Extension



Dr. Kody Varahramyan
Vice President for Research and
Dean of the Graduate School

c: Dr. Deborah Bouchard, Personnel File
Dr. Richard Brzozowski, Supervisor/Program Administrator

Request for Promotion and Continuing Contract Supervisor Recommendation

Faculty Member: Deborah Bouchard, Aquatic Animal Health Specialist, Assistant Extension Professor, University of Maine Cooperative Extension and Aquaculture Research Institute

The packet of accomplishments in requesting promotion to Associate Professor by Dr. Deborah Bouchard was submitted in September 2021. She began her faculty position on September 1, 2018. She has a 51/49 Extension/Research split appointment as an Assistant Professor/Aquatic Animal Health Specialist with the University of Maine Cooperative Extension and as the Director of the Aquaculture Research Institute (ARI) respectively. After reviewing the portfolio of accomplishments submitted by Dr. Bouchard, the recommendation of the Promotion Review Committee (PRC), the criteria for assessing faculty performance, and reading her letters of support, I offer this recommendation of her request for continuing contract and promotion to Associate Extension Professor.

I agree with the PRC that Dr. Bouchard has exceeded the standards for conducting issues and needs assessment for aquatic industry sectors. It is evident that Dr. Bouchard has used a variety of methods to identify issues and assess needs of her clientele.

Dr. Bouchard has met the standards in developing outcome-based goals and objectives that align with the federal and state goals. Her goals are well developed as well as specific, measurable, achievable, relevant, and time bound. She has included both short and long-range objectives for her work.

Dr. Bouchard has consistently reported impacts of her work in the Maine Planning and Reporting System (MPRS). Because her faculty position is funded by the Maine Economic Improvement Fund (MEIF), she has presented several economic impacts of her by project.

Dr. Bouchard has presented a thorough professional development plan to support her program development. She clearly values gaining knowledge and the enhancement of skills. As a statewide specialist, her strategy for building capacity among her team and beyond is evident.

Dr. Bouchard is to be commended for her efforts and involvement in a wide array of applied and scientific research projects. She has been very successful in pursuing and securing external funds to support this research. It is evident that she far exceeds this criterion with her leading or participating in numerous research grants. She has exceeded expectations.

Performance area II Undergraduate Teaching and Advising is not a part of her appointment. However, Dr. Bouchard has been appointed as Associate Graduate Faculty with the School of Marine Sciences and is also a member of the Aquaculture & Aquatic Resources Graduate Program. She mentors several students per academic year.

Regarding performance area III, Scholarship and Professional Activity, Dr. Bouchard has clearly met the criterion. In a short span of time as a faculty member, she has attended conferences at which she has been a well-received presenter. During the pandemic, she has continued to make presentations to peers and members of aquaculture industries. Dr. Bouchard has served effectively as the PI on contracts and collaborative research. Currently, she has several contracts. This work includes twelve research projects to support sustainable aquaculture with the aquaculture industry. Over the past five years, her work has generated over \$11,000,000.

Dr. Bouchard is a co-author on five peer-reviewed journal articles. She has also been involved in the development of a certificate program for Aquaculture.

Dr. Bouchard has met the expectations for serving on organizational committees and interview teams. This involvement has had a direct and positive effect on the University's Diagnostic and Research Laboratory. She has presented a list of different county, organization, and University of Maine-based committees on which she has served.

As a faculty member at the University, Dr. Bouchard has built linkages with University of Maine and System faculty and departments and has certainly enhanced the visibility and programming of Cooperative Extension. She has cultivated important connections and continues to develop constructive relationships with numerous faculty and staff.

I commend Dr. Bouchard for her active involvement in the following professional associations: The Alliance for Maine's Marine Economy, The World Aquaculture Society, Maine Aquaculture Association, and The American Fisheries Society.

To me, it is evident that Dr. Bouchard has a genuine passion for her profession as an aquatic animal health specialist and researcher. The Aquaculture Research Institute is a prime example of her exemplary work and dedication. The University of Maine System is very fortunate to have a faculty member with her drive, expertise, and commitment.

I strongly concur with the unanimous recommendation of the Promotion Review Committee that Dr. Deborah Bouchard receive continuing contract and be promoted to Associate Extension Professor.

If promotion is granted, it will take effect on July 1, 2022.



Dr. Richard Brzozowski, Program Administrator

November 2, 2021

Date

C: Dr. Hannah Carter, Dean, University of Maine Cooperative Extension
Dr. Deborah Bouchard
personnel file

Faculty Peer Review Committee Recommendation for Promotion and Continuing Contract Status

Faculty Member: Deborah Bouchard Ph.D., Aquatic Animal Health Specialist, Assistant Extension Professor, University of Maine Cooperative Extension and Aquaculture Research Institute

Performance Area I: Educational Program Development

Criterion 1: Conducts issues and needs assessment

Comments: Dr. Bouchard employs three methods of evaluation: Stakeholder input utilizing email and in-person meetings, advisory groups, and R&D research surveys.

Dr. Bouchard exceeds the standard for this criterion.

Criterion 2: Sets goals and outcome-based objectives

Comments: Dr. Bouchard sets SMART prioritized goals for her programs. She sets clear measurable short-term and long-term objectives for her unique research and educational programs. An example is she sets SMART objectives related to the development and implementation of the lobster disease database.

Dr. Bouchard meets the standard for this criterion.

Criterion 3: Designs, delivers, evaluates, refines, and reports programs

Comments: Dr. Bouchard documents an impressive array of programs, varied in scope and target audience. She varies her program delivery depending on the requirements of the program and stakeholders. She refines her programs when required based on program evaluations and stakeholder feedback. Some of her programs are delivered in the form of grants or contracts that fund her research and educational programs. She reports her program accomplishments in the MPRS.

Dr. Bouchard meets the standard for this criterion.

Criterion 4: Documents program impact with emphasis on economic, environmental, and social conditions

Comments: Dr. Bouchard evaluates the short and long-term economic and knowledge gain of research and program work. *She has completed 10 contracts to advance knowledge of aquatic animal health and received two grants to develop aquatic animal vaccines.* The Committee commends Dr. Bouchard's extraordinary efforts to develop the Aquatic Animal Health Lab and bring it into operation. It should be noted that because of Dr. Bouchard's appointment, her focus is research that supports stakeholder needs and sustainability of the Aquatic Animal Health Lab (AAHL). She offered over 40 tours for over 200 individuals of the AAHL. She developed and implemented the fee structure and standard operating procedures for the AAHL. The AAHL is financially self-sustaining and generates at least \$186,000 per year to support three FTE positions and facility

infrastructure and operations. Dr. Bouchard states that Maine leads the nation with a very successful and economically important lobster fishery with an annual boat value of near \$500 million dollars and with retail generating over \$1 billion annually. Her work is in service of maintaining and improving this important industry. She provided workshops to train the Department of Marine Resources (DMR) and the DMR used this knowledge to train over 150 boat captains. Stakeholders in turn gained and applied the knowledge by reporting over 900 lobster abnormalities on the database that she designed and maintains. To support her Aquaculture Experiment Station program, Dr. Bouchard acquired funding to support two new Finfish nutrition specialist faculty positions that have been hired.

Quote from a letter of support: *“Quite frankly she is one of the only reasons the farmers continue to instruct the association to support the University at the State and Federal levels. Dr. Bouchard single-handedly turned the Aquaculture Research Institute into a functional unit and recovered the industry's respect for it as an effective research body.”*
- Sebastian Belle, Executive Director, Maine Aquaculture Association.

Dr. Bouchard exceeds the standard for this criterion.

Criterion 5: Engages in professional development to enhance teaching preparedness and effectiveness

Comments: Dr. Bouchard has an established professional development plan to increase her knowledge in several areas. Dr. Bouchard shares this learning with UMaine and Aquaculture Research Institute colleagues. She shared knowledge gained from workforce development and leadership.

Dr. Bouchard meets the standard for this criterion.

Criterion 6: Conducts or collaborates on applied research to support program development

Comments: Since her initial appointment, Dr. Bouchard has conducted 15 research projects and 11 research contracts as PI or Co-PI that are in support of her aquaculture programs and are vital to the growth and sustainability of the industry. She collaborates with UMS faculty, and industry, regional and international partners.

Dr. Bouchard exceeds the standard for this criterion.

Criterion 7: Seeks and acquires grants, contracts, and special funds in support of educational program development

Comments: Dr. Bouchard has participated in the submission of 19 proposals for a total of \$13,491,745 and has been awarded \$10,705,485 and managed over \$7.9 million in funds as a PI. She acquired and completed over \$600,000 in contracted work. Funded research and contracts support her educational programming and the aquaculture industry.

Dr. Bouchard exceeds the standard for this criterion.

Criterion 8: Demonstrates educational program leadership

Comments: Dr. Bouchard collaborates with the Lobster Institute as a cooperating research associate to support the lobster industry and fishery. She acts as an advisor to two-state committees (State of Maine, Aquatic Animal Health Technical Committee (AAHTC) and the State of Maine, Lobster Bait Risk Assessment Review Committee. At a national level, she demonstrated leadership on the Agricultural Biorisk Compendium (ABC) Committee for Aquatic Animals and led and wrote the sub-section on Biocontainment in Laboratory Research. This subsection is utilized not only in Maine but across the country. Dr. Bouchard provides leadership to three national USDA programs related to aquaculture.

Dr. Bouchard exceeds the standard for this criterion.

Performance Area II: Undergraduate and Graduate Teaching and Advising
No teaching appointment

Performance Area III: Scholarship and Professional Activity

Criterion 1: Scholarly works completed and in progress

Comments: Dr. Bouchard has five peer-review publications, one book chapter authorship, and a Ph.D. dissertation.

Dr. Bouchard exceeds the standard for this criterion.

Criterion 2: Unpublished professional presentations (Optional)

Comments: Dr. Bouchard has completed 11 presentations.

Criterion 3: Other scholarly activities (Optional)

Comments: Dr. Bouchard is a member of nine professionally relevant organizations and reviewed seven grant proposals.

Performance Area IV: County, Organizational, and Campus Service

Criterion 1: Serves on organizational committees

Comments: Dr. Bouchard has served on four Cooperative Extension committees, three faculty peer committees, represented Extension on the Faculty Senate, and served as a faculty peer reviewer for one full professor.

Dr. Bouchard exceeds the standard for this criterion.

Criterion 2: Serves on search and interview teams

Comments: Dr. Bouchard has served on eight search and interview teams.

Dr. Bouchard exceeds the standard for this criterion.

Criterion 3: Enhances skills and knowledge of County Executive Committees (CEC) and other advisory groups

Comments: Dr. Bouchard serves on five steering committees in an advisory capacity. With Dr. Bouchard's guidance, the Alliance for Maine's Marine Economy was able to secure \$1.25 million in support of the Aquatic Research Laboratory.

Dr. Bouchard exceeds the standard for this criterion.

Criterion 4 – Builds and sustains UMaine Cooperative Extension linkages with county, UM, and UMS (Optional)

Comments: Dr. Bouchard serves on the faculty senate and six other University of Maine committees.

Criterion 5: Performs administrative roles and responsibilities

Comments: Dr. Bouchard fills the role of University of Maine Cooperative Extension Diagnostic Research Laboratory (UMCEDRL) Biocontainment Laboratory Manager, UMCEDRL Aquatic Animal Health Laboratory Director, UMCEDRL Biosafety Officer, supervises one to two research professionals, is Director of the Aquaculture Research Institute, and Network Research Director, Sustainable Ecological Aquaculture Network (SEANET), served as a committee member for three M.S., and five Ph.D. students and primary advisor to one Masters and one Ph.D. student.

Dr. Bouchard exceeds the standard for this criterion.

Criterion 6: Demonstrates commitment to UMaine Cooperative Extension civil rights expectations, and UMaine Extension and UM diversity goals

Comments: Dr. Bouchard attends an annual civil rights training. She is an active collaborator with several tribal communities. She has developed an ongoing dialogue with the Aroostook Band of Micmac, the Penobscot Nation, and the Houlton Band of Maliseet. Dr. Bouchard assisted Meggan Dwyer, Mary Tudor, and Darren Ranco (UMaine Wabanaki Center) with submitting a USDA-NIFA-Research Extension and Education for Undergraduates proposal - (A7401) AquEOUS: Aquaculture Experiential Opportunities for Undergraduate Students: Integrating Indigenous and Western Science through Applied Aquaculture Research.

Dr. Bouchard exceeds the standard for this criterion.

Performance Area V: Public Service

Criterion 1: Presentations and programs that do not require engagement in the full educational program development process

Comments: Dr. Bouchard has provided 14 public presentations and 18 news and TV presentations. She provided 40 tours to over 200 stakeholders of the Aquatic Animal Health Laboratory.

Dr. Bouchard exceeds the standard for this criterion.

Performance Area VI: Awards and Recognition

Criterion 1: Type of award or recognition (Optional)

Comments: None documented.

Letters of Support:

Promotion and continuing contract only: Content of letters, categories of authors, number of letters

Comments: Dr. Bouchard received excellent letters in support of her promotion. Common themes include compliments of her unique invaluable expertise, professionalism, and astonishing impacts on the aquaculture and fishery industries in Maine. Several letters reference that the University is fortunate to have Dr. Bouchard.

Quote from Letter of support: *“She is an outstanding and 'best-of-the-best' UMaine faculty member, scientist, researcher, administrator, and colleague”* - Dennis Harrington, Assistant Director of University of Maine Cooperative Extension.

Additional Comments:

The Committee commends Dr. Bouchard for successfully navigating the unique responsibilities of her Cooperative Extension appointment, and her many contributions to the development of the University of Maine Cooperative Extension Diagnostic Research Laboratory, which is vital to sustaining and enhancing the Maine Marine Economy.

Recommendation of the Faculty Peer Review Committee:

The Committee finds by a vote of 5 YES and 0 NO that Dr. Deborah Bouchard is demonstrating satisfactory performance in meeting the standards of Associate Extension Professor as described in the *“UMaine Extension Faculty Annual Performance, Reappointment, Promotion and Continuing Contract Application Guidelines”* on a continuing basis.

If promotion is granted, it will take effect July 1, 2022.

Date: October 7, 2021

A handwritten signature in black ink, appearing to be 'JB', is written over a yellow rectangular highlight.

Jason Bolton



Donna Coffin



David Handley



Tori Jackson



Frank Wertheim

C: Program Administrator R. Brzozowski

Dr. Kody Varahramyan, Vice President for Research and Dean of the Graduate School

D. Bouchard personnel file

United States Department of Agriculture

Research, Education and Economics
Agricultural Research Service

August 16, 2021

Richard Brzozowski, Ph.D.
Program Administrator
UMaine Cooperative Extension
5741 Libby Hall, Room 106
Orono, ME 04469-5741

Dr. Brzozowski:

My name is Brian Peterson, and I am Research Leader and Center Director of the USDA-ARS National Cold Water Marine Aquaculture Center (NCWMAC) in Franklin, ME. This letter is to strongly support Dr. Debbie Bouchard's promotion to Associate Extension Professor. I have known Dr. Bouchard for almost six years. When I arrived in 2015, Debbie was one of the first people I met from the University of Maine. My first impressions were that she interacted well with people, she was knowledgeable about issues important to stakeholders, and very willing to collaborate on research projects.

Dr. Bouchard and I have worked a variety of projects, grants, and cooperative agreements. For example, we have a Research Support Agreement that funds a collaboration between NCWMAC and the University of Maine to develop a method to detect off-flavor in water and fish tissue samples. We also have a Non-Assistance Cooperative Agreement that supports research to improve fish health in Atlantic salmon and advance genetic improvement technologies in the Eastern oyster. Dr. Bouchard and I have also been collaborators on research grants funded through USDA-NIFA for \$15 million.

Dr. Bouchard has participated on two committees for the NCWMAC. She recently served on our hiring committee to hire an Immunologist and she has been a member of our Institutional Animal Care and Use Committee for the last five years. Her knowledge regarding Atlantic salmon has been invaluable in addressing animal welfare issues at our facility. Dr. Bouchard has also recommended undergraduate students to work for the NCWMAC. These students work part time and learn valuable laboratory and fish husbandry skills. Many of these students have acquired full time jobs in the aquaculture industry.

I have seen Dr. Bouchard present research seminars at professional meetings as well as presentations to industry stakeholders. These talks were very well received by both academia and stakeholders. It is clear to me that Dr. Bouchard is someone that most people respect and rely on for questions related to fish health. I have also been on many zoom calls with Dr. Bouchard and stakeholders and was very impressed with her ability to interact with them.

My first impressions of Dr. Bouchard were on target after getting to know and work with her. She is a team player that the industry relies on for answers to their questions. The NCWMAC relies on her expertise to support our animal welfare program and address our fish health questions. I view Dr. Bouchard as a friend and colleague and know her research has had positive impacts on the Atlantic salmon industry. She is a great mentor for students and other faculty at the University of Maine.

Sincerely,



Brian C. Peterson, Ph.D.
Research Leader and Center Director
National Cold Water Marine Aquaculture Center



United States Department of Agriculture

September 1, 2021

Dr. Richard Brzozowski, PhD
UMaine Cooperative Extension

Dear Dr. Richard Brzozowski,

I am writing to offer my whole-hearted support for your pending decision to promote Deborah Bouchard to Associate Professor. I am an aquaculture focused veterinary epidemiologist with the USDA APHIS Veterinary Services Center for Epidemiology and Animal Health, and I've known Dr Bouchard since 2002 when I was stationed in Eastport Maine to provide epidemiologic support to the Infectious Salmon Anemia program. At the time, Dr Bouchard was already a highly respected and appreciated expert in aquatic animal health having established a diagnostic laboratory devoted entirely to aquatic animals to meet the expanding needs of the region. Her subject matter expertise, alongside her capability to form strong working relationships with the industry, the State of Maine and, as we established a presence in the region, the USDA, made her a central figure in the design and acceptance of many of the strategies implemented to ultimately gain successful control of a transboundary foreign animal disease outbreak. Her exceptional ability to liaise with industry and government to devise or support initiatives to advance aquatic animal health has been a characterizing feature of her work and is the reason that I've had the opportunity to continue working with her on a number of fronts to this day.

Recently, Dr Bouchard has been instrumental in helping the USDA pilot the Comprehensive Aquaculture Health Program Standards (CAHPS), a developing federal platform for aquatic animal health improvement and verification. CAHPS evolved through APHIS/industry partnerships aimed to safeguard health and strengthen trade for United States' exceptional aquatic resources and the growing industries they sustain. A few years ago, Dr Bouchard led one of the first initiatives to beta-test CAHPS, in her case on an Atlantic salmon hatchery in Maine. Her work revealed both its strength of concept and its excessive complexity in implementation; these helped incentivize and guide development of templates and ultimately a mobile app to ease and standardize the inspection process. Most recently, Dr Bouchard is a PI on an USDA Agriculture & Food Research Initiative, Sustainable Agricultural Systems (SAS) grant that will field test this newest CAHPS format on land-based recirculating aquaculture systems which are a promising focus for aquaculture development in Maine and the U.S. as a whole.

Dr Bouchard and I also collaborate on several active fish health advisory groups, specifically Maine's Aquatic Animal Health Technical Committee (AAHTC) and Maine's Lobster Bait Risk Assessment Group. Dr Bouchard provides expertise on aquatic animal health and diagnostics, pathogen risks, and science-based solution generation. She is collegial, clear, well-grounded, open to discussion, and highly respected by industry, academia, and government agencies alike. I look forward to continued opportunities to work alongside Dr Bouchard and commend the University of Maine for its strong support for her current and future initiatives.

Sincerely,

A handwritten signature in black ink, appearing to read "Lori Gustafson".

Lori Gustafson, DVM, PhD



MAINE AQUACULTURE ASSOCIATION

Richard Brzozowski, Ph.D.
Program Administrator

UMaine Cooperative Extension
5741 Libby Hall, Room 106
Orono, ME 04469-5741
Office: (207) 581.3222

E-mail: richard.brzozowski@maine.edu

September 7, 2021

Dr Brzozowski, my sincerest apologies for the last-minute nature of this letter in strong support of Dr. Deborah Bouchard, Assistant Extension Professor and Director of the Aquaculture Research Institute, who is seeking promotion to Associate Extension Professor. Dr. Bouchard has a long history of working closely with our sector. She is trusted and respected by our producers and the many companies that provide goods and services to the aquaculture sector. That trust and h does not come easily, it is earned not given. Farmers, as you know, are cautious and often suspicious. Dr. Bouchards work over the years has dramatically improved farming practices in the area of biosecurity and aquatic animal health. Her research, extension, education and training work have been instrumental in helping Maine's aquatic farmers compete in a highly competitive world market. Dr. Bouchard has also served a critical advisory role to the states aquatic resource management agencies.

Dr. Bouchard's impacts have been broader than just in Maine. Students who have trained with her have gone on to serve important roles in both the private and public sectors at state, national and international levels. Her leadership in developing professional relationships with colleagues at other research institutions and the private sector has been instrumental in the growing perception of Maine as a leader in the development of a competitive and sustainable national aquaculture sector. She has been instrumental in the University becoming known as the go to institution for applied aquatic animal health research that is accepted not only by fellow academics but the commercial sector as well. Quite frankly she is one of the only reasons the farmers continue to instruct the association to support the University at the State and Federal levels. Dr Bouchard single handedly turned the Aquaculture Research Institute into a functional unit and recovered the industries respect for it as an effective research body. The University is lucky to have her and there are many in the private sector who gladly hire her away! On behalf of the Associations membership and Board of Directors, I strongly recommend you recognize her critical role and elevate her to an Associate Extension Professor. I would be more than glad to answer any questions you may have about the Associations endorsement and support of Dr. Bouchard. Feel free to contact me anytime.

Sincerely,
Sebastian Belle
Sebastian Belle
Executive Director



06 September 2021

Richard Brzozowski, Ph.D.
Program Administrator
University of Maine Cooperative Extension

Re: Deborah Bouchard Recommendation

Dear Dr. Brzozowski:

I am submitting this letter of recommendation to strongly support Deborah Bouchard's promotion to Associate Professor. My name is William Keleher and I am CEO of Kennebec River Biosciences (KRB) located in Richmond, ME, a company that provides animal health solutions to the global aquaculture industry. I have known Dr. Bouchard since 1988 when I was an undergraduate student at UMaine and she was with the Aquatic Animal Health Laboratory then housed in the Department of Microbiology. My remarks below will concentrate primarily on the last five years (2016-2021).

One of the essential functions that Dr. Bouchard fulfills is to actively work with private sector companies like KRB; providing access to UMaine personnel and facilities as they look to meet key commercialization objectives. An example of this is our current project which will determine the efficacy of DNA vaccine for an important virus found in Atlantic salmon. Based on this work, KRB will be able to provide an improved vaccine solution to Cooke Aquaculture for their Maine operations; one that offers superior flexibility and performance. Dr. Bouchard actively develops these types of collaborative approaches which act as a multiplier with respect to economic development within the state and is critical to small businesses such as KRB.

Another vital role Dr. Bouchard plays is as a provider of objective science-based opinion especially with respect to issues related to aquatic animal health. Her counsel is valued by both the commercial aquaculture sector as well as by state & federal regulators and it is a testament to both her character and gravitas that her opinions carry significant weight. She sits on the Maine Aquatic Animal Health Technical Committee and regularly provides guidance used by the professional staff and the Commissioner at the Department of Marine Resources. Dr. Bouchard has also provided key input into the Comprehensive Aquaculture Health Program Standards (CAHPS) being developed by USDA-APHIS for the aquaculture industry and has been tasked with implementing it's use in Maine, a process KRB will be a strong partner in.

In looking to fill positions within our company, I have regularly reached out to Dr. Bouchard for possible candidates that we could hire. In a number of cases, we have employed students from UMaine and they have worked out extremely well and had the requisite skills for working in a high throughput laboratory setting. As we look to grow in the coming years, I expect there will be more hires from Dr. Bouchard's program and cannot say enough about the caliber of students coming from UMaine.

In closing, I strongly support Dr. Bouchard's promotion to Associate Professor and think she has been highly effective in her many varied roles. As aquaculture is poised for significant growth in Maine and the United States over the coming decade, Dr. Bouchard will be one of the professionals that will be indispensable in making this a success.

Sincerely,

William R. Keleher, CEO
wkeleher@kennebecbio.com



Together, improving life

August 30, 2021

Richard Brzozowski, Ph.D.
Program Administrator
UMaine Cooperative Extension
5741 Libby Hall, Room 106
Orono, ME 04469-5741
Office: (207) 581.3222
E-mail: richard.brzozowski@maine.edu

Dear Richard Brzozowski:

Thank you for accepting my note in support of Dr. Deborah Bouchard's promotion. My name is Alexis Slupe, I am an intrapreneur at W.L. Gore and Associates, which is to say my job is to match material capabilities we have with real world problems in an effort to solve valuable problems for industry. I came to know Debbie through one of my programs seeking to leverage our materials knowledge in marine environments, a white space for Gore. Debbie, I hope you don't mind me switching tones to a more familiar one, has been a tremendous asset to our work at W.L Gore & Associates in developing a new pest management strategy for salmon farmers.

I have known Debbie since the spring of 2019 when I arranged a meeting with her at an aquaculture conference. As a result of Debbie's expertise, her research institute resource availability, and her interest in collaboration with an external company, I was able to secure funding from Gore leadership to support a joint research program that leveraged the parasitology and aquaculture knowledge housed in Cooperative Extension and the Aquaculture Research Institute to augment our capabilities for the intended product. We began with a very small team, and a very specific goal. An outcome of the great resourcing decisions, very collaborative tone, and reliable deliverables schedule is that we were able to provide sufficient justification to expand the engagement and support additional phases of work. Utilizing the teams' defined laboratory study to engage in commercial scale field studies allowed us to stand on solid science and engage a salmon industry collaborator.

We are well into our second sea lice seasons' worth of field trials with new students and researchers involved along the way. Each has contributed mightily, and I have enjoyed working with them directly. At the outset of each statement of work, Debbie and I have been able to frame out objectives. She has then followed through with developing the protocols, resourcing, students, and data management/file management systems to be able to provide what I term 3rd party scientific studies. While we work together, I truly value

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that Debbie and her team are independently capable, consistent, reliable, reachable, and trustworthy. And the reporting provided at the conclusion of each study is well considered, written both with a clear level of specialist capability and in such a way that a technically competent non-specialist can take away the key points. The presentations that have been provided to leadership at Gore were well written and delivered.

I have never known of any issues with our researchers that are Debbie's students, and she appears to have a solid working relationship with all whom she recruits. I honestly can't speak to the on campus, in program efforts Debbie makes as you requested in your letter. As an outsider to the university, all I can comment on is the student capabilities and work developed are top notch. She's must be doing a tremendous amount in the background to have such impact across at least 5 students that I've worked with.

It is due to Debbie's continued attention to detail, focus on solid work products, nimble work methods (to adjust to the weather and the project needs) that we have been able to be successful in 3 joint projects to date. And Gore is grateful to UMaine for offering such a powerful set of capabilities in your Marine Research Institute and student research programs.

We look forward to continued collaboration and aim to have a significant joint impact on the salmon farming industry's single most expensive fish health challenge.

Please feel free to reach out to me with any questions, I'd be happy to clarify or respond to additional questions.

Sincerely,

A handwritten signature in blue ink that reads "Alexis Slupe".

Alexis Slupe
Associate, Core Technology



Dennis Harrington
Assistant Director and Financial Administrator
University of Maine Cooperative Extension
5741 Libby Hall 106A
Orono, Maine 04469-5741
207-581-3132
dennis.l.harrington@maine.edu

August 30, 2021
Richard Brzozowski, PhD
Program Administrator
University of Maine Cooperative Extension
Richard.brzozowski@maine.edu

Dear Dr. Brzozowski,

I write this letter with enthusiastic and unequivocal support for the promotion of **Dr. Deborah Bouchard**, Cooperative Extension's Aquatic Animal Health Specialist, to Associate Extension Professor. Dr. Bouchard possesses truly formidable abilities as a scientist, researcher, scholar, and administrator, and is a strong, strong leader within her discipline at the University of Maine and beyond.

I have known and worked with Dr. Bouchard through her full tenure with the University of Maine Cooperative Extension - from her first position as Lab Manager Professional in 2006, to her appointment as Assistant Extension Professor in 2018, to the present. I worked quietly and enthusiastically behind the scenes with Extension Director John Rebar to navigate the complexities of her funding line through the Maine Economic Improvement Fund. This work included a memorandum of understanding between Cooperative Extension and the UMaine Aquaculture Research Institute under the Vice President for Research and Dean of the Graduate School.

In her joint role as Aquatic Animal Health Specialist and Director of the Aquaculture Research Institute, Dr. Bouchard balances a unique and diverse set of obligations that includes a leadership and administrative component far beyond that of her peers. I have worked closely with her as she navigates a matrix of management and administrative responsibilities associated with her oversight of the Aquatic Animal Health Lab for Cooperative Extension. This work includes management of a complex research facility, supervision of professional staff, the mentoring of research faculty, management of Cooperative Extension's biosafety level 3 labs, and generation and management of a significant amount of external funds through grants, contracts, and services. In all of these efforts she meets and exceeds the measure of her obligations, and has established a far-reaching reputation for excellence, creativity, wisdom, and reliability. Dr. Bouchard certainly meets and exceeds the criteria for promotion.

Educational Program Development and Research

Dr. Bouchard's program development, scholarship, and expertise are enhanced and kept current by her robust engagement in professional development, with many

examples of recent professional conferences, workshops, and symposia consistent with the goals of her professional development plan. Her roles vary from advisory, to organizer, to committee member, to subject matter expert; but all provide an opportunity for her to continue her journey of discovery and share her knowledge with regional, national, and international colleagues and stakeholders through scholarship presentations and teaching.

Especially noteworthy and commendable among her efforts is research consisting of a focus on the health of American lobsters, and the advancement of sustainable aquaculture in Maine and beyond. Her research is stakeholder-driven and guided by outcome-based objectives that are ultimately informed by ongoing evaluation and refinements.

Dr. Bouchard's management and advancement of the University of Maine Cooperative Extension Aquatic Animal Health Laboratory has been a remarkable process that began with a vision that is being realized in a state-of-the-art facility within in the new UMaine Diagnostic and Research Laboratory. Dr. Bouchard worked hand-in-glove with architects and engineers to create the facility, then again with builders and contractors to install and refine the many complex systems that make up a high-biosafety level aquatic research laboratory. Beyond this and her normal faculty and administrative responsibilities, she also served as biosafety officer and lead the initial development of standard operating procedures for the many processes within the lab. Dr. Bouchard has developed eight unique research projects within the lab since its opening in late 2018; engaged industry projects to support the annual costs of the lab for ongoing improvement; and generated more than \$.5 million in grant awards to fund Lab-based research.

Since 2018, Dr. Bouchard has participated as principal investigator or co-principal investigator on grants totaling nearly \$7 million; and directed industry projects generating income of nearly \$400,000.

Graduate Teaching and Advising

Dr. Bouchard holds an appointment as Associate Graduate Faculty with the School of Marine Sciences. She has been a committee member for six recent MS and Ph.D. candidates and primary advisor to one. She regularly serves as a mentor to graduate students and oversees undergraduate student employees, capstone students, and interns.

Scholarship and Professional Activity

Dr. Bouchard is a regular public presenter and panelist in her role as Extension specialist, research scientist, and subject matter expert. Her participation includes many invited presentations, testimonies to Maine State legislative panels, and participation in educational summit events and symposia. Notable is her testimony to the Maine State Marine Resources Legislative Committee and at the 2020 Maine Aquaculture Research, Development and Education Summit.

An important component of research is the extent to which it documents and disseminates new knowledge. Dr. Bouchard's research has included collaborative publications of research results in four recent publications.

Organizational and Campus Service

Dr. Bouchard exemplifies what it means to be a contributing member of a University and academic community. Her broad and stellar reputation coupled with consistent and quiet competence has led to numerous opportunities to provide leadership in UMaine efforts and initiatives. She has served on many UMaine search committees for faculty and administration; notably including her service as co-chair of the recent successful international search for the UMaine Executive Vice President of Academic Affairs and Provost.

Other UMaine service includes serving as the Extension representative to UMaine Faculty Senate, the UMaine Research Council, the UMaine System Innovation and Economic Development Council, the UMaine Marine Sciences Advisory Team, the UMaine Biological Safety Committee, and various UMaine advisory committees.

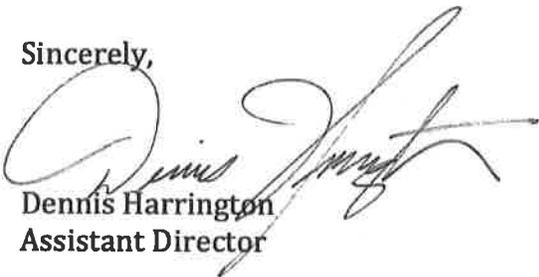
Public Service

Dr. Bouchard has given freely of her time and expertise to benefit the public through State committees and other relevant efforts, many of which are mentioned in other sections of this narrative. Other public service and professional activities include participation as a reviewer for national grant proposals, and external peer committees; and membership in a number of State and national committees.

In Conclusion

Dr. Bouchard clearly meets and exceeds the criteria for promotion with outstanding program development and research; graduate teaching, advising and mentoring; strong scholarship including documentation and dissemination; and exemplary organizational, campus, and public service. Maine, UMaine, and the sciences related to aquatic animals and aquaculture are better for the work of Dr. Bouchard. She is an outstanding and 'best-of-the-best' UMaine faculty member, scientist, researcher, administrator, and colleague. Again, I offer my full and enthusiastic support for her promotion to Associate Extension Professor.

Sincerely,



Dennis Harrington
Assistant Director

September 15, 2021

Richard Brzozowski
Program Administrator
UMaine Cooperative Extension
5741 Libby Hall, Room 106
Orono, ME 04469-5741

Dear Dr. Brzozowski:

I am submitting this letter in enthusiastic support for Dr. Deborah Bouchard's promotion to Associate Extension Professor. I have known Dr. Bouchard since 2006 when I was a Research Faculty member in the School of Marine Sciences and she was Research Coordinator and Laboratory Manager of the University of Maine Aquatic Animal Health Laboratory. At the time she assisted me in an externally funded research project on Atlantic Salmon. Since that time both of our roles at the University have drastically shifted and since I started as the Director of Maine Sea Grant in 2018, my interactions with Dr. Bouchard have increased because of the complimentary nature of Maine Sea Grant's mission with Dr. Bouchard's role as Director of the Animal Health Laboratory, Aquaculture Research Institute, and her own research as a Cooperative Extension Faculty member. She is now one of my most valuable colleagues at UMaine. As such, I am happy to offer a well-informed assessment of her activities during the period under consideration for her promotion. I have structured my comments according to the performance areas you requested.

Educational Program Development – Dr. Bouchard's role in this area is described in her job description as specifically related to oversight of research activities of the Aquatic Animal Health Laboratory (AAHL). Dr. Bouchard clearly excels in this performance area. She carefully considers the needs of the aquaculture community broadly (research and industry) as exemplified by her enduring commitment to multiple avenues to staying aware of the pressing issues facing the aquaculture research and industry communities and translating those into real opportunities, e.g., a biosecurity level 3 laboratory. As an example of how she assures knowledge of industry needs, she has long-standing relationships with key aquaculture organizations in the state. For example, she works closely with the Maine Aquaculture Innovation Center to regularly ensure the distribution and analysis of a Research Development needs survey. This is done in partnership with Maine Sea Grant and other close partners and I can attest to the fact that without Dr. Bouchard's continued oversight of that survey happening, the University and partners would not have the information they need to stay current with aquaculture research needs in the state. Diligence on these types of activities in turn results in valuable returns on time investment, not the least of which is exemplified by the results of the survey conducted in 2019 that led to a \$1.2M award from NOAA (Dr. Bouchard as co-PI) to fund research and extension activities to address needs directly out of the survey.

It is notable, although it shows up as a mere line on a piece of paper in her packet, the dedication and work she put into the the design, implementation, and now operation of the new AAHL facility,



assuring unique opportunities to researchers and the industry to be able to access a Biosafety Level 3 (BSL-3) research laboratory in Maine. I am less familiar with the contract work that Dr. Bouchard brings into the AAHL but am impressed by the list included in her promotion package. These are primarily targeted at pressing Salmon-related issues but also include an important (and industry-responsive) project on lobster bait and other contracts originating from companies across the US and in the UK, elevating the importance of her work to the international stage.

Scholarship and Professional Activity – Dr. Bouchard has an excellent record as lead PI on contracts and collaborative research. She has 10 current contracts and is currently working on 12 research projects (5 as PI) to support sustainable aquaculture with the aquaculture industry. The funding she has brought to her program since 2016 is impressive, over \$11M! I have had the fortunate opportunity to work with her on several of these projects and find the rigor of her work and commitment to Sustainable Aquaculture truly admirable. Furthermore, she is a co-author on five peer-reviewed journal articles and regularly presents at professional conferences and workshops (3-4 annually). In addition, she has been involved in the development of a certificate program for Aquaculture, from the ground up with new courses are underway to realize this opportunity. It is worth pointing out that these courses were purposely created with a focus on the needs of the industry, not purely an academic exercise. I have watched her and her staff consistently seek input from the industry on what needs to be in these courses to make and keep them relevant, a true testament to extension education programming.

Organizational and Campus Service – Dr. Bouchard is a role model for Extension Faculty in terms of service to Cooperative Extension and the University of Maine. She provided an impressive list in her package of more than 35 different county, organization, and campus service committees she has served on during the evaluation period. I want to highlight the remarkable diversity of her involvement, from the search committee for the current Provost to the incredibly important work with indigenous communities and attention to educational programs such as being an internship committee member. I have had the privilege to serve on several committees with Dr. Bouchard and would like to attest to her dedication to each and every committee. She is a member you can always count on and know she will be there to help achieve the goals for every service commitment. I have watched Dr. Bouchard build and operate the Aquaculture Research Institute. She has been purposeful in her commitment to the Institute, in the staff she has been bringing on to fill the roles of a growing program. She manages the program effectively and because of her leadership her staff are true ambassadors and express an allegiance to the Institute much like Dr. Bouchard's.

Public Service – With the establishment of the new AAHL Diagnostics Laboratory she has provided countless events to highlight its unique features and draw in support from members within the aquaculture industry but also across a spectrum of interests, including seafood industry members broadly. She has listed 14 public presentations or panels she has either participated in, been invited to or led, ranging from those in Maine to those of international scope. These have included research-specific events as well as educational summits and meetings with legislative representatives, all appropriate and important areas of outreach. She is a sought-out expert in her field. On top of this, she regularly engages with media to deliver information in a very public manner with a truly balanced approach to messaging, to the broader community, from topics on fisheries and farming to the

importance of sustainable aquaculture as it connects to social and economic needs of the state. Dr. Bouchard is a true ambassador of sustainable aquaculture in Maine.

Dr. Bouchard's work, research and leadership in the multiple programs she leads, has led to persistent support of multiple seafood-related industries in the state as exemplified by the quote from Curt Brown of Ready Seafood, just an excerpt: "...her expertise...has proven invaluable countless times." I can hear many of Dr. Bouchard's partners uttering these same words, from salmon aquaculture to shellfish aquaculture partners and communities alike. Her work is vital to a diversity of Maine's seafood industries and I know her dedication to continuing that is unwavering.

Finally, I would like to reiterate my support for Dr. Bouchard's promotion to Associate Extension Professor. She is a dedicated scientist and leader with an amazing passion for extending her work on sustainable aquaculture at the University of Maine, in Maine and the world more broadly. I value her professional leadership and look forward to many more years of partnership to support the missions of our two programs at the University of Maine.

Sincerely,

A handwritten signature in cursive script that reads "Gayle Zydlewski". The signature is written in black ink and is positioned above the typed name.

Gayle B. Zydlewski

Director, Maine Sea Grant College Program
Professor, Marine Sciences
gayle.zydlewski@maine.edu