ATTACHMENT C
FULL PROPOSAL COVER SHEET AND NARRATIVE

MASSACHUSETS BAYS NATIONAL ESTUARY PROGRAM
FY16 HEALTHY ESTUARIES GRANTS

Request for Response ENV 18 CZM 05

Name of Applicant: Jarrett Byrnes

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Project Title: Evaluating the Health of Boston Harbor Rocky Reefs in the Face of Changing Oceans

Project Partners: UMass Boston Scientific Diving Training Course

Target Assessment Area(s) *: Metro Boston

Amount Requested: $27,450

Match Amount (at least 25% of TOTAL project cost): $6,862

Total Project Cost: $34,409

* Refer to MassBays' 2013 Estuary Delineation and Assessment, available at https://www.mass.gov/massbays-about-the-bays

Evaluating the Health of Boston Harbor Rocky Reefs in the Face of Changing Oceans
Jarrett Byrnes, UMass Boston

Problem Description

Coastal rocky reef kelp forests are an underappreciated resource within the Commonwealth of Massachusetts. They are found throughout the Massachusetts Bays Assessment Areas at the outer more exposed edges of estuaries. As they are at the edges of the Mass Bays planning area, they are an underappreciated component of the ecosystem. These forests support a diverse array of commercial fish and lobster populations (Bologna and Steneck, 1993), buffer shorelines from erosion (Mork, 1996), are likely a buffer from ocean acidification (Hendriks et al., 2015), could provide some potential for carbon sequestration (Mcleod et al., 2011), and we are beginning to see the birth of a New England kelp market (Augyte et al., 2017).

At the same time, our coastal oceans are facing a number of fast-moving environmental changes. Coastal urbanization, a known stressor of forests (Connell and Glasby, 1999) continues. Warming waters are projected under IPCC scenarios to cause reductions in kelps, with even complete elimination in the Gulf of Maine by 2090 under some RPC scenarios (Assis et al., 2017). While kelps have rebounded from past impacts of urchins (Steneck et al., 2013), these systems are subject to strong competition from invasive species (Dijkstra et al., 2017). Indeed, the long-term trajectory of kelps in New England is one of decline (Krumhansl et al., 2016) and we are seeing a rise in turf algae, as has been witnessed in kelp systems around the world (Filbee-Dexter and Wernberg, 2018). Moreover, with potential plans to alter coastlines in the face of sea level rise with coastal mitigation structures, including a possible large wall across Boston Harbor, it behooves us to establish a baseline for this system and understand how changing environmental drivers are altering its trajectory.

Establishing a reasonable baseline is complicated by the highly dynamic nature of kelp forests, well-know for not only experiencing dramatic state-shifts (Ling et al., 2015) but also high interannual variability that can mask the signal of real change (Krumhansl et al., 2016). **Here I propose to conduct a series of observations of coastal kelp forests in the Boston Harbor Islands to 1) build an understanding of interannual variability in kelp forests and their communities, 2) provide data to CZM, DMF, Mass EPA, the National Park Service, and other agencies when considering biological impacts from projects such as the Boston Harbor Seawall, pipeline permitting, or future plans for kelp harvest, 3) leverage the variability of the last several years of temperatures to evaluate links between sea surface temperature and the health of Boston Harbor kelp forests.**

This project will take place in the Metro Boston assessment area on the outer Boston Harbor Islands (Calf Island and Little Brewster) as well as just outside of the Lower North Shore assessment area (Bakers Island). The project will focus on kelp forests on rocky reefs on these outer islands, allowing for a comparison between the two sets of islands with analogous physical conditions (Fig. 1)

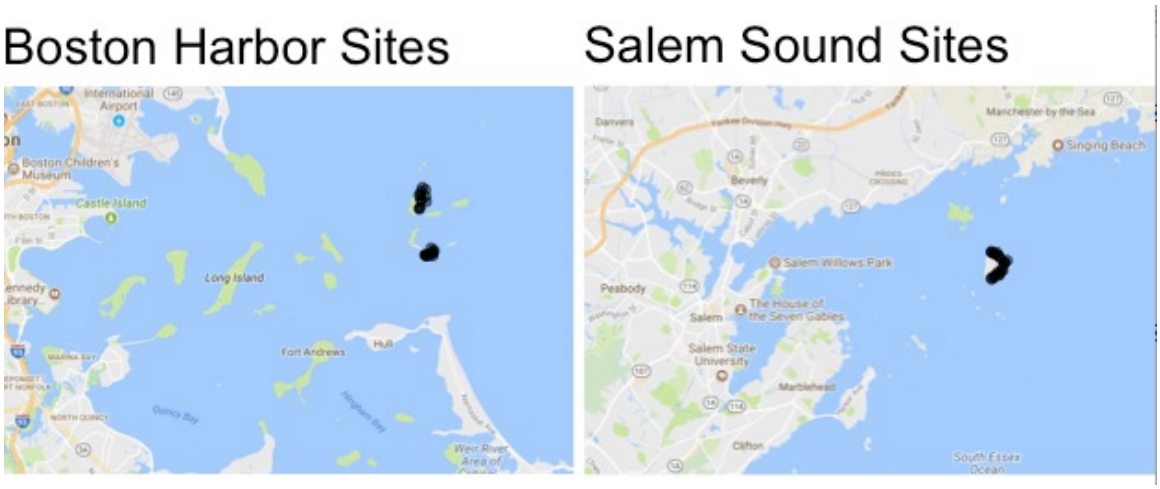

Figure 1: Location of sample transects in Boston Harbor at Calf Island (top) and Little Brewster (bottom) and in Salem Sound at Bakers Island on its north and south sides from 2014-2017.

Why is understanding the variability both within and between these two areas important? One of the challenges of understanding long-term changes in kelp forests or the impact of human impacts is their inherent interannual variability. Kelps are amazingly dynamic, responding rapidly to changing environmental conditions. They have the ability to rebound from major disturbances within mere months (Dayton et al., 1992) unless some additional stressor inhibits recovery (Edwards and Hernández-Carmona, 2005; Wernberg et al., 2012). Even in the presence of large quantities of data, the fact that many kelp systems around the world have very little monitoring data makes it exceedingly difficult to say with confidence whether populations are undergoing change. This is true even in areas with known impacts (Krumhansl et al., 2016). The biggest barrier to understanding change in these systems is the signal of change relative to interannual variability. The first solution to this problem is a signal so large it cannot be ignored, such as the multiple regime changes we have witnessed here in New England over the past several decades (Steneck et al., 2013).

We do not want to wait for kelp forests to undergo such dramatic change, however, in order to detect a problem. The second approach is to have long time series that incorporate this interannual variability in order to tease apart signal from noise. Such records are invaluable for kelp systems, sometimes showing no long-term changes even when most science suggests there should be some (Reed et al., 2016) or detecting major long-

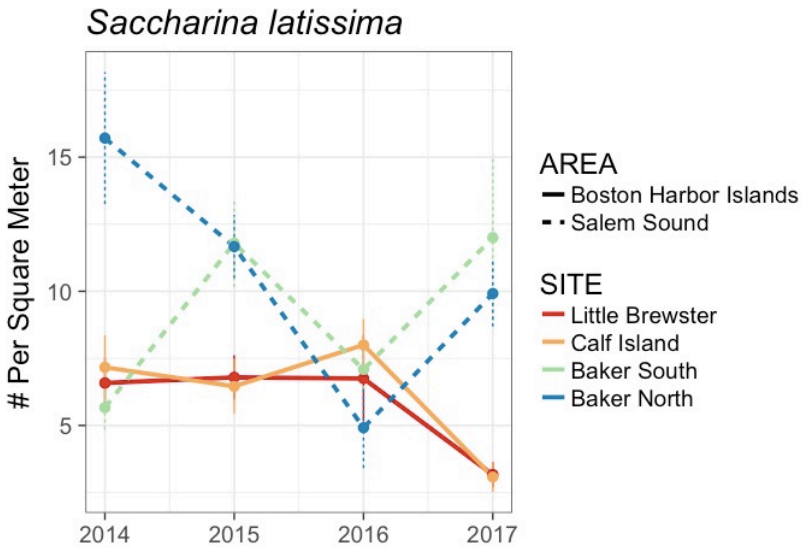

Figure 2: Densities of sugar kelp (*Saccharina latissima*) in Boston Harbor Islands and Salem Sounds sites from 2014-2017.

term changes in the face of highly variable interacting stressors, as seen in the record of long-term declines in Nova Scotia that were otherwise masked by urchin outbreaks (Filbee-Dexter et al., 2016).

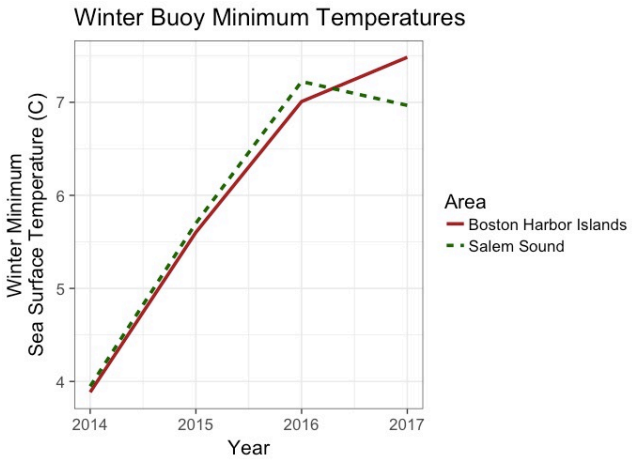

Figure 3: Winter minimum sea surface temperatures from the Boston Harbor Islands via buoy 44013 and Salem Sound via buoy 44029. Data from the National Buoy Data center.

We can already see how important these issues are in the study of local kelp forests. Consider the current state of the data I have collected for these two areas and what it might tell us. I have been conducting this work since 2014 (Fig. 2), and two additional years of data will begin to give the dataset sufficient robustness to understand the variability these forests see at the harbor islands both in space (between islands and transects within a year) and time (between years). Why is this important? Considering the data to date, it can be difficult to do direct attribution of environmental signals to kelp abundances. Consider the abundance of the most common species of kelp, *Saccharina latissima* (Fig. 2). We can see dramatic spatial variability between sites within years, a large decrease in the Salem Sound sites until 2016, but then a bounce back in 2017. In the harbor, in contrast, kelps stayed relatively constant until they took a dip in 2017. This pattern could be consistent with any number of drivers. One compelling one, of course, is sea surface temperature. Looking at winter minimum temperature (Fig. 3), when kelp us undergoing reproduction and early growth, we see that the minimum has been consistently increasing in both areas, although it took diverging trajectories in 2017 which could reflect patterns in kelps. This is compelling, but, ultimately, entirely speculative, as we do not yet have enough data to tease out the spatial and temporal variability of kelps from a correlated pattern such as thermal stress.

Moreover, if major changes do occur within the harbor, such as the creation of a seawall as is currently under study at UMass Boston, or other large-scale engineering project, knowing the variability both within the harbor and how it compares to an adjacent relatively unaffected site will be crucial for assessment of future and implications for this critical nearshore habitat.

Project Goals and Anticipated Outcomes

The central goal of this project is to establish a robust time series of kelp forest communities in the outer Boston Harbor Islands with companion data from Bakers Island in Salem Sound, a similar habitat subjected to similar abiotic conditions, but without the same degree of current and possible future anthropogenic impacts. This data will be made publically available to relevant agencies and the general public in addition to being published in the scientific literature. In the short term I propose first to invite members of agencies and Mass Bays to an annual Kelp Forest Ecosystem Ecology Netowkr of New England meeting where we discuss trends in current data and plans for each summer of monitoring work. This project is being held in conjunction to similar efforts at URI, Northeastern, UNH, and the Bigelow labs. We've had members of agencies attend past sessions, both in person and remotely. Second, as part of the conduct of this research, I will involved UMass Boston students in data collection, building their expertise in environmental survey techniques for the future workforce. Third, I will disseminate new data on an annual basis for use by any relevant stakeholder and advertise each new release. In the medium term, this data

will be used for scientific publications on the dynamics of kelp forests in coastal Massachusetts and how this relates to shifting oceanographic and anthropogenic conditions. It will also be provide reference data when relevant for assessment of impacts that could affect the outer Harbor Islands kelp forests. In the long-term, I plan for this data set to continue to grow beyond the time of this grant. I hope it becomes a community resource into the future for planning and assessment of any long-term impacts to the harbor including, but not limited to, major harbor modification projects, progressively warming waters, any changes in water quality due to urbanization impacts, and other unforeseen ecological surprises.

Project Approach

Survey Methodology

At eight transects split between Calf Island and Little Brewster within the Boston Metro MassBays planning area and eight sites in Salem Sound around Bakers Island, my group will survey kelp forest community structure in the summers (typically between July and August) of 2018 and 2019 using the Kelp Ecosystem Ecology Network protocol (Byrnes et al., 2014). Briefly, along each transect, we will assess: kelp abundance and size distribution, fish abundance, abundance of mobile invertebrates, abundance of common algae with individual forms, and percent cover of rare or indistinct algae and sessile invertebrates (Fig 4. for a summary diagram of relevant methods). During the first summer, we will also dry and ash kelps to establish a direct relationship between morphometrics and biomass. Last, at each site I will deploy two temperature loggers recording hourly temperatures for the entire year.

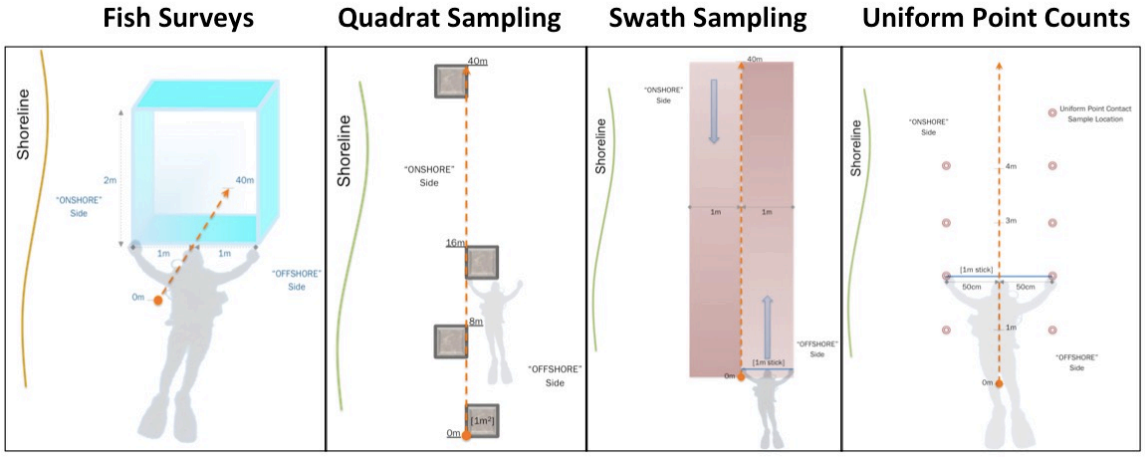

Figure 4: Diagramatic representation of different sampling methodologies. See text for details.

To select where we sample, at each of the four sites (Fig. 1), four transects are selected annually using a stratified random sampling design. Sites are broken up into four equal sized areas and then transects are selected within each strata using a random number generator to select alongshore position. Transects are put in at the 10m isobath and then run for 40m parallel to shore. We GPS all transect starts and ends by using floats placed on either side of the transect.

We begin surveys with a fish count (Fig. 4) conducted while positioning the transect. A diver slowly swimming the length of the 40m transect 1m above the transect line recording the abundance and size of all fish individuals encountered within a predefined imaginary "cube" extending 2m on either side of the transect and 2m up from the substrate. Fish are enumerated in predefined size classes and care is taken not to count a fish twice.

Quadrats are used to count common sessile algae and invertebrates that can be easily individuated (e.g., kelps or *Styela clava*), common mobile invertebrates, such as urchins or juvenile sea stars, and small cryptic fish. Along each transect, a diver places six $1m^2$ quadrats (Fig. 4), spacing them evenly 8m apart starting at the beginning of the transect.

For less common mobile organisms, such as larger demersal fish, sea stars, lobsters, we use swath counting techniques. Divers count organisms along 1x20m swaths on either side of the transect (Fig. 4). This enables a slow careful search for hidden organisms or larger cryptic demersal fish.

Colonial sessile invertebrates and algae that cannot be easily individuated (e.g., *Daisysiphonia japonica*) are counted using uniform point counts to estimate percent cover. A diver records the species that intersect an imaginary vertical line (operationally defined as a distinct "point" ~2mm in diameter) positioned at each end of a meter stick placed at every 1m along the transect (n = 80 points per transect, Fig. 4). Additionally, the substrate type under each point is noted. If there are multiple species encountered under the point (e.g., algae on top of a tunicate), then all species of algae/animal are recorded.

As kelp abundance does not necessarily equate to total productivity – kelps can be abundant yet small or few and large – we will record the length and width of ten individuals of each species of kelp found at each site. During the summer of 2018, we will work with an undergraduate in the UMB Research Experience for Undergraduates program to relate morphometrics to grams of dried carbon in order to continue with visual estimation rather than having to dry and ash every sample. This method has proven effective at least with respect to dried kelp mass out on Cashes Ledge (Witman and Lamb, 2018) as well as for other species of kelps (Reed et al., 2008).

To gain some insight into immediate physical environment, two Onset 64K Pendant temperature Loggers (UA-001-64) will be installed at each site. Loggers are enclosed in a PVC housing and secured to rebar attached inside of cracks using marine epoxy. To date, this method has proven entirely reliable for annual recovery.

Last, to broaden the scope of the dataset and any analyses, I will request the Hubline artificial reef data (Barber et al., 2009) to compare the outer islands to a nearby additional Boston Harbor sites.

Project Staff

The project will be lead by PI Byrnes. I have four years of experience running this sampling program, and worked at the SBC LTER for two years previous on an analogous program. I will be responsible for coordinating the logistics of the project and the data management. This grant will provide for the hiring of one summer technician to assist our efforts. We have a pool of students who have been trained here at UMB in subtidal research or, if local students are unavailable, I will seek qualified technicians who are trained scientific divers. In the past, we have typically worked with students from Salem State who were trained under Ted Maney or students who were trained by Jim Coyer at the Shoals Marine Lab. In addition to these students, we will leverage funds from the MPH Foundation to hire a technician, Breckie McCollum, as part of a summer RA-ship. This is the cost share for the grant. McCollum is a PhD student in my lab and has worked on this sampling program for the last three years. Also assisting on this project is my PhD student Brianna Shaughnessy who has worked on this project for two years, trained our Chilean teams, and is using data from this project for her thesis. She is funded independently from the UMB Coasts and Communities IGERT program. Last, we use summer sampling as a capstone for the scientific diving training program here at UMB. This means that 6-8 newly trained undergraduate divers help with conducting the sampling in order to finish their course. We are also assisted by Ted Lyman, the UMB Dive Safety Officer who teaches the course.

Scope of Work and Costs
To conduct this work my lab will conduct sampling at sixteen transects each summer with multiple divers using the protocol above. Based on past years experience, the necessity for training, and followup work, this comes to $1300 in tank fills and within year gear maintenance, $300 in gas for our boat, and $500 per year in gear replacement. Further, we service all of the dive gear in our lab annually, and four three sets of gear, this is $900 annually. Our going rate for a summer technician comes to $7,500 for the summer, and $960 for the fall undergraduate for data entry.

Data Quality Control
Our methods have a robust quality control system in place. After dives, data sheets are immediately photographed and archived using cloud-based storage directly from the field. Data sheets are also given high quality scans as soon as they are rinsed and dried back on land. After entry using standardized templates with data validation enabled, all data are QA/QC-ed by undergraduates using read-it-back methodologies. Last, fully verified and checked data are run through a series of R scripts that screen and detect outliers, typos, and other data entry problems. Upon passing all checks, data are archived on Github (https://github.com/kelpecosystems/observational_data) before being sent to TemperateReefBase (http://temperatereefbase.imas.utas.edu.au/) for long-term archiving and access. TRB also contains a full metadata schema for all datasets.

Timeline and Anticipated Milestones
Late Spring 2018 – Prep boat, gear repair and preparation, site selection.
Summer 2018 – Sampling of sites and original data sheet archiving. Training workshop in June as well as training dives. Sampling dives between July and August.
Fall 2018 – Data entry, QA/QC.
Winter 2019 – Data archiving, notification of relevant parties. Anticipated manuscript on first five years of data relating temperature change to kelp and community structure.
Spring 2019 – Gear servicing, preparation.
Summer 2019 – Sampling of sites, with summer technician working on data entry at end of tenure in August.
Post-Funding – Archiving of 2019 data and secondary contact of agencies.

Direct Benefits
The data generated by this project will directly benefit the community by filling a data gap. We currently have little information on kelp forests in New England, let alone in the Boston Metro Area. Of the data we do have, most is either short-term, with only one or two years of sampling, and very little targets whole communities, with the Hubline data as a notable exception. In order to understand long-term change in these systems, we need to have robust data sources that follow whole communities over long periods of time. Thus, this dataset will provide a unique resource for the future of Boston Harbor impact assessments and a broader understanding of the biology of the harbor. Moreover, given the efforts I will make, open annual meetings and freely available protocol handbooks (Byrnes et al., 2014), my hope is that this work will lay down a foundation for future work by other labs and agencies as we seek to understand the kelp forests at the mouth of many of the Mass Bays estuaries.

Applicability Beyond the Target Area
The surveys methodology we employ is fully transferable to other embayments with kelp forests. All survey methodologies are publically available (Byrnes et al., 2014). They are currently used

by not only my group by the Dijkstra lab at UNH, the Humphries lab at URI, the Grabowski lab at Northeastern with one site at Nahant, and the Rasher lab at Bigelow in Maine. My hope is that the protocol is adopted by other groups – agencies or academic teams – that are operating in and around New England. It's a robust method that is also employed by the Santa Barbara Coastal LTER, the Subelab group operating out of Chile and Peru, and other sites around the world. The methods employed here and the data generated will have broad impacts beyond just this project as they all fall under the aegis of the Kelp Ecosystem Ecology Network (http://kelpecosystems.org).

Project Outcome and Impact Evaluation
Simply put, the project's impact will be judged by use and citation of its data. As data and protocols are fully citable, we expect that we can track their long-term impact via standard citation metrics, in addition to any publications generated directly by my group (e.g., from one planned by me, listed above, and any used by graduate students who are working on this project as part of their dissertations).

Outreach/Publication:
As part of this project, we conduct an annual training meeting for all Kelp Ecosystem Ecology Network Of New England members. I have been hosting this for the past three years. This year's meeting is being hosted by the Rasher lab at the Bigelow labs and the 2019 meeting is TBD. Each year, we extend invitations to staff at all relevant agencies as s form of outreach. We also livestream meetings, post meeting materials online, and produce a species identification and protocol handbook that are freely available online. In addition, as data is archived, we will contact relevant staff at agencies and the Mass Bays foundation to inform and remind them of the resource.

Qualifications:
For full qualifications of the PI, see attached biosketch. In brief, I have been participating in kelp forest monitoring on the east and west coasts of the US since 2008, and before that was involved in the National Park Service Kelp Forest Monitoring program as an irregular volunteer diver. Currently, I am an assistant professor at UMass Boston where my lab focuses on how human drivers affect coastal kelp forests. In 2013, I ran a series of global kelp forest research sysnthesis meeting at the National Center for Ecological Analysis and Synthesis where we also developed the sampling protocols for the Kelp Ecosystem Ecology Network that will be used here.
Project graduate students and the UMB DSO have all been involved in conducting this sampling for multiple years. They are experienced scientific divers with long resumes that predate their experience working at UMass Boston and hundreds of logged scientific dives. The technicians that we hire annually for the program, while at times newer to research, have come with consistently high recommendations from a variety of scientific diving training programs.

Conclusion
This project will generate new data on a critically undersampled component of the Mass Bays. It will allow for a long time series, enabling us to begin to understand whether changes we see in our local kelp forests can be attributed to specific impacts or whether they are part of normal spatial and temporal variability of this dynamic system. This data will provide a baseline for future development and modification of the harbor as we continue to consider a wide variety of options in the face of sea level rise and climate change. It will provide a baseline of healthy kelp forests, at least for a baseline of the 2010s, that we will be able to use to judge how the health of Boston Harbor changes into the future.

Budget

BUDGET ITEM			GRANT $	MATCH $	TOTAL $
Salaries	Hours (#)	Hourly Rate ($)			
(2) Undergraduates TBN	1330	12	15960		15960
(1) Graduate students				6862	6862
Fringe	Rate (%)	Assessed against ($)			
Contractual					
[Contractor name and role]					
Other Direct Costs					
Travel (miles at $0.45/mile)					
Supplies (consumables)			6000		
Indirect charges	Rate (25%)	Assessed against ($21,960)	5490	0	
TOTALS			27450	6862	34,409

This grant will hire two undergraduates in year one. One will serve as a summer technician ($7500) while the second will serve as a fall data technician ($960 during the fall semester). We will hire a second technician in the summer of 2019. We will cost share some time for one PhD student in the summer for a match of $6,862 drawing from a grant from the MPH foundation. We ask for $6000 in supplies which, per year, will cover servicing of 3 full sets of gear at $300/year each, tank fills and other gear maintaince during the field season ($1300/year), gas for boat and truck ($300/year), and other field gear replacements ($500/year). Our 25% overhead rate will come to $490 over two years, bringing the funds requested total to $27,450.

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BIOGRAPHICAL SKETCH

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PROFESSIONAL PREPARATION

BA	2001	Brown University, Biology
MS	2003	University of California Davis, Population Biology
PhD	2008	University of California Davis, Population Biology

APPOINTMENTS

2012-present	Assistant Professor, Department of Biology, University of Massachusetts Boston
2010-2012	Postdoctoral Fellow, National Center for Ecological Analysis and Synthesis
2006-2010	Postdoctoral Fellow, Santa Barbara Coastal LTER, UC Santa Barbara

PRODUCTS

Five scholarly products related to project; † post doc; ‡graduate student; †† undergraduate student

Krumhansl, K.A.†, Okamoto, D.K., Rassweiler, A., Novak, M., Bolton, J.J., Cavanaugh, K.C., Connell, S.D., Johnson, C.R., Konar, B., Ling, S.D., Micheli, F., Norderhaug, K.M., PÈrez-Matus, A., Sousa-Pinto, I., Reed, D.C., Salomon, A.K., Shears, N.T., Wernberg, T., Anderson, R.J., Barrett, N.S., Buschmann, A.H., Carr, M.H., Caselle, J.E., Derrien-Courtel, S., Edgar, G.J., Edwards, M., Estes, J.A., Goodwin, C., Kenner, M.C., Kushner, D.J., Moy, F.E., Nunn, J., Steneck, R.S., Vásquez, J., Watson, J., Witman, J.D., **Byrnes, J.E.K.,** 2016. Global patterns of kelp forest change over the past half-century. Proc. Natl. Acad. Sci. U.S.A. 113, 13785–13790.

Byrnes, J.E.K., Grabowski, J.H., Dijkstra, J.A., and Humphries, A. 2017. Kelp Ecosystem Ecology Network Of New England Community Sampling, 2013-2016. Data Product available at http://temperatereefbase.imas.utas.edu.au. Methods at http://www.kelpecosystems.org/projects/protocols-materials/

Byrnes, J.E.K., Cavanaugh, K.C., Haupt, Bell, T.W., Harder, B., A.J., Rassweiller, A., Pérez-Matus, A., Assis, J., and The Zooniverse. 2014. Floating Forests. http://floatingforests.org.

Byrnes, J. E. K., Cardinale, B.J., and D. C. Reed. 2013. Interactions between sea urchin grazing and prey diversity on temperate rocky reef communities. *Ecology* 94:1636-1646.

Byrnes, J.E., Reed, D.C., Cardinale, B.J., Cavanaugh, K.C., Holbrook, S.J., and Schmitt, R.J. 2011. Climate driven increases in storm frequency simplify kelp forest food webs. *Global Change Biology*. 17: 2513-2524.

Five additional scholarly products; † post doc; ‡graduate student; †† undergraduate student

Dunic, J.C. [‡], Elahi, R., Hensel, M.J.S. [‡], Kearns, P.J., O'Connor, M.I., Acuña, D. [‡], Honig, A. [‡], Wilson, A.R. [‡], **Byrnes, J.E.K.**, In Review. Human activities influence the direction and magnitude of local biodiversity change over time. Available at bioRxiv 162362. http://www.biorxiv.org/content/early/2017/07/12/162362

Witman, J.E., Lamb, R., **Byrnes, J.E.K.** 2015. Towards an integration of scale and complexity in marine ecology. *Ecological Monographs.* 85: 475-504.

Foster, M.C.[††], **Byrnes, J.E.K.**, Reed, D.C., 2015. Effects of five southern California macroalgal diets on consumption, growth, and gonad weight, in the purple sea urchin *Strongylocentrotus purpuratus*. PeerJ 3, e719. doi:10.7717/peerj.719

Byrnes, J.E.K., Cardinale, B.J., and Reed, D.R. 2013. Sea urchin grazing increases with prey diversity on temperate rocky reefs. *Ecology*. 94:1636-1646.

Byrnes, J.E., Stachowicz, J.J., Hultgren, K.M., Hughes, A.R., Olyarnik, S.V., Thornber, C. 2006. Predator Diversity Enhances Trophic Cascades in Kelp Forests by Modifying Herbivore Behavior. *Ecology Letters*. 9: 61-71.

SYNERGISTIC ACTIVITIES

Coordinator for the international Kelp Ecosystem Ecology Network. http://kelpecosystems.org

Contributing Developer to *lavaan*, *sem*, and *semTools*- Libraries for the analysis of Structural Equation Models in R http://lavaan.org, https://github.com/simsem/semTools/wiki

Marshlife.org http://marshlife.org - A blog part of a MIT SeaGrant on salt marsh food web structure where researchers tell stories of life in the field and current advances in salt marsh research.

Global Impacts of Climate Change on Kelp Forests. Leader, National Center for Ecological Analysis and Synthesis working group.

SciFund Challenge, co-founder and board president. SciFund Challenge is a nonprofit organization that empowers scientists to shrink the gap between science and society. We train scientists how to connect to the public, back scientists in their outreach, and crowdfund to support research.

Current

Byrnes, Jarrett PI
National Aeronautics and Space Administration (NASA)
Using Citizen Science to Understand Thirty Years of Change in global kelp Cover by Expanding the Zooniverse to NASA Satellite Imagery
1/15/2017-2/28/2022
$910,628

Byrnes, Jarrett Pi
Mass Biological Labs (MBL) LTER NSF
LTER-Plum Island Ecosystems: Dynamics of Coastal Ecosystems in a Region of Rapid Climate Change, Sea-Level Rise, and Human Impacts
10/01/2016-9/30/2022
$363,520

Byrnes, Jarrett Pi
MPH Foundation
Support of Graduate Student Coastal Ecological Research
10/01/2017-10/21/2019
$21,000

Pending
Byrnes, Jarrett PI
MassBays Estuaries Grant ENV 18 CZM 05
Evaluating the Health of Boston Harbor Rocky Reefs in the Face of Changing Oceans
04/23/18 – 09/30/19
$27,450

OFFICE OF RESEARCH & SPONSORED PROGRAMS

100 Morrissey Boulevard
Boston, MA 02125-3393
Phone: 617.287.5370
Fax: 617.287.5396

February 22, 2018

Prassede Vella
Massachusetts Bays National Estuary Program
251 Causeway St., Suite 800
Boston, MA 02114

Dear Ms. Vella,

This letter is to acknowledge that the University of Massachusetts Boston commits to match 25% of the total project cost for the proposal submitted by Jarrett Byrnes entitled "Evaluating the Health of Boston Harbor Rocky Reefs in the Face of Changing Oceans." These matching funds, in the amount of $6,826 have been approved.

This letter also serves to acknowledge that funding of this proposal will be on a reimbursement basis. Should you have questions administrative questions, please contact Heather Carey, Sr. Grants and Contracts Administrator, heather_carey@umb.edu 617-287-3956.

Sincerely,

Shala Bonyun
Assistant Director, Office of Research and Sponsored Programs

Internal Revenue Service

Date: November 2, 2004

University Of Massachusetts
% Office Of The Treasurer
100 Venture Way 2nd Flr.
Hadley, MA 01035-9684

Department of the Treasury
P. O. Box 2508
Cincinnati, OH 45201

Person to Contact:
Michelle Jones 31-07675
Customer Service Specialist
Toll Free Telephone Number:
8:00 a.m. to 6:30 p.m. EST
877-829-5500
Fax Number:
513-263-3756
Federal Identification Number:
04-3167352

Dear Sir or Madam:

This is in response to your request of November 2, 2004, regarding your organization's federal tax status.

Our records indicate that your organization may be a governmental instrumentality or a political subdivision of a state.

No provision of the Internal Revenue Code imposes a tax on the income of governmental units (such as states and their political subdivisions). Therefore, it has been the position of the Service that income of governmental units is not generally subject to federal income taxation. If, however, an entity is not itself a governmental unit (or an "integral part" thereof), its income will be subject to tax unless an exclusion or exemption applies.

One exclusion is provided by section 115(1) of the Code, which excludes from gross income:

> "...income derived from ... the exercise of any essential governmental function and accruing to a State or any political subdivision thereof ..."

Your organization's income may not be subject to tax, either because the organization is a governmental unit (or an "integral part" thereof), or because the income is excluded under section 115. In addition, your organization may also be eligible to receive charitable contributions, which are deductible for federal income, estate, and gift tax purposes. Also, your organization is probably exempt from many federal excise taxes.

Your organization may obtain a letter ruling on its status under section 115 by following the procedures specified in Rev. Proc. 2002-1 or its successor.

Your organization may also qualify for exemption from federal income tax as an organization described in section 501(c)(3) of the Code. If the organization is an entity separate from the state, county, or municipal government, and if it does not have powers or purposes inconsistent with exemption (such as the power to tax or to exercise enforcement of regulatory powers), your organization would qualify under section 501(c)(3). To apply for exemption, complete Form 1023 and pay the required user fee.

University Of Massachusetts
04-3167352

Sometimes governmental units are asked to provide proof of their status as part of a grant application. If your organization is applying for a grant from a private foundation, the foundation may be requesting certain information from your organization because of the restrictions imposed by the Code on such foundations. One such restriction imposes a tax on private foundations that make any "taxable expenditures." Under section 4945(d) and (h) of the Code, "taxable expenditures" include (1) any grant to an organization (unless excepted), unless the foundation exercises "expenditure responsibility" with respect to the grant; and (2) any expenditure for non-charitable purposes. Under section 4942 of the Code, private foundations must also distribute certain amounts for charitable purposes each year--"qualifying distributions"--or incur a tax on the undistributed amount. "Qualifying distributions" include certain amounts paid to accomplish charitable purposes.

Private foundation grants to governmental units for public or charitable purposes are not taxable expenditures under these provisions, regardless of whether the foundation exercises "expenditure responsibility." Under section 53.4945-5(a)(4)(ii) of the Foundation and Similar Excise Tax Regulations, expenditure responsibility is not required for grants for charitable purposes to governmental units (as defined in section 170(c)(1) of the code). Similarly, grants to governmental units for public purposes are "qualifying distributions", under section 53.4942(a)-3(a) of the regulations; and, if they are for charitable purposes, will not be taxable expenditures, under section 53.4945-6(a) of the regulations. Most grants to governmental units will qualify as being for charitable (as well as public) purposes.

Because of these restrictions, some private foundations require grant applicants to submit a letter from the Service determining them to be exempt under section 501(c)(3) and classified as a non-private foundation. Such a letter, or an underlying requirement that a grantee be a public charity, is not legally required to be relieved from the restrictions described above, when the prospective grantee is a governmental unit and the grant is for qualifying (public or charitable) purposes.

We believe this general information will be of assistance to your organization. This letter, however, is not a ruling and may not be relied on as such. If you have any questions, please call us at the telephone number shown in the heading of this letter.

Sincerely,

Janna K. Skufca, Director, TE/GE
Customer Account Services