

UNIVERSITY OF CALIFORNIA, DAVIS

BERKELEY • DAVIS • IRVINE • LOS ANGELES • MERCED • RIVERSIDE • SAN DIEGO • SAN FRANCISCO



SANTA BARBARA • SANTA CRUZ

OFFICE OF RESEARCH  
Sponsored Programs  
1850 Research Park Drive, Ste. 300  
Davis, CA 95618-6153

Telephone: 530.754.7700  
Facsimile: 530.752.0333  
E-Mail: [proposals@ucdavis.edu](mailto:proposals@ucdavis.edu)

August 9, 2018

Contracts and Grants Administrator  
University of California, San Diego  
California Sea Grant  
9500 Gilman Drive, #0232  
La Jolla, CA 92093-0232

**Proposal: .....Assessing the combined effects of ocean acidification and warming on  
disease susceptibility and restoration success of the critically endangered  
white abalone**

**Principal Investigator: .....Kristin Aquilino**

Dear Contracts and Grants Administrator:

On behalf of The Regents of the University of California, Davis campus, it is a pleasure to provide institutional support and approval in support of the proposal referenced above, which is being submitted in response to the California Ocean Protection Council Proposition 84 Competitive Grant Program.

We look forward to expediting new contracts with all State agencies by using the current **Model Language for Contracts with the University of California and California State Universities**, if applicable, as directed by the California Department of General Services and available here:  
<http://www.dgs.ca.gov/ols/Resources/ModelContractLanguageUniversities.aspx>

Please contact me with any administrative questions. We request correspondence pertaining to this proposal be sent via email to [proposals@ucdavis.edu](mailto:proposals@ucdavis.edu) or mailed to the Office of Research Sponsored Programs Office, 1850 Research Park Drive, Suite 300 Davis, CA 95618-6153. Please refer to Proposal **#FY19-0433** on all future correspondence.

We look forward to working with you on this important project.

Sincerely,

A handwritten signature in blue ink that reads 'Patrick Bell'.

Patrick Bell  
Contracts and Grants Analyst

**Plan ahead!** The UC F&A Rate for State agency awards\* will increase over time as follows:

Now	– 6/30/2019	25%
7/1/2019	– 6/30/2020	30%
7/1/2020	– 6/30/2021	35%
7/1/2021	– 6/30/2022	40%

\*The appropriate UC federally negotiated F&A Rate will apply to State agency awards made with federal funding. Please see 2 CFR § 200.414 and 2 CFR § 200.331.



July 25, 2018

Dear OPC California Sea Grant Selection Committee,

I am writing in strong support and commitment to the OPC Prop 84 Sea Grant proposal submitted by Drs. Kristin Aquilino, James Moore, and Eric Sanford of UC Davis Bodega Marine Laboratory, entitled “Assessing the combined effects of ocean acidification and warming on disease susceptibility and restoration success of the critically endangered white abalone.” The Cultured Abalone Farm is explicitly vested in understanding the impacts of ocean acidification and disease on our operations and ways we can mitigate these effects, and we are enthusiastic that our lead Scientist, Dr. Dan Swezey can facilitate these efforts through collaborative research.

This proposal provides an innovative approach to understanding how ocean acidification and disease impact abalone aquaculture. Both of these issues are of major concern for abalone growers in California. Development of tools or strains of abalone that confer resilience to ocean acidification and disease will help ensure the security of our business in the face of climate change. I have collaborated with Dr. Aquilino and other co-PIs on projects related to abalone culture and restoration for many years, and they have excellent expertise and experience to address the ways that we can make our business more resilient to ocean acidification.

In my capacity as managing member of the Cultured Abalone Farm, a commercial abalone aquaculture facility based in Santa Barbara CA, I enthusiastically endorse the aims, methods and science contained within this proposal. I also commit to providing the enclosed scope of work in the subcontract. I look forward to continued productive output from this innovative public-private sector collaboration.

Sincerely,

Douglas Bush  
Managing Member, The Cultured Abalone Farm



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
NATIONAL MARINE FISHERIES SERVICE  
West Coast Region  
501 West Ocean Blvd  
Long Beach, CA 90802-4213

July 31, 2018

OPC Prop 84 Sea Grant Selection Committee,

I strongly support the California Sea Grant Proposal titled, "Assessing the combined effects of ocean acidification and warming on disease susceptibility and restoration success of the critically endangered white abalone" from Drs. Kristin Aquilino, Dan Swezey, Jim Moore, and Eric Sanford. The proposed project aligns perfectly with NOAA's recovery goals for the endangered white abalone (*Haliotis sorenseni*). White abalone is one of NOAA's eight Species in the Spotlight, the species most likely to go extinct soon without our efforts, and the proposed work is essential to recovery efforts.

Due to intense overfishing in the 1970s, white abalone became the first marine invertebrate to be federally listed as endangered in 2001. With no evidence of natural recovery after the closure of commercial fisheries in 1996, NOAA Fisheries identified captive breeding and stocking as crucial white abalone recovery. The captive breeding program led by UC Davis Bodega Marine Laboratory has had tremendous success over the past six years, largely due to the captive production efforts by Dr. Aquilino and disease management by Dr. Moore. However, there are still many unknowns about how captive-bred animals will fare in the wild, and understanding how ocean acidification and disease will impact the captive production and outplanting success of white abalone is imperative for restoring the species.

Dr. Aquilino and her collaborators on this project have excellent expertise and experience for completing the proposed work, which is critical to endangered white abalone recovery, and will also contribute to sustaining red abalone aquaculture in California. Partnerships with red abalone farmers have already greatly benefitted white abalone recovery efforts, and the proposed work is an extension of already strong collaborations.

I enthusiastically support the funding of this proposal.

Sincerely,

*Melissa Neuman*

Melissa Neuman, PhD  
Protected Species Conservation & Recovery  
National Marine Fisheries Service  
West Coast Region







P.O. Box 136 805/995-2495  
Cayucos, CA 93430 FAX # 805/995-0236

The Abalone Farm, Inc.

The Abalone Farm Inc. enthusiastically supports the OPC California Sea Grant proposal titled, "Assessing the combined effects of ocean acidification and warming on disease susceptibility and restoration success of the critically endangered white abalone" by Drs. Kristin Aquilino, Jim Moore, Dan Swezey and Eric Sanford. The proposed work is designed to address the challenges presented by both ocean acidification and the pathogen that causes Withering Syndrome, each of which are a concerning source of variability and uncertainty in California abalone reproduction, survival, and commercial aquaculture. Withering Syndrome has had major impacts on past production at our farm. Understanding how ocean acidification conditions might influence the manifestation of the disease is crucial both for the restoration of white abalone and for continued commercial production of red abalone in the face of climate change.

Our farm has a longstanding partnership with the research efforts of Dr. Aquilino, Dr. Moore, and the UC Davis Bodega Marine Lab. Our methods of broodstock management and hatchery production have contributed to the white abalone recovery work at BML, and Dr. Moore's expertise in disease management has resulted in reduced mortality in our production. The proposed work to improve the understanding of California's iconic abalone's responses to ocean acidification and disease would have economic and ecological benefits.

This is an excellent experimental proposal which is strongly in line with the goals of the OPC California Sea Grant program, and as an industry partner we are proud to endorse and support it.

Sincerely,

Brad Buckley  
Board of Directors  
The Abalone Farm, Inc.  
Cayucos, CA



160 Wharf # 2  
Monterey, Ca. 93940  
831-646-0350  
www.montereyabalone.com  
Trevor@montereyabalone.com

## Monterey Abalone Company

July 26, 2018

Dear California Sea Grant,

Monterey Abalone Company has been farming Red abalone in cages suspended in Monterey Bay for almost 30 years. As proponents of shellfish culture, my partner Trevor Fay and I wholeheartedly support Dr. Aquilino's proposal, "Assessing the combined effects of ocean acidification and warming on disease susceptibility and restoration success of the critically endangered white abalone." The proposed work describes an insightful set of questions and experiments designed to address the challenges presented by both ocean acidification and the pathogen that causes Withering Syndrome. In addition to being important for white abalone recovery, and as Dr. Moore can attest, both of these issues are major concerns for our abalone farm. We have experienced reduced success in production coinciding with warm water events and disease, and a better understanding of these factors has potential ecological and economic dividends. The PIs on this project have a history of producing management tools rooted in collaborative research, and these tools benefit the industry.

This is an excellent proposal which is strongly in line with the industry needs as well as the goals of the California Sea Grant program. The Monterey Abalone Company enthusiastically endorses and supports it.

Sincerely,



Arthur Seavey  
Monterey Abalone Company



The Aquarium of the Pacific strongly supports the California Sea Grant Proposal from Dr. Kristin Aquilino, "Assessing the combined effects of ocean acidification and warming on disease susceptibility and restoration success of the critically endangered white abalone." The Aquarium of the Pacific has longstanding interests in recovering abalone species in Southern California, including the endangered white abalone (*Haliotis sorenseni*), one of NOAA's Species in the Spotlight, as well as supporting sustainable aquaculture.

The captive breeding program for white abalone recovery, led by UC Davis Bodega Marine Laboratory, has had tremendous success over the past six years, and now more white abalone likely exist in captivity than in the wild. However, a better understanding of the challenges they will face once stocked in the wild is necessary for their successful recovery. As partners in this recovery effort, the Aquarium of the Pacific has a committed interest in understanding how to successfully reintroduce this species. Additionally, although not federally listed as endangered, red abalone are also depleted in California, and the work proposed by Dr. Aquilino and colleagues will help efforts to restore this species as well. In-tact abalone populations provide tremendous benefits to rocky reef communities by promoting species diversity through grazing.

The Aquarium of the Pacific also strongly supports sustainable aquaculture through our Seafood for the Future program. Abalone aquaculture is considered a highly sustainable source of seafood; however, future changes in ocean conditions that can exacerbate ocean acidification, temperature fluctuations, and disease could threaten commercial abalone operations. The work outlined in this proposal will help abalone farms continue to maintain sustainable operations into the future, providing a stable supply of healthful seafood to a growing population while conserving working waterfronts.

The Aquarium of the Pacific has partnered closely with Dr. Aquilino and Dr. Moore on many abalone-related projects, and they are exceptionally qualified to perform this work. We enthusiastically offer our endorsement and support to this proposal.

Sincerely,

A handwritten signature in cursive script that reads 'Sandy Trautwein'.

Sandy Trautwein  
Curator of Fish and Invertebrates  
Aquarium of the Pacific



**PUGET SOUND**  
RESTORATION FUND

382 Wyatt Way NE  
Bainbridge Island, WA 98110  
[www.restorationfund.org](http://www.restorationfund.org)  
(206) 780-6947

July 30<sup>th</sup>, 2018

Dear OPC California Sea Grant Selection Committee,

Puget Sound Restoration Fund (PSRF) enthusiastically supports the California Sea Grant proposal from Dr. Kristin Aquilino titled, "Assessing the combined effects of ocean acidification and warming on disease susceptibility and restoration success of the critically endangered white abalone." The proposed project explores the effects of ocean acidification and disease on endangered white abalone and would inform work by PSRF to restore depleted pinto abalone populations through captive reproduction and outplanting.

We began outplanting captive-bred pinto abalone as our primary recovery strategy in Washington waters a decade ago, and a better understanding of the barriers to successful stocking would expedite recovery of this species. Ocean acidification is a concern for the reestablishment of pinto abalone populations. While the agent of Withering Syndrome is not currently present in Puget Sound, it is present in other parts of the range of this species. It has been gradually moving northward and could occur here in the future as waters warm. A general understanding of how disease and ocean acidification might interact is important for making predictions about abalone recovery in the face of climate change.

Dr. Aquilino, Dr. Moore, and their partners at The Cultured Abalone Farm and Bodega Marine Lab have excellent expertise and experience for completing the proposed work, which will not only help endangered white abalone and depleted pinto abalone, but also contribute more broadly to sustainable abalone aquaculture.

We strongly support the funding of this proposal.

Sincerely,

Josh Bouma  
Shellfish Biologist/Program Manager  
Puget Sound Restoration Fund  
382 Wyatt Way NE  
Bainbridge Island, WA 98110  
206-780-6947 office  
206-498-4108 cell  
[josh@restorationfund.org](mailto:josh@restorationfund.org)  
[www.restorationfund.org](http://www.restorationfund.org)